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Schizophrenia and Other Psychotic Disorders in Older Adults

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Synonyms

Psychosis

Definition

Schizophrenia and Other Psychotic Disorders: Psychiatric disorders involving poor understanding or breakdown of reality due to delusions and/or hallucinations.

Introduction

Schizophrenia and other psychotic disorders are commonly characterized by positive symptoms (i.e., delusions and hallucinations) and less so by negative symptoms (i.e., flat affect, anhedonia, and poverty of speech). These disorders are believed to be one of the most severe types of mental illness with significant health-care and economic burdens around the world. In particular, schizophrenia has been labeled as the eighth leading cause of disability in the world (Lopez and Murray 1998). In addition, the annual total costs (including health care, unemployment, and disability needs) associated with schizophrenia in the United States has been estimated to be more than $62 billion (Wu et al. 2005).

Psychotic symptom severity does not necessarily worsen with age in late-life schizophrenic and psychotic disorders. In fact, there is evidence from several review articles of longitudinal studies that psychotic severity, especially positive symptoms, improves in old age compared with younger age (Berry and Barrowclough 2009). For instance, Cohen found that older patients with schizophrenia have a lower rate of auditory hallucinations compared to younger patients with schizophrenia (Cohen 1995). Moreover, Jeste reported that aging was related to a decrease in psychopathology, even after controlling for chronicity (Jeste et al. 2003).

This encyclopedia entry covers schizophrenia and psychotic disorders in aging and will describe clinical and treatment information and issues that are specific to older adults with these serious mental illnesses.

Prevalence

There is some evidence that the prevalence of schizophrenia and psychotic disorders is lower in older adult populations versus younger adults. In the United States, the National Institute of

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Mental Health reported that the 12-month prevalence rate of schizophrenia only is 1.1% for the adult age population (National Institute of Mental Health 2011). In comparison, Meesters and colleagues reported that the prevalence of all psychotic disorders in persons aged 60 years and older was 0.71%, specifically 0.55% for schizophrenia, 0.14% for schizoaffective disorder, and 0.03% for delusional disorder (Meesters et al. 2012). In another study of 894 older adults aged 70–82 years, they found that the 1-year prevalence of any psychotic symptoms is 0.9% for those aged 70 years and 1.2% among those aged 78–82 years (Sigström et al. 2009). Notably, these rates are higher in the latter study because they measured psychotic symptoms rather than a clinical diagnosis of schizophrenia.

Late Onset of Schizophrenia

Although it has been estimated that about 85% of older patients were diagnosed before the age of 45 years, there is significant attention and research that focus on late-onset schizophrenia (Cohen 1995; Jeste et al. 2003). Howard et al. wrote a summary about late-onset schizophrenia based on a literature review of related research studies and a meeting by members of the International Late-Onset Schizophrenia Group (Howard et al. 2000). The group reported that about 15% of individuals with schizophrenia have their first psychotic episode after age 40. In late onset, the prevalence is higher in women than in men. They also concluded that symptoms, especially positive symptoms, were similar in early onset (before age 40) versus late onset. But when compared to very late onset (onset after age 60), there was evidence that the very late-onset groups had higher rates of visual hallucinations and lower rates of thought disorder and affective blunting.

The International Late-Onset Schizophrenia Group also concluded that late-onset schizophrenia has somewhat better prognosis compared to early onset (Howard et al. 2000). For instance, persons with late-onset schizophrenia compared to early-onset schizophrenia had less impaired occupational and psychosocial functioning. They also had better premorbid educational functioning. Nevertheless, late-onset individuals with schizophrenia also often seem to have premorbid schizoid or paranoid personality traits. Cognitively, they have poorer performance in some measures of learning, motor skills, verbal ability, and executive functioning. For the very late-onset patients (onset after 60 years old), the cognitive impairments are more global but not to the same degree as patients with dementia as learning capacity is still not impaired (Howard et al. 2000).

The International Late-Onset Schizophrenia Group also agreed that those with late onset require lower dose amounts of antipsychotics compared to patients with early-onset illness (Howard et al. 2000). Specifically, they concluded that late-onset patients will respond to dose amounts that are about 25–50% of the usual dose for early-onset patients. For the very late-onset patients, they may effectively respond to dosage amounts as low as 10% of the usual dose for early-onset patients (Howard et al. 2000).

Psychotic Disorders Due To Other Conditions: Dementia

In older adults, psychotic problems can occur secondarily to other conditions such as dementia, now called neurocognitive disorders in the *Diagnostic and Statistical Manual of Mental Disorders 5th Edition* (American Psychiatric Association 2013). In a review of 55 studies by Ropacki and Jeste, they found that psychotic symptoms were reported in 41% of patients with Alzheimer's disease (AD; mean age = 75, range = 68.8–84.6) (Ropacki and Jeste 2005). Specially, 36% of the AD patients experienced delusions and 18% experienced hallucinations. Delusions are more prevalent in the moderate stages (compared to mild stages) of dementia, suggesting that a certain level of neurophysiological functioning and neuroanatomical presence is needed to have delusions. They found that in the first 3 years of the psychotic episode, the incidence of psychosis increased and then plateaued after 3 years. In these patients, the duration of the psychosis varied greatly across patients. However, in their review of the literature, they suggest that

psychotic symptoms seem to persist about several months and rarely extend beyond a year (Ropacki and Jeste 2005).

As for risk factors, Ropaki and Jeste found only weak or mixed evidence of the associations of gender, education, and family history of dementia or psychiatric disorders with psychosis (Ropacki and Jeste 2005). As for the factor of age, whether it be patient's age, age of onset, or chronicity, these age-related factors were also mixed. They found several studies that successfully reported and several others that have failed to find these age effects with the older samples of individuals with schizophrenia (Ropacki and Jeste 2005).

But the authors did mention significant ethnic differences and reported research that found that African Americans with Alzheimer's disease were more likely to experience psychotic symptoms compared to Caucasians (Ropacki and Jeste 2005). They also suggested that incidence of psychosis was related to a faster decline in cognition. Particularly, hallucinations, but not delusions, seem to be associated with accelerated cognitive decline in dementia patients.

Remission in Older Adults

Remission can be defined as having little or no psychotic symptoms. Many cross-sectional studies have indicated that there is a higher remission rate in older versus younger adults with schizophrenia. For instance, in 2008, the Schizophrenia Group found that 49% of community-dwelling patients with schizophrenia who developed it before age 45 were in remission among a sample of 198 persons aged 55 years and older (Bankole et al. 2008). Meester et al. found a lower remission rate of 29.4% in adults with schizophrenia with a mean age of 68 years old (Meesters et al. 2011). In this study, both positive symptoms (81.9% of patients) and, to a lesser extent, negative symptoms (57.2% of patients) explained non-remission rates in their sample. Remission was also found to be higher in individuals with schizoaffective disorder (47.8%), compared with individuals with schizophrenia (24.4%) (Meesters et al. 2011).

Mortality Rates

Individuals with schizophrenia have a higher mortality rate than the general population due to a number of contributing factors (Saha et al. 2007). A review of 37 mortalities in schizophrenia studies by Saha, Chant, and McGrath found that the increased rate of death was 2.5 times higher for persons with schizophrenia compared to the general population (Saha et al. 2007). In another study conducted in Finland that examined 66,881 people with schizophrenia, those with schizophrenia were dying on average 25 years earlier than the general Finland population (Tiihonen et al. 2009). Factors impacting mortality in schizophrenia include high rates of suicide, complications secondary to low socioeconomic status, high-risk behaviors, and somatic conditions increasingly caused by the negative effects of second-generation antipsychotic medications (Saha et al. 2007; Tiihonen et al. 2009). Weight gain and metabolic syndrome are also becoming more prominent in the population with schizophrenia leading to higher rates of cardiovascular mortality for this population (Saha et al. 2007). Furthermore, adults with schizophrenia have been reported to exhibit signs of physical aging at an increased rate in comparison to the general population (Jeste et al. 2003).

Research has shown however that long-term antipsychotic medication use leads to overall lower mortality rates in patients with schizophrenia when compared to unmedicated individuals with chronic schizophrenia (Tiihonen et al. 2009). With the exception of some specific second-generation antipsychotics, these medications have been shown to have positive effects on life expectancy, especially when the patient exhibits treatment compliance (Tiihonen et al. 2009). One medication in particular, clozapine, contributed to lower rates of suicide mortality and the possibility of individuals leading a healthier lifestyle to combat the negative cardiometabolic effects of antipsychotic medication (Tiihonen et al. 2009). Though there are drawbacks to the use of clozapine (e.g., frequent blood level monitoring), study results indicating the positive effects on the life span of individuals

with schizophrenia indicate that it should be considered as a first-line treatment (Tiihonen et al. 2009).

Neurobiology and Cognition

There are relatively few studies that have examined brain structures in older adults with schizophrenia. Frisoni et al. mentioned that previous studies have found various brain abnormalities such as cortical and subcortical volume reduction (Frisoni et al. 2009). It is uncertain how much of these reductions were due to schizophrenia per se versus long-term use of antipsychotic medications or possible comorbid neurcognitive disorders such as Alzheimer's disease. In their review, they describe mixed finding in MRI studies. Some have found significant reductions in brain volume such as in the hippocampus and amygdala in older adults with schizophrenia; others have found no differences, such as one study that compared 45–87-year-old patients with early- versus late-onset schizophrenia compared with healthy controls (Frisoni et al. 2009). Frisoni and colleagues conducted an MRI study of geriatric patients with schizophrenia, Alzheimer's patients, and healthy older adults (Frisoni et al. 2009). They found that the older adults with schizophrenia have 10% less left cortical gray matter volume and 11% less right cortical gray matter volume compared with healthy controls. In contrast the healthy controls were 7% higher in left gray matter volume and 5% higher in right gray matter volume compared with the Alzheimer's disease patients. Furthermore, in a sample of individuals with schizophrenia compared with the healthy controls, other regions with significantly less brain volume included the cingulate gyrus and orbitofrontal cortex. Interestingly, the volumes of these brain areas were not statistically different between the persons with schizophrenia or Alzheimer's disease.

In a more recent study by Prestia et al., older individuals with schizophrenia were compared to older healthy adults (Prestia et al. 2015). These older adults with schizophrenia had significantly smaller left and right hippocampus and amygdala as well as tissue loss in specific connections with the frontal cortical and limbic structures. Volumes of the hippocampus and the amygdala were positively correlated with the severity of negative psychotic symptoms but not with positive symptoms. For cognitive correlates with brain structures, only one measure of executive functioning and language reproduction (i.e., verbal fluency) was positively associated with the left hippocampus volume. There were no significant correlations between volume of these brain structures with any other measures of cognition, specifically learning and memory, language, constructional abilities, and executive functioning.

Multiple studies have shown that general intelligence is about 5–10 IQ points lower in persons with schizophrenia than comparison samples (Jeste et al. 2011). It is unclear if this cognitive deficit is a prodromal indication of the disorder's neuropathology or if it is a risk factor for developing severe mental illness; however, research has illustrated cognitive deficits in persons with schizophrenia as earlier as the first grade (Palmer et al. 2009). In adulthood, cognitive functioning has been found to be lower in individuals with schizophrenia in several cognitive domains such as learning and memory, attention, psychomotor skills, and executive functioning compared to healthy controls (Berry and Barrowclough 2009). Interestingly, psychotic symptom severity seemed to be independent of degree of cognitive impairment (Berry and Barrowclough 2009). There is evidence of stability in young and middle-aged adulthood (Friedman et al. 2001). In a 6-year follow-up of cognitive functioning of adults with schizophrenia, they found that cognitive decline was limited to those over age 65 (Friedman et al. 2001).

With these cognitive deficits especially in old age, some research hypothesize that diagnosis of psychotic disorders may increase the risk of dementia. In a study by Harvey and colleagues, cognitive decline and conversion to dementia rates were greater for elderly patients with schizophrenia who spent a majority of their lives institutionalized compared to the general population (Harvey et al. 1999). However, up to 90% of older patients with schizophrenia live in the community.

Though these individuals tend to illustrate mild cognitive impairment throughout their lives, studies have found that the rate of cognitive aging in these patients appears to be comparable to individuals without schizophrenia (Jeste et al. 2011). In other words, these community-dwelling patients with schizophrenia exhibited similar age-expected cognitive decline across neurocognitive domains as the general aging population (Jeste et al. 2011). Perhaps then the risk of dementia in this population is very severe psychopathology that results in institutionalization early in life.

Psychosocial Functioning and Quality of Life

Subjective quality of life is a self-report measure used with persons with schizophrenia to assess overall well-being and satisfaction with life (Meesters et al. 2013). Though positive and negative psychotic symptoms greatly impact a person with schizophrenia's life, it has been shown that general psychopathology such as depression and anxiety have a more significant impact on subjective quality of life, especially in older individuals (Eack and Newhill 2007). Additionally, social cognition factors such as theory of mind largely contribute to an individual's assessment of his or her quality of life, as well as psychosocial factors (Meesters et al. 2013). Elderly patients with schizophrenia are likely to have less impaired psychosocial functioning compared to younger patients (Berry and Barrowclough 2009). This is likely due to successfully managing their symptoms in old age that in turn contributes to the overall higher quality of life rating within this subset of the population of individuals with schizophrenia (Meesters et al. 2013). Still, Berry et al. reported that several studies have found that older adults with schizophrenia compared to same-aged controls were still impaired in "communication, transportation, finance, engagement in activities, forming friendships, looking after the home and shopping" (p. 70) (Berry and Barrowclough 2009). They also reported a similar study of patients with schizophrenic and schizoaffective disorders over the age of 45 years old who have greater global functional impairment compared to bipolar patients (Berry and Barrowclough 2009).

Research has shown that social cognition has the most significant impact on quality of life for individuals with schizophrenia (Tolman and Kurtz 2012). Furthermore, the domain of theory of mind within social cognition has been shown as more influential to an individual's quality of life than emotion perception (Tolman and Kurtz 2012). Impaired theory of mind negatively impacts quality of life as well as intact theory of mind for a more severely ill patient (Tolman and Kurtz 2012). This influence of theory of mind is in contrast to healthy controls and siblings of people with schizophrenia where neurocognitive factors serve as better predictors for quality of life (Tolman and Kurtz 2012). A patient's ability to perceive his or her impact on the surrounding environment and interpersonal interactions is more likely to improve the individual's quality of life in comparison to simply identifying emotional cues displayed by others (Tolman and Kurtz 2012).

Individuals with schizophrenia have exhibited deficits in community functioning such as obtaining and maintaining employment and living in the community independently (Berry and Barrowclough 2009). These deficits are strongly tied to neurocognitive deficits and continued decline throughout aging (Tolman and Kurtz 2012). Interestingly, a recent study on neuropsychological predictors of objective and subjective quality of life suggests that lower neurocognitive functioning may serve as a protective factor in life satisfaction to some extent in that patients with schizophrenia who also have stronger cognitive abilities report lower satisfaction of life due to increase insight into their level of disability and severe illness (Tolman and Kurtz 2012).

As a person with schizophrenia ages, they are likely to see an improvement in psychosocial functioning due to reduced symptoms and fewer subsequent hospitalizations as well as a better understanding of how to manage the disorder (Jeste et al. 2011). They are likely to subjectively rate their quality of life as better than younger or

middle-aged patients with schizophrenia due to acquiring numerous coping skills and construction of adequate social support to improve overall functionality (Jeste et al. 2011). More specifically, structural changes in the brains of elderly schizophrenia patients have been shown as well as normal age-related reduction in activity of the monoaminergic system that can assist in decreasing positive psychotic symptoms (Jeste et al. 2011). Additional contributing factors to improve quality of life and psychosocial functioning in elderly patients include reduced substance use behaviors, increased medication compliance, and longer exposure to psychotherapeutic interventions (Jeste et al. 2011).

Treatment

For schizophrenia and other psychotic disorders, the typical treatment especially if the psychotic symptoms are significantly impairing their daily functioning is antipsychotic medications. Specifically, typical (i.e., first generation such as haloperidol, chlorpromazine, molindone) and atypical (i.e., second generation such as olanzapine, risperidone, and clozapine) antipsychotics have been used to successfully treat positive psychotic symptoms. In general, this remains to be true for older patients with schizophrenia, but specific treatment guidelines must include aging considerations for this patient population.

There is relatively sparse research conducted on the effectiveness of antipsychotic medications in older adults. The studies that currently exist have reported somewhat mixed findings. In one study that examined the efficacy and safety of clozapine in 45 older adults with schizophrenia who were treatment resistant, they found that the medication was well tolerated and was not discontinued by any patient and that the rates for rehospitalization were lower with this medication than when they were on other medications in a 5-year comparison period (Pridan et al. 2015). However, in a 2-year longitudinal study reported by Jeste and colleagues, four different second-generation medications, namely, aripiprazole, olanzapine, quetiapine, and risperidone, were examined in 332 middle-aged and older adult outpatients. No significant improvements in psychiatric symptoms were detected (Jeste and Maglione 2013).

In comparison to younger adult patients, older adults with schizophrenia are at higher risk of the pharmacological side effects of first-generation antipsychotic medications that include Parkinson-like symptoms, falls, and metabolic problems (Jeste and Maglione 2013). These side effects have been found to be as high as 60% in older patients with schizophrenia compared to only 19% for younger patients. This is likely due to the effects of aging that include slower metabolism and greater receptor sensitivity (Berry and Barrowclough 2009). In the 2-year longitudinal study by Jeste and colleagues that examined four atypical antipsychotic medications in middle-aged and older adults, the rates of significant side effects were 50% for nonserious side effects and 23.7% for serious side effects, including 36% incidence of metabolic syndrome (Jeste and Maglione 2013).

Another factor that strongly affects the success of medications is adherence. Unfortunately, similar to younger patients, adherence rates to medications have been found to be poor in older outpatients with schizophrenia. In the same longitudinal study by Jeste and colleagues, more than 50% of the patients discontinued these second-generation (atypical) medications within 6 months (Jeste and Maglione 2013). This is likely due to the relatively high rates of side effects that were reported in their sample.

As for non-medication treatments, psychosocial as well as cognitive interventions have been found to be helpful for older psychotic patients. For example, Jeste and colleagues described a randomized controlled study conducted by Patterson et al. in 2006 that used a manualized treatment called functional adaptation skills training (FAST) in 240 middle-aged and older psychotic adults over a 24-week (session of 2 h per week) treatment period (Jeste and Maglione 2013). This treatment focused on six areas of daily living functioning including: (1) medication management, (2) social skills, (3) communication skills, (4) organization and planning,

(5) transportation, and (6) financial management. They found significant improvements in social and communication skills but no significant improvement in psychotic symptom severity, depression, or quality of well-being (Jeste and Maglione 2013).

In a more recent study of cognitive-behavioral and social skills training (CBSST) treatment, Granholm et al. conducted a randomized control study of 79 older adults with schizophrenia (Granholm et al. 2013). These researchers found that the CBSST significantly improved life satisfaction, motivation, and self-esteem and lowered symptom distress. Encouragingly, retention rates have been found to be as high as 86% in completing psychotherapy interventions as well as that mean attendance (of sessions) rate to be 92% (Berry and Barrowclough 2009).

In sum, the research is somewhat mixed in the benefits of antipsychotic medications in older adults especially when compared to the costs of these medications and their potential long-term side effects. Randomized controlled trials need to be made in this area to get a clearer understanding of the positive and negative effects of antipsychotic medications on older adults with psychotic disorders. Nevertheless, the use of antipsychotics is still generally the first line of defense for psychotic disorders for older adults. According to Jeste and Maglione, the generally accepted protocol for antipsychotic medication is recommended to be a lower initial dose (25–50% lower compared to young adults with schizophrenia) with slow increase in dosage depending on tolerance of side effects and treatment response (i.e., the significant reduction of psychotic symptoms). As for psychosocial and cognitive treatment studies, encouraging results have been found. This is not to suggest that these treatments are better than medication. Rather, in addition to medication, these treatments can significantly improve the quality of life of these older patients.

Conclusion and Future Directions

As the numbers of geriatric patients with schizophrenia and other psychotic disorders increase in the United States and all over the world, there is an increased need for continued research in the understanding and treatment of late-life schizophrenia. This entry suggests that while there are many commonalities between younger and older adults with schizophrenia, the differences both qualitatively and quantitatively between these age groups point to the importance of research and clinical investment for geriatric patients with schizophrenia. For these vulnerable groups of patients, they have characteristics of double jeopardy due to old age and severe mental illness. Therefore, more clinical research still needs to be done for tailored and multidisciplinary assessment and treatment of geriatric schizophrenia and psychotic disorders to aid in patient treatment management, reduce economic and family/caregiver burden, and ultimately improve quality of life for these patients.

Cross-References

- ▶ Bipolar Disorder in Later Life
- ▶ Depression in Later Life
- ▶ Depression and Cognition

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Second Generation Socioemotional Selectivity Theories

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Synonyms

Emotion and aging; Emotion regulation; Emotional well-being; Socioemotional functioning

Definition

Socioemotional selectivity theory has been informing much of the research on emotion and aging for the past 25 years. The theory describes how aging is related to increased importance placed on emotional goals. In the past decade, researchers have developed new theory based on socioemotional selectivity theory, targeting specific aspects of emotional experience. These theories focus on both cognitive aspects involved in processing emotional information (cognitive control hypothesis; positivity effect) and emotion regulation strategies (strength and vulnerability integration).

Socioemotional selectivity theory describes how people's thoughts and behavior change with age as a function of their temporal perspective. According to the theory, as temporal perspective – or how much time people perceive is left in their lives – grows increasingly shorter, people will place more value and importance on emotional goals (refer to the entry on socioemotional selectivity theory for a more expansive description). The importance placed on emotional goals will guide social partner preferences; change how people attend to, appraise, and remember emotional and nonemotional information; and influence emotion regulation strategies and emotional well-being. The wide-ranging applications of socioemotional selectivity theory on social, emotional, health-related, and cognitive processes have been discussed for years (Carstensen et al. 1999). In fact, the continued applications of this theory into new areas of research has resulted in three second-generation theoretical models that articulate age differences observed in specific areas of cognitive and emotional functioning. They include the positivity effect, the cognitive control hypothesis, and strength and vulnerability integration (SAVI).

Positivity Effect

Socioemotional selectivity theory posits that when perceived time left in the life span is limited, as is normative for older adults and not younger adults, saliency of emotional information increases over nonemotional information. In an early test of the theory, people read a short passage from novel that included both nonemotional and emotional content; then, less than an hour later, participants were asked to recall the contents of this passage in an incidental memory paradigm (Carstensen and Turk-Charles 1994). Results indicated that each successively older age group recalled a greater proportion of emotional to nonemotional material. This increased saliency of emotional information was also examined in later studies, but importantly, Laura Carstensen and her colleagues examined the importance of the valence in these recollections. When recalling events from participants' lives, for example, the autobiographical memories of older adults were more positive than those of younger adults (Kennedy et al. 2004). When either recalling or recognizing positive, negative, and neutral images that they had previously viewed, older age was related to recalling a greater proportion of positive images relative to negative images; younger age, in contrast, was associated with recognizing and recalling relatively more negative to positive and neutral images (Charles et al. 2003). Likewise, another study in Carstensen's lab studied age difference in attention for positive, negative, and neutral stimuli (Mather and Carstensen 2003). The researchers found that older adults focused their attention on the more positive (when presented with positive and neutral faces) and less negative (when presented with negative and neutral faces) facial stimuli. Younger adults, in contrast, were more likely to focus their attention on more negative faces.

Carstensen and her colleagues termed this cognitive phenomenon the positivity effect, whereby older age is associated with attentional and memory performances that favor more positive, or less negative, information (Carstensen and Mikels 2005; Carstensen et al. 2006). Since publication of the first studies and theoretical papers where the term was first presented, more than 100 studies from multiple laboratories have studied the positivity effect, replicating the important finding – when examining positive compared to neutral stimuli, when comparing negative stimuli versus neutral stimuli, or when comparing cognitive processes in relation to all three valences (positive, negative, and

neutral) together in a study (Reed and Carstensen 2012). Furthermore, a recent meta-analysis examined the conditions under which the positivity effect is likely to be observed in empirical studies (Reed et al. 2014). These conditions included: (1) providing participants with no explicit instructions regarding how to examine the information and (2) studying groups of people that spanned a wide age range. The reasoning behind the first effect is explained by socioemotional selectivity. With no explicit instructions, people process information using their own goals. Older adults, who increasingly prioritize emotional goals, will thereby attend to emotional material more than nonemotional material relative to their younger counterparts. If, however, researchers ask older adults to instead prioritize accuracy or another goal, the performance of older adults will reflect this current goal request, and not their own preferences.

The second aspect is related to socioemotional selectivity theory's position that the age-related change in time perspective is linear and gradual across a normative, long, life span. As a result, age-related changes are very small and will best be detected when comparing across a long age range, or when comparing between groups who vary in age to a great extent.

Cognitive Control Hypothesis

Socioemotional selectivity theory posits that time perspective shapes motivational goals, which in turn shape emotional experiences. Other theories, however, have proposed different factors responsible for age differences in emotional experiences. For example, dynamic integration theory discusses how older age is generally related to declines in the cognitive ability to process complex emotional information (Labouvie-Vief 2003). This theory further contends that positive information is less complex and therefore easier to process than negative information. As a result, dynamic integration theory posits that older adults will compensate for this loss in ability by distorting information in a positively biased direction and by appraising the world in a simpler, yet more positive, manner. The more recently proposed aging-brain model also takes a loss-based approach, stating that older adults are focusing on and remembering positive information over negative information as a result of age-related declines in the amygdala, which differentially affects attention to negative information more so than positive information (Cacioppo et al. 2011).

In contrast to the loss-based explanations, the cognitive control hypothesis states that high-functioning cognitive control is necessary for older adults to act upon and achieve their emotional goals. Thus, people with the highest levels of executive control will be most successful in their emotional goal pursuits as importance increases with age (Kryla-Lighthall and Mather 2009). Researchers tested this hypothesis by examining the positivity effect for older and younger adults who varied on measures of cognitive control and by examining how performance was affected when people were engaged in a divided attention task, which limits cognitive resources for the emotional task at hand (Mather and Knight 2005; Knight et al. 2007). Results indicated that when dividing the group into high and low performers on the executive control tasks, older adults who scored highest were the ones who displayed the positivity effect, whereas younger adults showed a bias toward negative information regardless of their cognitive performance (Mather and Knight 2005). Older adults who scored low on the executive functioning task remembered more negative than positive or neutral information, showing the same pattern as the younger adults. In addition, when older adults were distracted in studies using divided attention paradigms, they no longer displayed the positivity effect and instead showed biases toward negative information (Mather and Knight 2005; Knight et al. 2007). These studies showed that the positivity effect was not the result of low cognitive functioning, as the loss-models presumed, since lower executive functioning leads to increased negativity. In addition, other studies also showed that superior cognitive performance was required for emotional material to that for nonemotional material (e.g., Mikels et al. 2005). For example, one study confirmed the usual association between older age and worse working memory performance only for nonemotional visual images, but no age differences

were present for visual images with emotional content (Mikels et al. 2005). Moreover, older adults had better performance for positive over negative visual information, whereas younger adults showed the reverse pattern. These findings further support socioemotional selectivity theory, and the cognitive control hypothesis, by showing that older adults invest their cognitive resources in the activities most important to them: those aligned with emotional goals.

The cognitive control hypothesis, then, bolsters SST in two ways: first, the hypothesis has generated findings showing that older adults prioritize emotional goals such that they expend cognitive efforts to display the positivity effect. Thus, the positivity effect is the result of older adults' active goal strivings and not a byproduct of a process over which older adults had no active control, such as a failure to inhibit emotional stimuli. In addition, the findings directly contradict researchers who posit that the positivity effect is the byproduct of cognitive decline.

Strength and Vulnerability Integration (SAVI)

SAVI is the most recent theoretical model developed from SST (for a complete description, see the section on strength and vulnerability integration). Most of the research motivated by socioemotional selectivity theory has demonstrated age-related gains in processing emotional information and in levels of positive affective experience. In addition to the previously recognized strengths of aging, SAVI incorporates age-related decline and focuses on the boundary conditions of age-related increases in functioning (Charles and Piazza 2009; Charles 2010). SAVI examines when older adults are able to focus on and achieve their emotional goals (as have many studies of socioemotional selectivity theory), but adds an emphasis to the situations when older adults are no longer able to maintain high levels of control in sustaining emotional well-being.

SAVI incorporates socioemotional selectivity theory to explain why older adults increasingly focus on and prioritize emotion-related goals and why, as a result, they are motivated to seek positive emotional experiences and avoid situations that elicit negative distress. Socioemotional selectivity theory, as its name implies, emphasizes selectivity, such that older adults strategically select the situations and environments that promote emotional well-being. This is strength of aging, garnered from time perspective, as described by socioemotional selectivity theory, and also by life experiences and time lived, which provide older adults with information about the situations, social relationships, and experiences that are the most beneficial to their emotional well-being. These strengths promote successful emotion regulation and explain why, in large groups of adults spanning a wide age range, affective well-being shows similar levels if not higher levels among the older adults in the sample.

When older adults cannot select their environments to maintain affective well-being, however, they experience distress. Because older adults' motivational goals are focused on avoiding negative affect, stressful situations are often less frequently experienced with age, even to the extent that healthy older adults in their 80s report fewer daily stressors than those in their 60s and 70s, for example (Charles et al. 2010). When a situation arises that elicits high levels of arousal, however, SAVI posits that the benefits of aging will be attenuated. At this point, age-related physiological vulnerabilities will make regulating high levels of arousal difficult. SAVI posits that the effects of physiological arousal will be harder to modulate in an older and more vulnerable system. In addition, the immediate situation will place demands on the system, similar to the divided attention task situations discussed above (Mather and Knight 2005). In such situations, the current physiological demands make it more difficult to use emotion regulation strategies such as positive appraisals, so age differences in affective reports will be attenuated and sometimes may even not be present in the midst of these distressing situations.

When people are immediately faced with a negative event, they lack the time to appraise the situation, and physiological demands on their system will need to be modulated. As time passes, people will use their appraisals and recall the

emotional experience; these appraisals and memories are posited to become more positive and less negative with age. As a result, age differences will be greatest for events that occurred farther away from the time they were assessed and less pronounced for emotional experiences that are closer to the time they occurred. One study, for example, found that older adults report lower levels of negative affect than younger adults when asked about emotions experienced across various time intervals, such as the current day or the past week (Charles et al. 2015); however, age differences were greater the longer the time recalled (across a month, for example, as opposed to a day).

Conclusion

All of these theoretical models originated from studies testing socioemotional selectivity theory. Each one – the positivity effect, the cognitive control hypothesis, and SAVI – incorporates the tenets of socioemotional selectivity theory to explain age differences in thoughts and behaviors. These second-generation theories narrow the focus of socioemotional selectivity theory to apply to specific cognitive processes (positivity effect), cognitive conditions necessary for the theory to work (cognitive control hypothesis), and context-specific conditions when emotion regulation benefits from strength and vulnerability integration (SAVI). As researchers apply socioemotional selectivity theory to increasingly diverse aspects of emotional experience, new information will arise, and new terms and theories to explain them. These theories optimally will serve as a guide for future research when investigating the mechanisms behind age differences in social and emotional experiences.

Cross-References

- ▶ Age-Related Positivity Effect and Its Implications for Social and Health Gerontology
- ▶ Aging and Psychological Well-Being
- ▶ Emotional Development in Old Age
- ▶ Mental Health and Aging
- ▶ Positive Emotion Processing, Theoretical Perspectives
- ▶ Psychosocial Well-Being
- ▶ Social Cognition and Aging
- ▶ Socioemotional Selectivity Theory
- ▶ Strength and Vulnerability Integration

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Selection, Optimization, and Compensation at Work in Relation to Age

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Synonyms

Action regulation; Goal setting; Life management strategy; Resource allocation

Definition

The model of selection, optimization, and compensation (SOC) encompasses three processes of action regulation in respect to successful aging and life-management: Selection refers to the setting and prioritization of goals, based on personal motives and preferences (elective selection) or due to perceived loss of internal or contextual resources (loss-based selection). Optimization involves the obtainment, improvement, and coordinated use of individual means to pursue important selected goals. Compensation involves the acquisition and application of alternative individual means or the utilization of external or technological aids to substitute lost means.

The Model of Selection, Optimization, and Compensation

Individual well-being and productivity across the lifespan depend largely on access to resources. In terms of the Conservation of Resources Theory (COR) resources can be considered as internal or external entities that are either valued in their own right (e.g., health) or as means to obtain valued ends (e.g., money) by most people within a given culture in a broad array of situations (Hobfoll 2002). An aging individual faces dwindling intra-individual resources (e.g., physical fitness, health, sensory abilities, and basic cognitive functions) that successively outweigh gains of resources (e.g., knowledge, experience, and social status) (Baltes 1997). In that vein, one of the most essential challenges for aging employees is to maintain well-being, functioning, and productivity over the work lifespan despite this relative loss of resources.

The model of selection, optimization, and compensation (SOC), introduced by Paul and Margret Baltes (Baltes and Baltes 1990), provides a theoretical framework to explain three fundamental action strategies that enable individuals to cope with resource losses and to conserve valuable resources throughout the lifespan (Hobfoll 2002). The SOC model suggests that every developmental process encompasses a combination of

three kinds of adaptive behaviors (Freund and Baltes 2002): Selection refers to the setting and prioritization of goals, based on personal motives and preferences (elective selection) or due to perceived loss of internal or contextual resources (loss-based selection). The SOC model suggests that successful personal development and life management requires a focus on specific goals – in contrast to allocating energy among multiple goals. Selection, therefore, guides and organizes individual behavior, directs personal development, and creates a feeling of purpose in one's life. Optimization involves the obtainment, improvement, and coordinated use of individual means to pursue important goals that were selected individually. Thus, optimization refers to the quality and also persistence of resource allocation. Compensation, like optimization, also refers to means. It specifically addresses the question of how aging individuals who face permanent or temporary loss of resources are still able to maintain a desired level of functioning. Compensation involves the acquisition and application of alternative individual means or the utilization of external or technological aids to substitute lost means.

In sum, the SOC model assumes that available resources can be used more efficiently when individuals focus on fewer, but important goals, pursue these goals in an optimized way, and by doing so, apply adequate compensatory means (Baltes 1997).

SOC at Work

The SOC model has stimulated research in various fields and has received broad empirical support (Riediger et al. 2006). In the last years, a growing number of studies applied the SOC model to the work context in order to explain organizational behavior and coping with age related changes in occupational contexts. The following questions and issues were investigated in particular:

The Association Between SOC at Work and Subjective Well-Being

Studies indicate that high utilization of SOC strategies is related to increased levels of well-being both in the work and in the family domain (Wiese et al. 2000), and better work-family balance (Baltes and Heydens-Gahir 2003; Young et al. 2007). Moreover, SOC appears to be related to job satisfaction (Schmitt et al. 2012), work engagement (Weigl et al. 2014), and positive expectations about future opportunities at work (Zacher and Frese 2011). In an extension of these cross-sectional findings, first longitudinal studies also demonstrated the prospective impact of SOC on subjective well-being (Wiese et al. 2002).

Beyond the assumption that SOC contributes to a more effective resource allocation and thus enhance personal functioning and well-being, there are complementary explanations for these positive effects of SOC on well-being. SOC can also be considered as a set of behavioral strategies that represent active coping (Dewe et al. 2010). Moreover, SOC is expected to promote goal disengagement and foster goal re-engagement. For instance, loss-based selection refers to the setting of new feasible goals to respond to disadvantageous internal or contextual changes. Thus, SOC might counteract mechanisms of inflexible and rigid organizations of action which might affect mental well-being (Fresco et al. 2006).

The Association Between SOC at Work and Job Performance

Investigations suggest that the use of SOC at work contributes to competency maintenance and job performance (Abraham and Hansson 1995; Yeung and Fung 2009). Moreover, the well-known positive effects of conscientiousness on job performance seem to partly operating through the use of SOC (Bajor and Baltes 2003). In the same vein, generalized optimization strategies appear to be indirectly – i.e., through specific strategies of career planning – linked with various indicators of career success such as increased pay, higher ranked job positions, and career satisfaction (Wiese et al. 2000). However, studies so far failed to demonstrate whether the use of SOC can also predict career success over time (Wiese et al. 2002).

In regard to the single SOC strategies, particularly selection strategies seem to be conductive for

performance (Abraham and Hansson 1995; Yeung and Fung 2009; Bajor and Baltes 2003). However, selection strategies were also shown to enhance the negative impact of burnout on the performance in secondary job tasks, and compensation seems to be most successful strategy in buffering the negative effects of burnout on performance (Demerouti et al. 2014). Thus, the strength and direction of the interrelation between single SOC strategies and performance might be affected by moderating factors as well as the specific performance-dimension under consideration.

The Association Between SOC at Work and Work Ability

A growing body of research particularly in the field of nursing and healthcare work demonstrates that SOC can explain efficient and adaptive resource allocation in terms of maintaining work ability, i.e., the perceived balance between the employees' resources and their job demands (Müller et al. 2012, 2013a; von Bonsdorff et al. 2014; Weigl et al. 2013). Representative findings in older employees in Germany indicate that this association is also true for professions outside of healthcare (Riedel et al. 2015). However, the effects of SOC on work ability seem to be considerably weaker compared to the effects of important job characteristics (Riedel et al. 2015). With respect to the single SOC strategies, optimization, and compensation strategies appear to be the most efficient strategies to maintain work ability (Riedel et al. 2015).

The Interaction Between SOC at Work and Work Characteristics

The application and the consequences of SOC at work are both dependent on the design and characteristics of the task as well of the work environment. It appears that SOC requires job autonomy (Weigl et al. 2013, 2014; Müller et al. 2012). Moreover, research indicates that SOC is related to supportive supervisory behavior (von Bonsdorff et al. 2014), as well as learning and developmental opportunities on the job (Weigl et al. 2014). These findings suggest that in organizations, the development and successful applications of individualized behaviors like SOC is dependent on sufficient control and latitudes to make own decisions, and requires joint agreements between the supervisor and the employee. In regard to work stressors, role conflicts and role ambiguity have shown to be positively related to selection and compensation strategies (Abraham and Hansson 1995). This indicates that employees apply SOC in response to unfavorable and stressful work conditions.

Beyond that, SOC is presumably intertwined with work characteristics. In other words, the use of SOC seems to reinforce or buffer the effects of work characteristics on individual outcomes. Comparably, work characteristics seem to reinforce or buffer the effects of SOC: Empirical findings indicate that SOC accentuate the positive effects of high job autonomy on work ability (Weigl et al. 2013; Riedel et al. 2015). Thus, taking advantage of SOC seems to add to the mere effects of job autonomy. In contrast, when job autonomy is low, the use of SOC might even have detrimental effects such that SOC can actually be counterproductive if the employee does not have the formal authority to use those (Weigl et al. 2013).

Despite interactions with job autonomy as an important contextual resource and situational enabler, SOC also seem to interact with unfavorable work characteristics: The use of SOC appears to support employees in managing more difficult tasks (Yeung and Fung 2009). Moreover in low-complexity jobs SOC appears to contribute to employees positive expectations about future opportunities at work (Zacher and Frese 2011). Finally, high use of SOC was shown to significantly buffer the relationship between problem solving demands and fatigue (Schmitt et al. 2012).

Studies also revealed that the single SOC strategies have a different effect when quantitative job demands are high, and even detrimental effects are conceivable (Riedel et al. 2015): Employees who apply selection strategies may be able to diminish negative effects of high quantitative job demands, whereas optimization has been shown to strengthen negative effects of high quantitative job demands, and conversely, optimization appeared to compensate for a lack of skill discretion. Thus, from a perspective of resource

allocation (Hobfoll 2002), under condition of high job demands the selection of specific tasks might prevent overload whereas optimization might even increase overload when complying with many job demands. On the other hand, the acquisition of resources through optimization might make up for a lack of environmental resources.

Effects of SOC at Work in Relation to Age and Health of Employees

SOC seems to be particularly effective for older employees (Abraham and Hansson 1995; Yeung and Fung 2009; Müller et al. 2013a; Weigl et al. 2013) which agrees with the assumption that SOC contributes to the more efficient allocation of personal resources. Moreover, SOC strategies turned out to be particularly effective for older employees under specific challenges: SOC seem to maximize the supportive effects of job autonomy particularly in older employees (Müller et al. 2012; Weigl et al. 2013). Again from a resource perspective, older employees may particularly benefit from high job autonomy because it provides opportunities either to balance out age-related losses that hamper the acquisition of SOC at work or to maximize age-related gains, like experience. Likewise, SOC at work was shown to be effective particularly among older employees in low-complexity jobs for focusing on future opportunities at work (Zacher and Frese 2011). However, in difficult task situations employment of SOC strategies seems to support older employees to increase momentary performance, but global performance was only supported by SOC in younger employees (Yeung and Fung 2009). The authors concluded that in the long run older employees might need other strategies than SOC to handle difficult tasks successfully. Accordingly, one recent study pointed to a stronger relationship between SOC and work ability in younger compared to older nurses (von Bonsdorff et al. 2014). These inconsistencies call for further investigations into the interplay of chronological age and SOC at work.

From a resources perspective, recent studies investigated whether the use of SOC contributes to reduce consequential losses of poor health. One study with older employees from 60 to 85 years indicated that high use of SOC buffered the effects of health status on the intention to remain employed (Müller et al. 2013b). In participants with low use of SOC, there was a weaker intention to remain employed when health status was poor, while this intention was stronger in case of a better health status. Concerning burnout, a prevalent state of diminished health, an investigation showed that compensation was the most effective SOC strategy in buffering the negative effects of burnout on performance, and selection strategies enhanced the negative impact of burnout on performance (Demerouti et al. 2014). Thus, developing and applying compensatory means might be an effective way of coping with limited resources and instrumental in order to maintain performance. Selection strategies potentially reduce the scope of activities into which employees invest their energy which might include detrimental effects (Demerouti et al. 2014).

Future Research Directions

The research on SOC at work has made substantial progress across the past years. Notwithstanding, several limitations in the current evidence base need to be addressed and overcome.

Future studies that explicitly incorporate specific work as well as individual characteristics are needed to further discover the complex interplay of SOC behaviors, individual, and contextual characteristics. Available evidence on the relationship between SOC at work and desirable individual outcomes are respectively based on very few studies. Therefore, replications are needed.

The vast majority of studies on SOC at work have a cross-sectional design which limits insights into cause and effect relationships. It is mainly assumed that the use of SOC at work predicts better well-being, performance, or work ability. Potentially, effects might also be existent in the opposite direction, because SOC is in the short term a resource-demanding strategy. Thus, employees with more personal resources, e.g., high well-being, might thus be able to apply more SOC. Moreover, the long-term effects of SOC at work are not known. SOC behaviors that

are advantageous in the short run might turn out detrimental in the long term (Yeung and Fung 2009). For example, a narrowed scope of selected goals might restrict further development and skill acquisition particularly in early career stages.

In cross-sectional designs a bias due to "healthy worker effects" cannot be ruled out. The existing findings on SOC at work may be valid for professionals with superior well-being because employees with poor health may have already withdrawn from the surveyed workplaces or the active workforce. Although there are first attempts to examine the interaction between health and SOC (Demerouti et al. 2014; Müller et al. 2013b), research is needed to investigate whether employees with poor health are capable to effectively apply SOC behaviors at work or whether SOC strategies work differently.

With one exception (Zacher et al. 2015), there is yet hardly any empirical support for the basic assumption of SOC theory, that the orchestrated use of the three SOC behaviors is the most beneficial strategy. Most of the existing research on SOC at work has either reported the aggregated effects of all three SOC behaviors or their individual effects respectively. Such analyses are not able to disentangle different combinations of SOC strategies and to provide insights into specific behavioral strategies that blend single SOC domains. As an example, the same average SOC score might represent a variety of combination of single SOC strategies, i.e., high selection, low optimization or compensation; or low selection, high optimization or compensation. Hence, the combinations represent totally different regulatory strategies in terms of directions and efforts to enhance or allocate resources. Thus, further investigations of meaningful combinations of SOC behaviors at work might be worthwhile.

Finally, applying self-directed behaviors such as SOC at work almost inevitably affects work procedures, distribution of tasks, responsibilities, and cooperation. As an example, selection behaviors like "delegating tasks to colleagues" or compensation efforts like "asking for help" might be associated with a higher workload for colleagues. Therefore, there is a need for research on the inherent "social aspect" of SOC at work to account for the complexity and interrelatedness of work systems. Future research might therefore develop designs to investigate the effective organization of SOC on the team level.

Conclusions and Implications for Practice

An increasing body of research demonstrates that using SOC at work is on average a promising strategy to maintain well-being, performance, and work ability. These effects refer – not exclusively – but particularly to older employees or employees with limited resources. Thus, in accordance with theory, SOC behaviors seem to contribute to the efficient allocation of personal resources, to balance out lack of environmental job resources, and to boost the effects of available job resources. Beyond that, the available empirical evidence on SOC at work also mainly fits the perspective of active coping as well as flexible goal engagement and disengagement on individual well-being.

Since the majority of studies revealed positive effects of SOC at work, it seems advisable to inform employees about the SOC model and to train individuals to deal more effectively with diminished resources. Organizations may offer trainings for employees to craft their work places and jobs so that employees experience engagement and motivation as well as cope successfully with the job demands at hands. Nevertheless, practical measures and interventions based on SOC have to take into account the complexity of sociotechnical work systems. Applying individualized behaviors like SOC at work requires that the employee is allowed to make autonomous decisions about important aspects of its job and has the support of its supervisor and colleagues. As a coordinated strategy SOC at work might balance out detrimental effects of high job demands, low job resources, and booster the effects of high job resources. However, under specific circumstances, SOC use might be detrimental. Detrimental effects of SOC at work can particularly be expected when the work environment does not sufficiently tolerate autonomous

decision making of employees (Weigl et al. 2013), in case of an unbalanced use of effortful optimization strategies under demanding work situations (Riedel et al. 2015), as well as an unbalanced use of selection strategies when individual resources are already depleted presumably by choosing a too narrow range of resource investment that hamper the retrieval of resources (Demerouti et al. 2014). These findings have to be considered when SOC measures are implemented in occupational practice.

Since various studies demonstrated that the effective use of SOC at work is closely related to work and task characteristics, measures that concurrently address individual as well as organizational or task characteristics might be promising. Drawing on available SOC research we assume that top-down approaches that reduce job demands and increase job resources should be aligned with individual bottom-up approaches that foster individual coping or job crafting strategies.

Cross-References

- ▶ Age-Related Changes in Abilities
- ▶ Aging and Psychological Well-Being
- ▶ Life Span Developmental Psychology
- ▶ Mental Health and Aging
- ▶ Psychological Theories of Successful Aging
- ▶ Work Design and Aging

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Self-Theories of the Aging Person

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Synonyms

Cognitive schema; Self-concept; Self-knowledge; Self-schema; Self-understanding

Definition

Self-theories of the aging person focus on how a person's self-representations and self-understanding change with age. Self-representations are those attributes that (a) are part of an individual's understanding and knowledge about the own person, (b) are the focus of self-reflection, and (c) can be consciously acknowledged by the person through language and other forms of communication.

General Framework

Self-theories of the aging person focus on how a person's *self-representations* and *self-understanding* change with age but also how, in turn, self-representations and self-understanding influence individuals' psychological and behavioral aging and related outcomes (Markus and Herzog 1991). Thus, the focus in self-theories of the aging person is on the individual's *self-concept* or *self-representations*. For the purposes of this entry, we will use these two terms interchangeably to refer to those attributes that (a) are part of an individual's understanding of and knowledge about the own person, (b) are the focus of self-reflection, and (c) can be consciously acknowledged by the person through language or other forms of communication (Diehl 2006; Harter 2012).

Contemporary psychological theories conceptualize self-representations as a multidimensional, contextualized, and dynamic *cognitive structure* with important adaptive and self-regulating functions (Brandtstädter and Greve 1994; Higgins 1996). This conceptualization implies that individuals' self-concept is viewed as a *cognitive schema* containing knowledge about personal traits, values, and beliefs, episodic and semantic memories, and knowledge about social roles, positions, and interactions. This cognitive schema is involved when self-relevant information is processed. From a life-span developmental and gerontological perspective, several theorists (Markus and Herzog 1991; Brandtstädter and Greve 1994) have pointed out that the self-concept gives individuals a sense of continuity

and permanence, allows them to distinguish themselves and their developmental history from others, and gives their experiences meaning within a larger life story (Diehl 2006; McAdams 2013). Moreover, self-concept theories also provide an explanatory framework that can account for the fact that human personality is both stable and flexible across the adult life span (Roberts and Mroczek 2008). That is, the notion that self-representations are hierarchically organized makes it meaningful to distinguish between representations that are essential to a person's general identity (i.e., core self-representations) and representations that are linked to specific contexts. Core self-representations tend to be relatively stable across contexts, whereas context-specific self-representations are responsive to the demands of different social roles, life events, or challenges associated with life stage-specific developmental tasks (Markus and Herzog 1991). Thus, self-concept theories provide a suitable framework to account for continuity and discontinuity in adults' development – two processes that are at the heart of the overall aging process. Self-representations are also of critical importance because the biological and psychosocial changes intrinsic to the aging process challenge the self-referential knowledge that constitutes a person's conception of him- or herself (Brandtstädter and Greve 1994).

Self-theories of the aging person are different from other psychological or sociological theories of aging because they put the individual squarely at the center of their theorizing and investigative efforts. Like action-theoretical accounts of psychological aging, self-concept theories emphasize the role of the individual as an *active, self-reflexive agent* who not only passively reacts to internal or external age-related changes and processes but who also intentionally and actively shapes these processes. This view is best illustrated in Brandtstädter and Greve's (1994) model of *accommodative*, *assimilative*, and *immunizing processes* that the aging person (more or less consciously) employs to negotiate age-related changes that challenge his or her positive identity. Thus, the main purpose of this triad of processes is the protection of a person's positive self-representations in different behavioral domains against the potentially negative onslaught of the aging process and to preserve the biological and psychosocial integrity of the person.

Specifically, *assimilative adaptations* involve instrumental and self-corrective activities (e.g., efforts to enhance or maintain a desired ability or level of performance), compensatory activities (e.g., using external aids), and self-confirmatory actions (e.g., choosing environments that conform to a person's self-definition). Brandtstädter and Greve (1994) postulate that assimilative activities should be the preferred mode of adaptation when individuals realize that age-related losses have occurred or are imminent, but when they still believe that these losses may be reversible or can be counteracted through appropriate actions. The authors also postulate that individuals very likely will switch from an assimilative to an accommodative mode if they perceive that assimilative efforts are not effective or become too costly in terms of effort or resources. Consequently, *accommodative adaptations* involve (a) disengagement from blocked goals, (b) adjustment of personal aspirations and self-evaluative standards (e.g., gradual rescaling of self-evaluative standards), (c) self-enhancing comparisons (e.g., downward social comparisons), and (d) palliative interpretations, such as positive reappraisals or the discounting of unattainable goals. In support of the overall model of adaptive behavior, Brandtstädter and Renner (1990) showed that over the course of adulthood (age range 25 to over 75 years), individuals reported an increasing shift from assimilative to accommodative actions (see also (Diehl et al. 2014a)). The authors suggest that this developmental shift may account for the observed stability of self-esteem and subjective well-being in most adults.

Finally, Brandtstädter and Greve (1994) described *immunizing mechanisms* as the third mode of self-concept stabilization. According to the authors, immunizing processes protect self-representations that are highly relevant to a person's self-definition and self-esteem and can be categorized as data-oriented or concept-oriented.

Data-oriented immunization is a bottom-up process in which behavioral data (e.g., actual cognitive performance, feedback from the social environment, etc.) fundamentally challenge an individual's self-related beliefs so that he or she engages in a number of immunizing maneuvers to protect his or her self-representations in the respective domain against these data. These maneuvers may include downgrading the diagnostic relevance and validity of the behavioral data (e.g., "My memory is still good even if I forgot a few items on my shopping list") or shifting the temporal focus of self-evaluation so that past accomplishments can be used to stabilize current and/or future self-representations. In contrast, *concept-oriented immunization* is a top-down process in which the person engages in self-stabilizing maneuvers by emphasizing behaviors and attributes that are positively related to age and by de-emphasizing aspects that tend to decline with age. It is important to note that immunizing processes are, by definition, different than defensive mechanisms, because the person can usually acknowledge that the standards for self-definition and self-worth in a certain domain have changed as he or she has grown older (Greve and Wentura 2003). For example, although a good memory may have been a critical self-defining attribute for an individual in young adulthood and midlife, the same attribute or behavior may not be a self-defining feature of cognitive competence anymore in later adulthood.

In summary, Brandtstädter and Greve's (1994) model provides a framework that describes the psychological processes that underlie changes in self-representations across the adult life span. Indeed, there is evidence from numerous studies showing that assimilative, accommodative, and immunizing processes can account for a number of developmental changes in adults' self-representations (Brandtstädter and Renner 1990; Greve and Wentura 2003; Rothermund and Brandtstädter 2003). However, this model is only one approach that tries to explain how individuals' self-representations change over the adult life span. Several other explanations also need to be taken into account.

Specific Accounts for Changes in Adults' Self-Representations

The other accounts we consider here link adults' self-representations to their *constituent elements*, such as personality traits, social roles, life plans, and normative expectations, as well as individuals' personal memories and their awareness of personal lifetime. The overall argument with regard to these approaches is that changes in these domains give rise to changes in self-representations because they constitute the elements and the content of a person's self-concept and, in particular, of his or her context-specific self-representations.

In terms of *personality traits* such as the Big Five (i.e., agreeableness, conscientiousness, extraversion, openness to experience, and neuroticism/emotional instability), it is well documented that significant changes in mean levels occur across the adult years (Roberts and Mroczek 2008; Helson et al. 2002). For example, over the course of adulthood, men and women tend to become more emotionally stable (i.e., mean-level decline in neuroticism) and more agreeable and conscientious (i.e., mean level increases in these traits), whereas the mean levels of openness to experience and extraversion tend to stay fairly stable, especially in midlife and into old age. Although the exact causes of these changes in key personality traits are not entirely known (see Roberts and Wood 2006), it is logical to conclude that these mean-level changes are also reflected in adults' changing self-representations. For example, mean-level changes in agreeableness are likely to be reflected in adults' self-representations related to getting better along with others, coping with conflict more constructively, and perhaps being more tolerant toward the opinions and attitudes of others. Similarly, mean-level changes in conscientiousness may be represented in the self-concept as having become more serious about personal tasks and responsibilities and having stronger commitments to certain pursuits, such as performance in the workplace or taking better care of one's physical health, financial security, or psychological well-being. Thus, although the connection between changes in personality traits and

self-representations has not been extensively investigated (Diehl 2006), some studies suggest that such a connection exists even into very old age (Troll and Skaff 1997) and, hence, requires more scientific attention.

Changes in self-representations are very likely also the result of changes in *social roles* and changes in role expectations and responsibilities. For example, most societies have normative age-graded expectations with regard to certain social roles, such as family-related roles, work-related roles, or community-related roles (Settersten and Hagestad 2015). Indeed, life-course sociologists have coined the terms "social clock" and "social age" (Hagestad 1990) to indicate that individuals' lives are structured and evaluated according to certain sociocultural timetables. As such, individuals can be on-time or off-time with regard to these social timetables, and the degree of synchrony or asynchrony with such timetables very likely is reflected in their role-specific self-representations. Also, whereas changes in social roles in young adulthood are primarily characterized by the entry into new social roles (e.g., committed relationship, transition to parenthood, first steady employment, etc.), in midlife and old age, the opposite is primarily the case. That is, changes in social roles in midlife and old age are primarily characterized by *exit events*, such as the last child leaving home, retirement, loss of friends, widowhood, relocation, or the relinquishing of roles in the community, which can greatly challenge a person's self-concept and sense of self-esteem (see Kling et al. 1997).

Finally, changes in self-representations are also tied to individuals' *life plans* for and *normative expectation*s about the adult years, including the occurrence or nonoccurrence of *life events* and individuals' perceptions of *personal lifetime*. For example, research by Heckhausen et al. (1989) has shown that adults possess quite well-defined expectations regarding their psychological and social development across the adult life span. These expectations are shared by young, middle-aged, and older adults and are rooted in social and cultural norms that use chronological age as the indicator for having met certain developmental goals (MacMillan 2005). In combination with the occurrence of expected or unexpected life events (Helson et al. 2009) and personal perceptions of lifetime (Neugarten 1979; Carstensen et al. 1999), these social timetables often motivate individuals to engage in a midlife stock-taking or "*midlife review*" (Stewart and Vandewater 1999), with profound influences on their personality and self-representations (Helson and Soto 2005). In particular, during this process of midlife review, adults may have to come to grips with the fact that certain life plans did not materialize as hoped and that certain goals may have become unattainable. Thus, adults may realize that they have passed what Heckhausen et al. (2001) referred to as *developmental deadlines* or that time for the attainment of a desired goal is running out. Under more favorable circumstances, however, they may realize that the attainment of a certain goal and the realization of a certain life plan may require a "midcourse correction" and reorientation (Stewart and Vandewater 1999). Regardless of what scenario an individual may be confronted with (e.g., in family and personal relationships, at work, and in professional career), in each instance the psychological processes and potential action choices very likely will have an effect on the person's self-representations and will activate the self-stabilizing processes described by Brandtstädter and Greve (1994). A particular outcome associated with these processes is the person's increased awareness of his or her own age (Diehl and Wahl 2010) and also a keen awareness of personal lifetime (Carstensen et al. 1999). That is, individuals' time horizons of past, present, and future selves are likely to shift (Ryff 1991) when they realize that they have less time to live than they have already lived – a realization that usually happens in late middle age or early old age (i.e., approximately between 45 and 60 years). In addition, actual age-related changes in an individual's behavior, such as physical appearance and health, cognitive functioning, interpersonal relationships, or social-emotional functions, are likely to become noticed by the individual, creating an awareness of his or her own aging. Thus, this increasing awareness of one's own aging is likely to become a defining feature of the aging self (Diehl and Wahl 2010).

This important developmental process, however, has not been systematically investigated in the context of self-representations, and therefore we are focusing on this aspect in more detail in the following section.

Awareness of Aging as a Central Feature of the Aging Self

The construct of *awareness of aging* (*AoA*) refers to an individual's perceived experience of growing old(er) and can be assumed to become an integral part of the self-concept. AoA encompasses concepts such as age identity, self-perceptions of aging, and awareness of age-related change (AARC), all of which are concerned with how individuals perceive and interpret their own aging process (Diehl et al. 2014b), that is, how and what kind of self-representations individuals form of their own aging. AoA deserves scientific attention because of its well-documented associations with health and well-being in later life (Westerhof et al. 2014).

To illustrate the connection of AoA with adults' functioning and potential developmental outcomes, we use the example of a single-item question of subjective age, which simply asks adults "How old do you feel?" (Kastenbaum et al. 1972). The difference score between the age a person states in response to this question and the individual's actual chronological age is a robust predictor of a whole host of behavioral outcomes, including functional health and mortality (Hubley and Russell 2009; Westerhof and Barrett 2005). However, what is less known is the exact nature of the "tacit knowledge" that goes into this simple measure of subjective aging, making it such a powerful predictor of late life development. The concept of *awareness of age-related change* (AARC; Diehl and Wahl 2010) was proposed to provide a conceptual framework for investigating the subjective knowledge that forms the foundation for the predictive validity of a number of subjective age ratings.

Diehl and Wahl (2010) define AARC as ". . . all those experiences that make a person aware that his or her behavior, level of performance, or ways of experiencing his or her life have changed as a consequence of having grown older" (p. 340). Compared to other AoA constructs, AARC is a new concept because of its focus on the actual behavioral experiences that underlie adults' subjective perceptions of aging. For instance, AARC focuses on age-related changes in five behavioral domains, such as physical health, cognitive functioning, or interpersonal relationships, and addresses both positive and negative changes in these domains. Because of this elaborated structure, the systematic elaboration of the AARC construct provides an opportunity to advance both theoretical and empirical endeavors in the field of subjective aging.

Based on the theoretical model proposed by Diehl and colleagues (2014b), it is possible to postulate certain factors which can be expected to influence the development of AARC. For instance, developmental influences such as early life experiences, lifetime health, and social relationships are likely to shape a person's AARC across the life span. Furthermore, socioeconomic resources (e.g., education, finances, and access to health care), cultural influences (e.g., cultural age norms and expectations, aging-related social policies), and psychological resources (e.g., coping, emotion regulation, and personality) are also theorized to influence the development of AARC. Longitudinal evidence from investigations of other AoA concepts, such as attitudes toward own aging (ATOA), supports expectations of the importance of developmental, socioeconomic, cultural, and psychological resources. For instance, findings from a 12-year study (Miche et al. 2014) showed that a variety of personality, socioeconomic, and health-related factors influenced ATOA in middle-aged individuals (early 1940s to mid-1950s), whereas health and physical functioning were more relevant predictors among young-old adults (early 1960s to mid-1970s).

Understanding the role of AARC as part of adults' self-representations is also important in the context of behaviors that individuals may or may not engage in to promote their own health and well-being across the adult years. A large body of research suggests that most individuals

hold negative views of aging (Hummert 2011), and these negative views can and often do undermine individuals' efforts to engage in behaviors that promote healthy and successful aging (Levy and Myers 2004). There have been some investigations so far into the specific pathways (Levy 2009) by which attitudes interfere with engagement in health-promoting behaviors. For instance, a psychological pathway may manifest as a low degree of *perceived control* over the environment (Lachman et al. 2011) or as the *misattribution* of a health problem to the inevitable process of "getting old" (Sarkisian et al. 2007). Such pathways involving AoA are consequential because they limit and undermine individuals' participation in health-promoting behaviors. Given the well-documented connection between AoA and health behaviors, researchers have also begun to ask whether targeting AoA and the associated self-representations may be a fruitful way to promote healthy and successful aging (Kotter-Grühn 2015). In recent years, there have been several attempts to change negative views on aging with such a goal in mind (Sarkisian et al. 2007; Wolff et al. 2014).

In summary, AoA represents a central aspect of adults' self-concept, and a growing body of evidence suggests that it is associated with a number of important outcomes in late life (Diehl and Wahl 2015). Because AoA is not a fixed state, but rather a process that unfolds over time as a result of many different life experiences, it also holds promise with regard to intervention and prevention. Specifically, research on AoA holds the promise to open new views and to lead to new approaches on how adult development and aging can be optimized. The long-term goal of these endeavors is the improvement of adults' health and well-being and the delay of age-related disease and impairment.

Conclusions and Outlook

As this entry shows, a self-theoretical approach to adult development and aging has a number of unique features that are not represented in other theoretical approaches. First, a focus on self-representations is concerned with individuals as active agents and as producers of their own development, including the dialectics that are inherent in the related psychological, social, and interpersonal processes (Diehl 2006). In particular, self-theoretical approaches can theoretically and empirically account for key processes of adult development and aging such as continuity and discontinuity.

Second, a self-theoretical approach can enhance the explanation of certain phenomena that have puzzled aging researchers for quite a while. Among these puzzles is the "paradox of well-being," which refers to the fact that despite an increasingly negative ratio between gains and losses across the adult life span and despite objective losses, older adults tend to show fairly high levels of psychological well-being. Brandtstädter and Greve's (1994) model of assimilative, accommodative, and immunizing processes, for example, can describe and explain how "strategic" adjustments to self-representations and personal goals stabilize a person's sense of self-worth when it is threatened by the challenges and losses associated with growing old(er).

Finally, recent theoretical developments that view awareness of aging as a central component of middle-aged and older adults' self-concept (Diehl et al. 2014b) also open new vistas for intervention and prevention efforts. In particular, by focusing on adults' negative views on aging, and drawing on motivational approaches to improve these negative views, new intervention programs are being designed to promote behaviors that are known to promote healthy and successful aging. One of the big challenges of the ongoing global population aging is how to get individuals to take greater responsibility for their own adult development and aging and how to delay the onset of age-related diseases. Essentially, the delay of disease onset or disease-related loss often requires that individuals need to embrace and engage in behavior change for the long run. Self-theoretical approaches may provide some of the key elements to achieve such long-term behavior change and to optimize current and future generations' aging experience.

Cross-References

- ▶ Age, Self, and Identity: Structure, Stability, and Adaptive Function
- ▶ Age Stereotyping and Views of Aging, Theories of
- ▶ Self-Theories of the Aging Person

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Semantic Dementia

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Synonyms

Primary progressive aphasia semantic; Semantic variant primary progress aphasia (svPPA); Temporal variant frontotemporal dementia

Definition

Semantic dementia (SD) is a progressive neurodegenerative syndrome characterized by a gradual

decline in semantic processing and related language abilities. SD patients typically show difficulty with the comprehension and expression of words and a deterioration of semantic knowledge about places, people, objects, and general information (Murre et al. 2001). While the ability to produce speech remains unchanged, individuals with SD often struggle finding the correct word during conversation, first for less commonly used words and then for more rudimentary ones. These symptoms progress until the ability to understand the basic components of language and semantic relationships is lost, resulting in impaired ability to read, write, and partake in conversation (Kertesz et al. 2010).

What Is Semantic Dementia

Semantic dementia is one of several clinical syndromes within the broad construct of frontotemporal dementia (FTD). FTD is still sometimes referred to as Pick's disease after Dr. Arnold Pick, the eighteenth-century physician who first described a patient with the collection of behavioral and language symptoms now associated with FTD (Bott et al. 2014). The nosological classification of FTD and its associated syndromes have been debated ever since Dr. Pick's description at the turn of the century. Dr. David Neary and colleagues (Neary et al. 1998) created a consensus study group, proposing a broad construct called frontotemporal lobar degeneration (FTLD), which encompasses several syndromes that selectively affect the frontal and temporal cortex. FTLD consists of three clinical syndromes: FTD, progressive nonfluent aphasia, and progressive fluent aphasia.

Updated since 1998, a revised conceptualization of FTLD is generally broken down in to clinical subtypes characterized by changes in behavior (behavioral variant FTD or bvFTD) or changes in language (primary progressive aphasia or PPA). PPA is further divided in to semantic dementia (also known as semantic variant PPA), nonfluent variant PPA, and logopenic variant PPA (Bott et al. 2014; Gorno-Tempini et al. 2011).

The cognitive profile now associated with SD was first described by Dr. Elizabeth Warrington in her seminal 1975 publication (Warrington 1975). She presented the case study of three patients, all of whom demonstrated a pronounced loss in semantic memory and associated language processes, coupled with preserved speech production and solid performance in other areas of cognition (Warrington 1975; McCarthy and Warrington 2015). However, the emphasis of the paper was primarily on understanding semantic memory deficits, as compared to describing a unifying disorder. The term semantic dementia was first presented in 1989 by Dr. Julie Snowden and colleagues and then further refined by Dr. John Hodges and colleagues in 1992, providing a label for the collection of cognitive impairments presented by Dr. Warrington (Hodges et al. 1992; Snowden et al. 1989).

Diagnostic Criteria

The most recent international consortium criteria for SD were established in 2011 (Gorno-Tempini et al. 2011). Inclusion criteria for SD requires the presence of three core features: language difficulty as the most prominent clinical feature, language difficulty as the cause of impaired ability to perform daily living activities, and the presence of aphasia as the most significant deficit at symptom onset and during the initial phase of the disease. Exclusion criteria include the presence of prominent initial behavioral disturbances, episodic or visual memory impairments, or visuoperceptual difficulties, and the symptoms cannot be better accounted for by psychiatric or nondegenerative nervous system or medical disorders.

The 2011 consortium criteria also provide three levels of diagnostic certainty for a diagnosis of SD: clinical diagnosis, neuroimaging-supported diagnosis, and definite (Gorno-Tempini et al. 2011). A clinical diagnosis of SD requires impairments on tasks of confrontation naming and single-word comprehension, with at least three out of four additional core features, including (1) impaired object knowledge, (2) surface dyslexia or dysgraphia, (3) spared repetition, and (4) spared speech production. Neuroimaging findings consistent with SD are required for an imaging-supported diagnosis of the syndrome and must show either predominant anterior

temporal lobe atrophy or predominant anterior temporal hypoperfusion or hypometabolism on SPECT or PET imaging. The presence of genetic or pathological confirmation of FTLD is required for a definitive diagnosis of SD.

Pathology and Genetics

Pathological studies suggest that SD is a tauopathy and is thus best classified within the category of FTLD, instead of a variant of amyloid-associated dementias, such as Alzheimer's disease (Rossi and Tagliavini 2015). SD appears to often be associated with Pick bodies, in which a protein called tau clumps together inside nerve cells, inhibiting function and eventually resulting in the death of the cell. However, neuropathological findings are varied, and other studies suggest that SD is associated more with ubiquitin-positive, tau-negative intraneural inclusions typical of motor neuron disease; some patients even show atypical distribution of Alzheimer's disease pathology (Davies et al. 2005; Rossor et al. 2000).

Semantic dementia is characterized by focal atrophy and dysfunction of the anterior and posterior inferior temporal lobe, including the inferior and middle temporal gyri (Mummery et al. 1999). The temporal atrophy is typically left sided, but may also be bilateral. The hippocampus is believed to be spared although findings are somewhat mixed, as studies have found SD-related pathology in the dentate gyrus (Hodges et al. 2010). This selective atrophy of the polar and infero-lateral temporal regions is a unique characteristic of SD and is not seen in Alzheimer's disease (Murre et al. 2001).

An estimated 40% of all FTD cases include a family history of dementia, with approximately 10% of patients being autosomal dominant, affecting first-degree relatives across two generations (Bott et al. 2014). Of autosomal dominant cases, *MAPT*, *GRN*, and *C9ORF72* are the most common genes responsible for the inheritance of FTD. Of FTD syndromes, SD is the least likely to be hereditary, with a predicted familial rate between 2% and 7%, although a mutation in the *MAPT* gene has been reported in a case of SD (Hodges et al. 2010; Goldman et al. 2005; Bessi et al. 2010).

Clinical Presentation and Cognitive Deficits

As defined in the diagnostic criteria, the common complaint by individuals with SD is difficulty with aspects of expressive and receptive language, as language dysfunction is often the main symptom during the first 2 years of the disease (Bang et al. 2015). This is due to the disease's selective targeting of the left temporal lobe, a region of the brain critical for language abilities (Kertesz et al. 2010). Importantly, the ability to produce speech is preserved and remains fluent, but words start to lose meaning. Patients with SD may start substituting words in conversation, such as saying "that thing" in place of a noun, or progress from using more specific words to terms representative of broader concepts (e.g., from penguin to bird to thing). The progressive loss from specific to broad word categories may reflect the relative strength and frequency of use for each concept or word within the semantic network. More familiar, common items are associated with deeper, richer, and more robust semantic networks. This robustness results in a higher probability of a term or concept being resilient and remaining preserved despite initial degradation of semantic networks (Lambon Ralph et al. 1998).

Semantic dementia-associated language deficits are present across multiple modalities, not just for words, suggesting the disease represents a breakdown in networks important in conceptual knowledge (Bozeat et al. 2000). This breakdown in semantic networks in turn results in the more clinically evident deficits in language associated with the disease (Lambon Ralph et al. 1998). As such, patients with SD not only experience difficulty with word finding but also in the ability to recall the meaning of words and related concepts. Patients may ask "What does that word mean?" even for vocabulary commonly used in the past, as well as lose the ability to understand how concepts are related across semantic constructs (e.g., how a

giraffe and a tiger are related). This deficit results in difficulty with comprehension and expression during conversations, as patients rely on related yet incorrect words to communicate a message. SD-related deficits in verbal comprehension have profound effects on patient's daily activities. Tasks that involve spoken or written language, such as holding a conversation or watching television, become very difficult to undertake. The loss of word comprehension and related word concept is fairly unique to SD, as word knowledge is largely preserved across the aging process. Patients may also decline in other abilities that rely upon semantic processing, such as the ability to spell, comprehend written material, and remember names.

SD is associated with deficits across a variety of neuropsychological measures. Along with word comprehension and word finding difficulties, individuals with SD demonstrate impaired performance on other tests that rely upon semantic knowledge, including confrontational picture naming, matching words based on their semantic relationship, producing words within a semantic category (e.g., provide the names for as many types of animals as possible), and providing the name of an item based on its description (Murre et al. 2001).

While language-related abilities decline in patients with SD, other cognitive abilities not mediated by anterolateral temporal lobes remain preserved. Whereas episodic memory declines in other neurodegenerative diseases, such as Alzheimer's disease, this ability may remain largely untouched in SD. Interestingly, patients with SD are better able to remember more recent as compared to remote information, although may struggle when asked to provide more detail (Hodges and Graham 1998). This pattern is a reversal of the temporal gradient typically seen in other dementias and is likely due to the selective atrophy of the neocortex of the temporal lobes, combined with the largely spared hippocampal integrity frequently seen in SD (Hodges and Graham 1998). Executive functioning, performing math, visuospatial skills, nonverbal reasoning, and daily activities such as driving are largely preserved until later in the course of the disease. This intact ability to perform daily tasks creates an odd juxtaposition. For example, patients may be able to use a hammer, but may be unable to provide the name or understand the word for the object.

SD is primarily described in terms of language deficits, as the syndrome typically presents with left greater than right atrophy of the anterior temporal lobes. In left variant SD, functions pertaining to the right hemisphere are sometimes "released." In such cases, patients can develop visual-based compulsions, including painting, puzzle work, jewelry beading, and collecting items (e.g., coins, brightly colored objects) (Bang et al. 2015).

Twenty-five percent of cases present with right greater than left atrophy (Thompson et al. 2003). When SD starts in the right temporal lobe, patients may have difficulty recognizing faces and experience changes in behavior. Typical behavioral symptoms include a lack of empathy and engagement, an increase in compulsive behaviors such as writing notes, rigid thinking, awkward social interactions, loss of insight into behavior, difficulty with theory of mind, and restricted food preferences (Bott et al. 2014; Bang et al. 2015). Regardless of the side of onset, SD usually spreads to involve the contralateral side as the disease progresses.

Daily Functioning

Patients diagnosed with semantic dementia, unlike the behavioral variant of frontotemporal dementia, often do not display significant behavioral changes at the onset of the disease. However, as the disease progresses and begins to impact regions beyond the temporal lobes, a variety of behavioral changes more typical of FTD may occur that impact daily functioning and interpersonal relationships. Individuals in later stages of SD may present as disinhibited, engaging in socially inappropriate behavior with little insight in to how they are perceived by others, including a lack of embarrassment. Individuals may also show disregard for the feelings of others and display a general social coldness that includes a lack

of empathy (Bang et al. 2015). Individuals with SD may also neglect basic aspects of self-care, such as bathing regularly, due to general apathy and difficulty with initiation.

Symptoms of depression are seen in 44% of individuals with SD and occur regardless of side of disease onset (Bang et al. 2015). However, symptom presentation varies, as right-sided SD is associated with anxiety, atypical depression, and denial of symptoms, while patients with left-sided SD are more likely to report anhedonia and other classic depressive symptoms (Edwards-Lee et al. 1997). Individuals may also demonstrate exaggerated emotional responses to situations, such as extreme happiness or sadness and generally increased lability. This lability may be correlated with events or tasks that pertain to the patient's self-interests or clash with the patient's increased mental rigidity. Patients with a predominately right-sided disease focus may be prone to violent outburst and be argumentative, while patients with left-sided disease may become more "mellow" (Edwards-Lee et al. 1997).

The obsessions and compulsions of individuals diagnosed with SD can take many forms and may increase in intensity to the point of interfering with daily activities. Individuals may become focused on watching clocks, eating only select foods, or fixating on certain games or puzzles. The obsessions of individuals with predominately left-sided temporal lobe disease tend of focus on visual compulsions, such as painting or collecting objects. In contrast, right-sided SD often manifest in verbal compulsions (Bang et al. 2015).

These changes in empathy and personality can be very trying and difficult for the family members of individuals with SD, as the patient's behavior and disposition are often in stark contrast to how he or she was prior to disease onset. The lack of emotional reciprocity and awareness of social etiquette can be especially difficult, straining interpersonal relationships and making social outings challenging.

Course of Disease

Semantic dementia is estimated to represent 20–25% of all FTD cases and 3% of all dementia cases (Kertesz et al. 2010). The age of disease onset is often earlier than what is seen in Alzheimer's disease and similar to other forms of frontotemporal dementia, usually ranging from 45 to 65 years old, although late-onset SD does sometimes occur in the elderly (Shimizu et al. 2011). The mean age of symptom onset is age 60 with diagnosis occurring 4 years later on average (Hodges et al. 2010). Postmortem studies reveal a median survival rate of approximately 8 years with a range of 3–15 years (Hodges et al. 2003). However, this finding was based on a relatively small sample size ($n \leq 20$) and may have "been biased by the restriction to patients reaching autopsy." (Hodges et al. 2010) Another study by the several of the same authors utilizing a larger sample size reported a variable survival rate, as patients may pass away anywhere from 2 to 3 years after diagnosis to 17 years, with a 50% survival rate of 12 years (Hodges et al. 2010).

Conclusions

Semantic dementia (SD) is a neurodegenerative disorder characterized by a decline in semantic processing and language abilities, while the ability to produce speech and other cognitive abilities remain initially largely untouched. Couched within broad construct of frontotemporal dementia, SD has been characterized through a rich history of the case studies and only more recently is being studied empirically with larger sample sizes. SD often initially presents as difficulty with word finding and then transitions to problems with language comprehension and a breakdown in larger semantic memory-dependent tasks. As the disease progress, individuals with SD may begin to show changes in personality and behavior. The age of disease onset ranges from 45 to 65 years old, with a 50% survival rate of 12 years.

Cross-References

- ▶ Aphasia in Later Life
- ▶ Behavioral and Psychological Symptoms of Dementia

- ▶ Dementia and Neurocognitive Disorders
- ▶ Frontotemporal Dementia (FTD)
- ▶ Language, Comprehension
- ▶ Language, Naming
- ▶ Semantic Dementia

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Sensory Effects on Cognition in Later Life

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Synonyms

Audition; Cognition; Movement; Vision

Definition

This entry reviews the interacting relationships between sensory (audition, vision) and

sensorimotor (gross and fine motor) aging and cognitive aging. Evidence from experimental age-simulation, clinical, intervention, and neuroimaging approaches is summarized, along with major theories linking sensory/sensorimotor aging to cognition.

Background

The impact of sensory aging on cognitive status is a growing focus of research (Salthouse 2010; Scialfa 2002; Schneider and Pichora-Fuller 2000). On this topic, the visual and auditory systems have been most closely examined given that these are the two predominant sources of environmental input for further perceptual and cognitive analysis. For instance, the integrity of signals entering the cognitive system via auditory or visual channels, if compromised or degraded by aging, have been shown to impede efficient cognitive processing of that information due to a need to engage in top-down processing (e.g., contextual knowledge) to "fill in the blanks." A less commonly considered influence on cognitive functioning is the age-related decline of sensorimotor processes. This domain of functioning, which encompasses gross and fine motor tasks, requires the integration of multiple sensory inputs (tactile, visual, vestibular, proprioceptive). As such, sensorimotor aging has more recently been considered in terms of its indirect effects on cognitive processing efficiency. For example, motor tasks such as postural control and object manipulation appear to enlist more cognitive capacity in old age, consequently detracting from ongoing cognitive tasks such as memory retrieval, language processing, or navigation.

Within each domain (auditory, visual, motoric, cognitive), there is well-established evidence of gradual age-related degeneration that can be observed at anatomical, neuronal, and behavioral levels. What is currently less well established is our understanding of how, across domains, multiple age-related declines influence one another. The extant research has focused on theoretical questions concerning the directionality of influence (unidirectional, reciprocal, indirect) and whether other more general factors can account for correlated declines in sensory/sensorimotor and cognitive domains. On a more applied level, another topic of interest is whether the accurate assessment of cognitive abilities is hampered or biased when individual differences in sensory impairments remain uncorrected or when cognitive assessment tools are not optimally designed for individuals with subclinical sensory declines.

Much of the contemporary research linking sensory/sensorimotor aging and cognitive aging stems from a large-scale longitudinal study known as the Berlin Aging Study (BASE), which began with a sample of old-old (aged $\geq$ 70 years) community-dwelling individuals recruited using German city registry information. Multiple indices of physical, psychological, intellectual, and social functioning were collected at regular intervals. Using the early cross-sectional data, it was found that the age-related variance in general intellectual functioning was well accounted for by standard clinical tests of visual acuity (64.5%), auditory acuity (74.5%), and balance and walking speed (82.6%). Markedly lower correlational values were observed in a comparison group of young and middle-aged adults (Baltes and Lindenberger 1997), suggesting an increasingly strong connection between sensory/sensorimotor abilities and intellectual functioning with aging. Subsequent large-scale multivariate studies indicate broad agreement, although the identification of a singular "common cause" underlying sensory/sensorimotor and cognitive aging has been challenged by other efforts such as the Australian Longitudinal Study of Aging (ALSA). Follow-up longitudinal analyses of the BASE sample indicate weaker support for a single-factor model linking sensory and cognitive aging than the original cross-sectional report, leaving open the possibility of co-occurring factors such as cognitive compensation for sensory aging.

What follows is a review of the three main areas of research linking auditory, visual, and sensorimotor aging with cognitive functioning. Highlighted are key methodological approaches such as experimental age simulations of sensory decline, structural and functional neuroimaging,

and sensory remediation. Current theoretical views and future research directions are then presented in an effort to integrate and reconcile findings generated from three areas that have advanced in relative isolation from one another.

Effects of Aging Audition on Cognition

The most prevalent type of auditory impairment in old age is presbycusis or loss of sensitivity to high frequency sounds. However, hearing is also impacted by other age-normative changes including both peripheral and cognitive factors (Schneider and Pichora-Fuller 2000; Schneider et al. 2010). Although hearing loss may account for speech-recognition difficulties in quiet conditions, peripheral changes in the auditory system can only account for a portion of the difficulties experienced by older adults in noisy and multi-speaker situations. To this end, to fully comprehend an auditory scene, listeners must locate and perceptually segregate the sound sources in their environment in order to focus their attention on target sources and ignore the processing of information from irrelevant sources. In addition to locating speakers in space and focusing attention on relevant information, speech comprehension is affected by temporal processing, partly under the control of the central auditory nervous system. With age, processing speed and interaural timing are affected, with the auditory system becoming slower and more asynchronous, respectively. However, cognitive theorists have suggested that in addition to signal degradation from a deteriorating peripheral auditory system, older adults may be more vulnerable to intrusions from irrelevant or distracting stimuli than younger adults due to age-related changes in cognitive functioning such as changes in working memory, slowed speed of processing, and a deficit in inhibition. In tandem, older adults also utilize cognitive resources (e.g., working memory) to compensate for age-related hearing loss.

Epidemiological studies have revealed a correlation between hearing loss and cognitive function that remains even after correcting for individual differences in comorbid conditions, chronological age, and cognitive status. Furthermore, the prevalence of hearing loss is greater in demented than non-demented groups (Schneider et al. 2010). While the auditory-cognitive link is well replicated in such approaches, explorations of underlying causes require more experimental designs.

One such research strategy is to simulate aspects of age-related hearing loss by degrading the auditory speech signal to mimic a specific feature of the auditory system that is hypothesized to decline and affect cognitive performance. Examples of such experimental manipulations include presenting speech in noise, increasing the rate of speech, or adding temporal jitter, to mimic age-related declines in perceptual segregation, processing speed, and temporal processing, respectively. In studies of speech perception, older adults derive more benefit from informative sentence context than young adults (Pichora-Fuller et al. 1995; Schneider and Pichora-Fuller 2000), and performance is influenced by the predictive context of the stimulus (Burke and Shafto 2008). However, this utilization of top-down resources has been thought to detract from other cognitive processes: When auditory memory stimuli are presented in background noise such as multi-talker babble, age and noise have similar negative effects on long-term memory but not immediate memory, presumably because the auditory challenge interferes with capacity-limited memory encoding processes. Similarly, when speech rate is manipulated, the effects of age, hearing loss, and accelerated speech are more detrimental in syntactically complex sentences than in simple ones (Schneider et al. 2010). Therefore, age-related changes in hearing ability may be compensated for by recruiting cognitive resources, but at a cost to other ongoing cognitive activity. An implication of such findings is that when a listening task is simple or provides adequate environmental support, the older listener may successfully perform the task but expend more cognitive effort or capacity to do so. Effortful listening is a common complaint of older adults even when auditory acuity is within the normal range.

The interpretation of top-down cognitive compensation has been further explored using

dual-task methodology. In this approach, participants are administered an auditory task and a nonauditory task separately (i.e., single-task conditions) and simultaneously (i.e., the dual-task condition). This approach assumes that if older adults recruit more cognitive capacity to perform listening tasks, they should show larger dual-task costs than young adults. Dual-task costs are typically defined as a drop in performance from single-task to dual-task conditions, as expressed by absolute or proportional difference scores. Accordingly, compared to their age-matched peers, individuals with hearing loss show greater dual-task costs on a nonauditory secondary task while maintaining good auditory task performance under dual-task conditions. Notably, this pattern holds even after hearing loss is corrected by increasing the signal intensity or by improving the signal-to-noise ratio. This pattern is consistent with the view that more cognitive resources are needed to compensate for sensory deficits (McDaniel et al. 2008). Very new work using structural and functional magnetic resonance imaging (MRI) shows global decreases in brain volume in hearing-impaired older adults as compared to their age-matched peers and increased involvement of prefrontal cortical regions in older adults while performing listening tasks.

Others have investigated the impact of correcting for auditory impairments on cognitive functioning. In those older adults with diagnosed hearing impairment, sensory remediation (i.e., hearing aid use) has resulted in significant improvement on cognitive measures administered within the same modality as the intervention. This finding supports the importance of assessing hearing acuity in both research and clinical assessments of cognition. Furthermore, cognitive scores (working memory, general intelligence) correlate with measures of speech perception, even after amplification with hearing aids. Finally, individual differences in cognitive capacity are predictive of the degree to which individuals can benefit from more complex, cognitively demanding hearing aid models (Schneider et al. 2010), suggesting a reciprocal relationship between auditory and cognitive aging.

Effects of Aging Vision on Cognition

As with the aging auditory system, there are multiple anatomical changes to the visual system that occur gradually during the normal course of aging. Normative age-related transformations of the eye structures (e.g., decreased pupil size, increased lens density, yellowing, and opacity) result in reduced accommodation to near objects (presbyopia) and less light reaching the retina. Older adults show reductions in light sensitivity, contrast sensitivity, retinal illumination, and color vision, which affect more complex visual processes (Schneider and Pichora-Fuller 2000). Age-related slowing of visual processing has implications for older adults' ability to detect, identify, and track visual stimuli. These visual functions are fundamental precursors to many upstream cognitive processes. There is considerable evidence for age-related decline in visual tests of inhibition, selective attention, task switching, multitask processing, and processing speed (Burke and Shafto 2008; Kramer and Madden 2008). Older adults exhibit a slowdown in visual target detection, recognition, and identification of visual objects which adversely affects top-down processes that are typical of cognitive aging, including working memory. As demonstrated in the hearing-cognition literature, longitudinal and cross-sectional research has shown strong correlations between visual acuity and fluid cognitive abilities such as memory and attention (Scialfa 2002).

Age-simulation techniques have also been used in the visual domain to examine the interplay between age changes in cognition and sensory function. For instance, partial occlusion filters were used to simulate reduced visual acuity in middle-aged adults who were given standard tests of intelligence. However, this manipulation did not cause significant decreases in cognitive performance as compared to control participants wearing clear goggles. By contrast, subsequent work using similar simulation methods revealed worsened cognitive performance in samples of older adults, whose cognitive capacity is more limited than that of middle-aged adults. Possibly, the earlier findings did not yield significant effects

because there is sufficient spare cognitive capacity to compensate for the occlusion effects in midlife. In other age-simulation work concerning visual search tasks, older adults show slower and more effortful search compared to young adults. Manipulations that reduce luminance or duration of the visual presentation, to mimic lens opacity and slowed processing respectively, cause younger adults' pattern of visual search performance to resemble that of older adults (Scialfa 2002).

Other age-simulation work has shown larger age effects in visual processing speed when attentional load and background visual noise are increased. In the useful field of view (UFOV) task, the examinee is instructed to indicate the location of a peripheral target which may be embedded among an array of distractors. It is shown that older adults' UFOV is worsened when performed with a simultaneous cognitive task (Owsley 2011). Taken together, given a sufficiently demanding task, older adults' performance is disproportionately worsened in comparison to younger adults when either the visual demands of a cognitive task are increased or when the cognitive demands of a visual task are increased.

Further evidence of age-related cognitive recruitment comes from neuroimaging studies in which there are age-related differences in the pattern of brain activation during a cognitive task. For example, in selective attention tasks, older adults show greater activation of frontoparietal regions and reduced activity in visual cortices during visual search compared to younger adults. Sensory aging is also found to be associated with age-related decline in visual cortex activation during word recognition (Kramer and Madden 2008). Studies of visual language processing (dependent on visual acuity and contrast sensitivity) show that increments in word length differentially increased the lexical decision latency in older adults compared to younger adults, and this was linked to less activation of visual cortex. Similarly, in a fMRI study of lexical decision, older but not younger adults showed improved performance when word frequency increased. This frequency-related benefit was linked to increased activation of anterior and posterior regions of the occipitotemporal pathway. The interpretation given was that older adults utilize higher-order functions as a compensatory mechanism for declines in sensory processes (Burke and Shafto 2008), similar to what has been shown in the auditory aging research.

Intervention studies have shown that practice may improve cognition through the utilization of top-down mechanisms that outweigh the use of bottom-up sensory processes (Scialfa 2002). For example, visual processing speed and the ability to perform multiple attention tasks can be enhanced through a training program in which older adults practice the detection and discrimination of visual stimuli (Owsley 2011). Surgical intervention in the form of cataract surgery has yielded improvements to cognitive performance to some degree, although the clinical significance of the observed improvements has been called into question (Jefferis et al. 2011).

There is support for the notion that visual deficits produce age-related changes in cognition that may cause difficulty for older adults to process test material (Scialfa 2002). Therefore, cognitive tests are possibly biased against individuals with poor vision who attain poor cognitive performance scores. For example, seniors show larger Stroop interference effects which are commonly understood as a decline in selective attention. However, it has been shown that age-related deterioration in color vision might be responsible for an increase in the interference effect (defined as the difference between color naming and reading color-neutral stimulus latency) in seniors (Ben-David and Schneider 2009). Consistent with this finding, researchers have examined the Montreal Cognitive Assessment (MoCA), a widely used screening test for mild cognitive impairment (MCI), in terms of its suitability for older individuals with low vision. When four visual items were removed from the global score, test specificity increased, but the sensitivity to detect MCI in visually impaired older adults was reduced, suggesting that visual impairment may be a harbinger of cognitive impairment (Wittich et al. 2010).

Importantly, one should consider the role of sensory function in experimental design to diminish the effect of sensory loss on cognitive

performance. For instance, participants should be screened for visual health (near and far acuity, contrast sensitivity, UFOV) as appropriate for the experimental tests in question. Furthermore, visual test stimuli should be presented in consistently optimal conditions by avoiding low luminance and contrast, high spatial and temporal frequency, or short wavelengths (Scialfa 2002).

Effects of Sensorimotor Aging on Cognition

Following from the early correlational findings generated by the BASE and ALSA projects, a growing body of research has concerned the link between sensorimotor aging and cognition (Seidler et al. 2010; Woollacott and Shumway-Cook 2002; Yogev-Seligmann et al. 2008). Age-related loss of muscle mass leads to slowed contraction speed, loss of receptors in the joints reduces proprioceptive input, and degeneration in the basal ganglia, cerebellum, and motor cortex results in disruptions in movement onset, timing, and coordination of movement, respectively. Further age-related changes in sensorimotor integration affect movement velocity and correction (Ketcham and Stelmach 2001). Apart from such age-normative changes, conditions such as rheumatoid arthritis or Parkinson's disease affect the ease and control of movement.

Early models of gross motor control assumed that standing balance and locomotion were primarily driven by spinal and not cerebral circuits. Only recently has there been broad acceptance of the role of cognition in these motor tasks. This conceptual shift was, to a large degree, initiated by a clinical observation of dementia patients who, when asked a question, either stopped walking to answer or continued to walk while answering. Patients who stopped fell more frequently in the subsequent 6-month period than those who managed to dual task, suggesting that individual differences in cognitive capacity might be related to motor control. Indeed, measures of walking correlate positively with measures of executive functioning and processing speed, suggesting that there is shared neural circuitry underlying both domains of functioning. A large body of research has since been generated using experimental dual-task methods borrowed from cognitive psychology.

In much of this work, the emphasis has been on the dual-task costs that arise when a cognitive task is performed simultaneously with gross motor tasks such as walking or balancing. As much of this research has stemmed from the medical and movement sciences, the physical outcomes have been of greater interest than the cognitive. However, one can also consider the detrimental effects on cognitive performance that occur when the motor system is challenged by arthritis or tremor or when fear of falling is at issue and cognitive capacity is allocated to motor control instead of a concurrent cognitive task.

In keeping with other age-simulation work, reduced sensory inputs have been examined in the context of balance control in which the individual is instructed to stand upright without movement for a short period of time (e.g., 30 s). For example, altering proprioceptive input by balancing on a compliant foam surface or restricting vision while balancing is more detrimental to older adults' balance than young adults', and these effects are further exacerbated by the addition of a cognitive load. Similarly, in postural recovery studies involving unpredictable platform movements, older adults commonly show greater dual-task costs than young adults, both in terms of cognitive performance and in the efficiency of postural recovery, again suggesting that sensorimotor and cognitive systems compete for common capacity.

In dual-task studies of walking, it has been shown that older adults have a tendency to allocate more attention to walking than to the concurrent cognitive task, owing to the instinctive desire to prioritize physical safety over cognitive performance. Similar to the auditory and visual age-simulation work, higher-order cognitive processes such as memory encoding and language production have been shown to suffer under dual-task conditions as compared to single-task cognitive conditions. Conversely, dual-task costs in the sensorimotor domain seem less affected by age, suggesting that older adults are less willing to

relinquish cognitive capacity and truly divide their attention between cognitive and locomotor tasks compared to younger adults. This pattern supports the "posture-first principle" or postural prioritization hypothesis. Postural prioritization is commonly expressed by showing greater dual-task costs in the cognitive than in the sensorimotor domain, despite instructions to treat each task with equal importance. Not surprisingly, this prioritization behavior emerges more frequently when testing older fallers and those with self-reported fear of falling or when walking is restricted to a narrow or elevated path that induces fear of falling. In sum, postural prioritization may be seen as an indirect way in which sensorimotor aging can have a negative impact on cognitive performance.

Unlike the dual-task research on visual and auditory perception, in some instances the addition of a concurrent cognitive task is facilitative: Particularly for older adults, balancing or walking paired with a simple cognitive task may improve motor performance compared to single-task conditions, but these benefits turn into costs as the cognitive task increases in complexity (Frazier and Mitra 2008). One interpretation of this nonlinear pattern is that directing full attention to walking or balancing is unnatural and detracts from motor coordination; hence, a simple cognitive task helps by providing an external attentional focus. However, once cognitive complexity exceeds one's available capacity, performance costs are commonly observed.

Fine motor performance has been examined using finger sequencing and reach-to-grasp protocols measured under single- and dual-task conditions. These investigations reveal similar patterns of age-related increases in dual-task costs. As well, functional neuroimaging studies of older and younger adults performing hand or foot movements, finger sequencing, or tapping commonly show patterns of greater neural activation with age in prefrontal and sensorimotor cortical areas. In contrast to functional neuroimaging studies of visual and auditory tasks, in motor performance studies, it is less common to observe under-activation of regions more associated with peripheral processing that are more typically recruited in young adults.

More recently, portable neuroimaging (functional near-infrared spectroscopy) of walking has revealed that prefrontal brain regions are more involved in walking while talking compared to walking alone and that older adults underutilize the prefrontal cortex to coordinate dual-task performance. Findings from clinical populations provide convergent evidence for the link between cognition and mobility: Patients with Parkinson's and Alzheimer's disease exhibit more gait abnormalities when performing a simultaneous cognitive and walking task compared to healthy controls. Intervention studies targeting cognitive attentional training have led to improved gait speed, standing balance, and dual-task walking and balancing (Seidler et al. 2010; Yogev-Seligmann et al. 2008).

Theoretical Perspectives

Based upon the variety of findings reviewed, a number of explanatory models have been entertained (Schneider and Pichora-Fuller 2000, for an overview). Perhaps the simplest model, *sensory deprivation*, proposes that long-term decline in the sense organs leads to deterioration and atrophy of higher-level cognitive structures. The strong view of this model (irreversible deterioration) has been disconfirmed in studies showing improved cognitive performance following treatment to correct peripheral deficits, although these findings are mixed. A future aim would be to correct for more than one aspect of aging sensory functioning at a time. Further, the sensory deprivation view appears more applicable to the aging of vision and hearing than to motor processes, at least in its strictest form. A more parsimonious but indirect possibility is that declining hearing, vision, and mobility may lead to social withdrawal as activities become more effortful. This in turn might lead to cognitive under-stimulation and eventual cognitive deterioration.

A second major view is the *common-cause hypothesis*, stemming from the original BASE correlational findings. This view states that a third general factor underlies multiple domains of age-related decline. Candidate common factors

include: global neural degeneration, dopaminergic transmission efficiency, behavioral slowing, and genotypic variation. This perspective holds appeal in light of correlations between sensory measures and cognitive measures that have no obvious sensory requirement (e.g., letter fluency). However, as Schneider and Pichora-Fuller (2000) have noted, the third-factor explanation assumes that there is modularity or functional independence of sensory and cognitive systems, which is a debatable assumption.

Quite different from a modular view is the *shared resource* or *integrated system* view, which states that perceptual and cognitive systems share neural structures and resources. Within this perspective, cognitive decline could influence performance on perceptual tasks, and conversely, increased perceptual or motoric challenge would draw more resources from cognitive networks. Age-simulation designs, in which increasing sensory load results in reductions to cognitive performance, support the shared resource view. Similarly, studies in which cognitive load is increased by adding task complexity or by adding a concurrent task frequently result in costs to perceptual or motor performance.

Related to this is the *cognitive compensation* perspective, as illustrated in functional neuroimaging studies showing supplementary brain activation in prefrontal or contralateral regions more so in older than in younger adults and in behavioral studies of word perception in which older adults benefit more from the presence of semantic context as compared to young adults. Across auditory, visual, and motor aging literatures, the strict criterion for cognitive compensation is the observation of age-equivalent performance levels. However, age equivalence may not be attainable when cognitive resources are not sufficient to both compensate for sensory/sensorimotor declines and address the cognitive demands of the task at hand (Seidler et al. 2010), for example, when auditory memory encoding processes are disrupted by presenting stimuli in noise (Schneider et al. 2010).

Future Directions

The work on sensory/sensorimotor aging and its effects on cognition are moving toward further consideration of cross-domain and reciprocal interactions. For example, epidemiological work links hearing acuity and mobility, showing that older adults with hearing impairment are at greater risk of falling than their normal-hearing peers. Also on the topic of age-related hearing loss, combined audiovisual presentation shows promise in improving performance on comprehension and working memory tasks. In future work, longitudinal designs will be essential for the elucidation of lead-lag relationships among domains of functioning and should move beyond the aim to identify candidate common factors, taking into consideration the possibility of cognitive compensation. Currently these aims have been examined using distinct methodological approaches. The emerging research also calls for a closer examination of the sensory and motoric requirements inherent in standard neurocognitive assessment tools and adaptations to improve measurement sensitivity and specificity. Further work on the implications of combined sensory and cognitive impairments for everyday functioning would complement existing work showing that cognitive status plays a significant role in how well those with sensory impairments fare with activities of daily living (Heyl and Wahl 2012). Lastly, elucidation of the limits of sensory correction (e.g., hearing aid use) within complex real-world environments with multisensory and cognitive demands (postural control, multitasking) will better inform clinicians, end users, and industry.

Cross-References

- ▶ Australian Longitudinal Study of Aging (ALSA)
- ▶ Common Cause Theory in Aging
- ▶ Dual Sensory Loss

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Sexuality and Aging

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Synonyms

Attitudes toward sexuality and aging; Geriatric sexuality; Sexual behavior; Sexual dysfunction; Sexual expression in older persons

Definition

Sexuality and aging are a complex field, with attitudes toward sex and sexual expression characterized by factors such as historical context, cultural, and societal expectations as well as

shaped by numerous biological, psychological, and relationship factors.

Introduction

People have increased longevity, and with this comes the notion that they are sexually active for a longer period of time. Biomedical interventions have enabled older people to maintain an active sex life as well as vitality in the bedroom. However, it has only been within the last few years that research has investigated the sexual behavior of older adults, rather than relying on the stereotype that as people age, the need and desire for sexual activity may be less prominent (Marshall 2012). Over the past decade, clinicians and researchers in this field have acknowledged some of the factors associated with sexual functioning in older people, such as the availability of a partner as well as good physical health. It is only recently that the expression of sexuality and sexual behavior in people over the age of 50 years has been explored. This entry presents an overview of the history to sexuality and aging followed by the contemporary view of sexuality, including current attitudes, cultural differences, and sexual expression, in addition to differences between generations on marriage, cohabitation, and dating. It also considers the factors associated with sexual functioning and treatment in older people, with implications for clinical practice and future directions.

From Historical to Contemporary Views of Sexuality

Before the medicalization of sexual dysfunctions, loss of interest in sex as well as ability to function sexually was generally viewed as part of the natural aging process. If individuals experiencing sexual difficulties were to seek treatment, they may have been offered counseling to assist them to adjust to the changes in their bodies, rather than receiving interventions to address the problem. Pioneers in the sex research field, Masters and Johnson (1966) suggested that sexual activity was still possible among older people and that although some adjustments should be made in accommodating physical and health changes, sex could be enjoyed into older life by placing an emphasis on intimacy, rather than sexual performance. Although the nature and frequency of sexual activity may vary for individuals, there was little evidence available to suggest what was "normal" in regard to sexuality and sexual expression in older people.

The availability of medications to improve sexual functioning, such as the release of Viagra in 1998, has driven the more recent view that older people can maintain a healthy and active sex life. In addition, more is now known about effective therapies for the treatment of sexual dysfunction. Despite this, there is a poor understanding of the factors associated with the continuation and maintenance of sexuality for older people as well as what healthy aging in regard to sexual expression may encompass. There is limited research available on people over the age of 50 to suggest what they are currently experiencing and what they would like to experience in regard to their sexual expression. Given the health and lifestyle factors associated with aging, it is likely that the expression of sexuality will differ from when they were younger. For example, some older people may feel relieved, as they may not want to be as sexually active as they were previously, perhaps due to physical frailty or that they do not perceive sex to be important in the relationship. For others, it may be that sex is critical, and sexual expression will continue into older age, including kissing, touching, and hand-holding. Thus, numerous factors including cultural standards, societal expectations, and individual features may influence sexual behaviors in older age people.

Contemporary Views of Sex

In general, the population has lower mortality rates and an increasing aging population. The focus on physical illness and disease in aging has shifted to the maintenance of good health, with continued sexual functioning being viewed as a positive aspect of the aging process.

Specifically, the "baby boomers" have experienced the sexual revolution of the 1960s and other social changes such as the feminist and gay rights movements. This indicates that there may be a changing of societal norms, values, and trends in relation to sexual attitudes and sexual behavior, and what is socially acceptable may differ for this generation in comparison to previous cohorts of older people. It is highly likely that people within the "baby boomer" era will have very different views and expectations of sexuality. Therefore, previous data on sexual behaviors and expectations in the aging population may no longer be relevant to present-day aging.

Attitudes to Sex and Sexual Expression

To date, there have only been a few studies that have examined the sexual attitudes and behaviors of men and women above the age of 50. The National Social Life, Health, and Aging Project (NSHAP) (Waite et al. 2009), the National Survey of Sexual Health and Behavior (Herbenick et al. 2010), and the American Association of Retired Persons (AARP) study (Fisher 2010) provide some important insights into the attitudes and sexual practices of people aged over 45 years.

Sex and Sexual Behavior

Studies have demonstrated gender differences in attitudes toward sex as well as differences between age cohorts within the aging population. In a study of 1,670 adults over the age of 45, Fisher (2010) found that of the 1,487 people who completed the survey aged over 40 years, 80% of all men and 62% of women under the age of 70 years rated a "satisfying sexual relationship" as important to their quality of life. Only 8% of women over the age of 70 years reported that they agreed with the statement that "sex is only for younger people." Gender differences have also been found in the literature, with men of all ages rating themselves as more positive about sex and sexual expression than women, regardless of the circumstances (i.e., whether married, dating, or single). Among women, 71% believed there was too much emphasis on sex today, compared to 58% of men. On the other hand, 67% of men agreed that sex is critical in a good relationship, compared with 50% of women in the sample.

In another study, of men aged 57–64 years, 68% agreed with the statement "Sexual ability decreases with age" (Waite et al. 2009). This increased to 72% of those aged between 65 and 74 years and 78.5% of men aged between 75 and 85 years. For women, the findings were 71%, 83%, and 89%, respectively. Nevertheless, conservative attitudes remain among the older cohort, with many asserting that "religious beliefs guide their sexual behavior" (Waite et al. 2009). In a review of the literature, DeLamater (2012) concluded that a substantial proportion of older people are more likely to believe that sex declines in importance as they age. Moreover, further analyses of the AARP data conducted by DeLamater and Sill (2005) found that men and women who agreed that sex was important also reported significantly greater levels of sexual desire compared to those who did not rate sex as important. Thus, positive attitudes toward sexuality appear to be important for the maintenance of sexual activity in older people. It is also critical to consider the factors that may influence the importance that people place on sexual activity as they age. For example, the burden associated with becoming a caregiver for aging parents, looking after grandchildren, or transitioning into the role of the carer for a partner with declining health may impact on the desire or importance of sex in the relationship.

It has been demonstrated that healthy and physically active individuals over the age of 45 years report greater satisfaction with their sex lives than those who report health problems or increasing physical frailty. Indeed sexual satisfaction decreases sharply with age. Fisher (2010) reported that 12% of the respondents were more satisfied with their sex lives at present than they were 10 years ago, but 46% were currently less satisfied. In a study of sexual activity in adults aged 57 years and older, Waite et al. (2009) found that the most commonly cited reason men gave for not engaging in sex was the health of their partner. Supporting this, the most common response from women was that their own health limitations interfered with sexual activity. Also critical is the

importance of maintaining a sexual relationship for a couple and whether the level and nature of sexual activity throughout their lives is related to a decline in sexual activity in older age.

Sex and Sexual Expression

It has been suggested that older people may consider the use of other forms of sexual activity, such as oral sex and self- or mutual masturbation, when vaginal sex cannot be part of their repertoire. However, one study has shown that 62% of men and 53% of women aged 57–64 reported they had "any" oral sex in the preceding year, which compares with only 28% of men and 36% of women in the 75–85 year age range (Waite et al. 2009). Moreover, studies have shown that a large proportion of older people still engage in vaginal sex in their later years. Herbenick et al. (2010) found that vaginal intercourse was reported by 58% of men and 51% of women aged 50–59. This declined to 43% among men over the age of 70 and more sharply to 22% among women 70 years and older. Similarly, of people aged 57–64 years, 87% of women and 91% of men stated that vaginal intercourse is "usually" or "always" part of sexual activity (Waite et al. 2009). In older cohorts this diminished to 75% of women and 84% of men who indicated that vaginal sex was usually or always part of sexual activity. Thus, people aged above 75 years may not consider the use of oral sex as a substitute for vaginal sex. This may change over time in aging baby boomers, who have more liberal attitudes toward sex and sexuality and who may continue to engage in higher rates of oral and vaginal sex than current cohorts of older people.

DeLamater (2012) found that solo masturbation was common among the older cohort (70+ years), with 46% of men and 33% of women indicating they engaged in this behavior. Interestingly, men with partners were less likely to engage in solo masturbation, whereas for women, solo masturbation was unrelated to partner status. However, some caution in regard to sexual behaviors such as masturbation is advised, given the possibility of a "cohort" effect influencing women who came of age after sexual revolution of the 1960s rather than an effect driven by biological age (Waite et al. 2009).

Marriage, Dating, and Cohabitation

Fisher (2010) found that the number of people aged over 45 years who believe that unmarried people should not have a sexual relationship dropped from 41% 10 years ago to 22% in 2009. This suggests that people in this generational cohort may be more accepting different forms of relationship and that more people over the age of 45 may be willing to seek a sexual partner if they are widowed or divorced. In particular, the baby boomers have demonstrated more accepting attitudes toward divorce and remarriage as well as cohabitating without marriage. In the study by Fisher (2010), 54% of the participants stated that they were married, and 15% stated that they were dating or engaged, which included those who were single, divorced, and widowed and those who were separated and dating. Interestingly, those who were married reported less sexual satisfaction than those who were currently dating (52% compared to 60%).

Overall, significant gender differences have been found in the research, in that generally men report higher levels of sexual activity and place a greater level of importance on sex in the relationship than women. However, caution is warranted as men are more likely to be partnered, particularly in the older cohort studied (i.e., over 75 years), when compared to women. Women tend to live longer than men and are unlikely to re-partner in older age, explaining to some extent why there is a sharp decline in reported sexual expression in older women (Herbenick et al. 2010). Moreover, Waite et al. (2009) found that among women without a current partner, disinterest in sexual activity increased with age, suggesting either that the lack of a partner in itself lowered sexual interest or that no longer seeking out a partner might have lowered sexual desire. This is in contrast to older men without a partner who still expressed interest in finding a partner (Waite et al. 2009).

Cultural Perspectives

The limited research investigating attitudes toward sexuality and sexual expression in older people has predominantly involved Westernized cultures. Therefore, there is relatively little

information available regarding cross-cultural perspectives of sexuality and aging. However, the few studies that have been conducted in non-Westernized cultures have demonstrated substantial differences between the Western and Asian cultures. A study of 26,000 people aged between 40 and 80 years found that both women and men from China, Japan, and Thailand reported that sex was significantly less important than their Western counterparts (Laumann et al. 2006). Moreover, their sexual satisfaction was significantly lower than men and women from Western countries. People from Asian countries also reported lower levels of satisfaction with their relationships. Nevertheless, gender differences in beliefs about the importance of sex in the relationship and sexual satisfaction remained consistent across the countries; with men reporting higher rates of sexual satisfaction and importance on sex than women (Laumann et al. 2006), a finding that is also reflected across Westernized cultures.

A study by Yan and colleagues (2011) also found gender differences when they investigated the meaning of sexuality for Chinese men and women aged 61–85 years. Specifically, women who were interviewed reported that sex was part of their responsibility to procreate as well as to fulfill their husband's sexual needs, and men reported that sex was important for fulfilling their physical drive. Both genders though agreed that kissing, hugging, and caressing were not "sexual" activities. Interestingly, both felt that sex was neither pleasurable for women nor that it was needed in a similar manner to men (Yan et al. 2011). The differences in sexual expression and attitudes expressed by Western or non-Western cultures highlight the importance of considering the cultural context of sexuality, both in regard to assessment for people who present within the clinical setting and directions for further research. These studies demonstrate some of the complexities in understanding factors associated with sexuality and aging.

Aging and Sexual Functioning

It has been widely accepted that with increasing age, there is deterioration in sexual activity and functioning. This is based largely on the research findings showing strong links between aging and a decrease in sexual functioning. However, the findings are varied in more recent studies. For instance, research shows that erectile dysfunction, but not premature ejaculation or low desire, was found to be associated with age (Waite et al. 2009). It was also found that with the exception of lubrication issues, there were no major differences in the level of sexual dysfunction among women in younger (i.e., 57–64) and older (i.e., 75–85) age groups (Waite et al. 2009). It has also been suggested that sexual desire and frequency of orgasm decrease with age. However, this does not appear to be the case, with research showing that for partnered women and men, it is the decline of physical vitality rather than a decline in sexual interest that impacts most on their sexual functioning (Waite et al. 2009).

Factors Associated with Sexual Functioning

There are many factors that may have an impact on sexual functioning as we age – related to biology, psychology, and relationships. It is important to recognize that sexual functioning may not decrease as a direct result of the aging process, but that older individuals have increased risk of developing health concerns, which may impact on sexual functioning.

Biological Factors. There has been extensive research on the associations between aging, medical conditions, and medication as factors associated with male sexual dysfunction. Aging has been found to be a strong predictor for erectile dysfunction. In particular, Laumann et al. (2007) reported a several-fold increase in moderate to severe dysfunction with age, particularly between the ages of 40–49 years. A lack of interest in sex has also been demonstrated to be associated with age and the aging process. However, it has been found that age does not appear to increase the risk of all sexual dysfunctions for men. For instance, one study has shown that while age was a significant factor in predicting erectile dysfunction and problems with low sexual desire, it did not predict problems with delayed ejaculation or premature ejaculation (McCabe and Connaughton 2013).

Although there is less research on the biological factors associated with female sexual functioning, the influence of hormonal, neurological, vascular, and anatomical factors is recognized (McCabe et al. 2010). For women, life stage changes – such as pregnancy, childbirth, and in particular, menopause – have been shown to impact on sexual functioning. Lubrication problems with age have been well documented (McCabe et al. 2010). Hormone level changes are not restricted to women, but in both genders; it tends to be associated with a reduction in sexual functioning.

The reduction in sexual functioning in the course of aging may have several explanations. With a growing aging population, the risks of medical conditions such as diabetes mellitus, hyperthyroidism, high cholesterol, lower urinary tract problems, prostate disease, and cardiovascular disease also increase. All these conditions have been found to be associated with sexual dysfunction (Laumann et al. 2007). Of note are medical conditions such as vascular and endocrine difficulties that may lead to decreased penile blood pressure, which, in turn, exacerbates the difficulty developing and maintaining an erection. Other conditions such as arthritis may cause sexual activity to be very painful and therefore restrictive. Neurological conditions such as dementia and Parkinson's disease may act as both precipitating and maintaining factors for both male and female sexual dysfunction. Moreover, not only does the risk of complex medical conditions increase with age, but the use of medications, such as antihypertensives and antidepressants (McCabe and Connaughton 2013), as well as the hormonal contraceptive pill has become more prevalent, which have also shown to impact sexual functioning.

Psychological Factors. There are a number of psychological factors known to influence sexual functioning in men and women. Studies of women have found that low levels of sexual desire tend to be associated with negative attitudes toward sex in the family of origin (Giles and McCabe 2009). Other research has found that more severe problems in arousal and orgasm are related to negative current attitudes toward sex for both men and women (McCabe and Connaughton 2013; Giles and McCabe 2009). An individual's level of general anxiety has been associated with poorer sexual functioning irrespective of gender, as is depression and stress and comorbid anxiety and mood disorders.

Negative beliefs and thoughts related to poor body image have been identified as factors that may predispose, precipitate, and maintain sexual difficulties and low sexual satisfaction in men and women, leading to distraction during sexual activity and increased sexual avoidance. Research shows that men with erectile problems are not only distracted during sexual activity by thoughts of sexual performance (i.e., the maintenance of their erection) but also with concerns of body dissatisfaction and sexual undesirability (McCabe and Connaughton 2013). This has implications for the aging male and female, in that negative appraisal of age-related physical changes may lead to a higher level of risk for the development of sexual problems.

Relationship and Social Factors. Relationship factors may be both a cause and consequence of sexual dysfunction in both men and women. In particular, a lack of intimacy, communication difficulties, and poor relationship satisfaction have all been associated with poorer sexual functioning in both men and women (Althof et al. 2005; Basson 2000). It has also been found that the longer the relationship duration, the greater the risk of sexual dysfunction and that sexual dysfunction in one partner may precipitate sexual dysfunction in the other. Particularly salient for older adults is the impact of life transitions on sexual functioning. The experience of children moving out of home, retirement, the emergence of grandchildren, diminished income, and moving into an aged care facility can all have negative implications for levels of sexual desire as well as opportunity for sexual expression.

Treatment of Sexual Dysfunction

Psychopharmacology. The focus on biological causes of sexual problems and subsequent ready availability of medication such as sildenafil (Viagra), in the late 1990s, resulted in a shift in the medicalization of sexual dysfunction. There is

a substantial body of literature showing that these medications can be effective in the treatment of erectile dysfunction. Moreover, medications for the treatment of other male sexual dysfunctions, such as premature ejaculation, have also been shown to be effective. In contrast, pharmacotherapy for female sexual dysfunction has been of limited benefit. Since the approval of sildenafil for male erectile dysfunction, there has been a search for a similar treatment for women in the form of a "pink Viagra." However, study findings are inconclusive, and currently there is only one drug for female sexual dysfunction approved in Europe and none approved in Australia or the United States. Hormone treatments for female sexual problems have focussed on the delivery of estrogen and testosterone, both of which play key roles in female sexual response (Wylie and Malik 2009). Estrogen therapy is commonly used for sexual dysfunctions in women undergoing hormonal changes due to menopause and target symptoms such as diminished levels of lubrication and decreased vulvar sensation (Wylie and Malik 2009). To date though, there is no direct evidence that estrogen therapy is efficacious in the treatment of female sexual dysfunction, and this is in the context of considerable negative side effects of estrogen therapy that include increased risk of endometrial cancer, gallbladder disease, and venous thromboembolic events (Wylie and Malik 2009). Overall, there is a greater likelihood that men and women in their 50s and 60s have the expectation that sexual expression will continue as they age. Thus, despite the relative ineffectiveness of pharmacotherapy for women, it is nevertheless likely that there will be greater acceptance and use of medications to assist with sexual functioning in the future.

Behavior Therapy. The primary focus of Master and Johnson's (1970) behavioral sex therapy is to assist the couple to re-experience sexual pleasure without the anxiety of performing intercourse. Sensate focus begins by focusing on the pleasure of nongenital touching, followed by sessions involving self-exploration of the genitals, shared genital exploration with partners, intercourse, and finally orgasm. While participating in these tasks, men and women are instructed to focus on the sensations that accompany the experience with an absence of performance demand or excessive self-monitoring, which interfere with sexual functioning. Studies have demonstrated the effectiveness of behavioral techniques to treat sexual dysfunction in both men and women (Berner and Gunzler 2012).

Cognitive-Behavioral Therapy. The cognitive-behavioral therapy (CBT) treatment for sexual dysfunction aims to modify attitudes, beliefs, and expectations underlying the sexual dysfunction. In a review of the literature on couples with sexual dysfunction, Berner and Gunzler (2012) found that CBT successfully improved the sexual functioning of men, particularly those with erectile dysfunction. In women, CBT also was found to be effective for the treatment of hypoactive sexual desire disorder and was somewhat effective for the treatment of vaginismus (Berner and Gunzler 2012). Couple therapy using CBT has also resulted in significantly improved overall sexual functioning for women.

Although age is associated with an increased risk of sexual dysfunction, it is also the case that such dysfunction is not an inevitable outcome of the aging process. All the above data needs to be considered in light of large numbers of men and women above the age of 65 years reporting good sexual functioning well into their 80s and 90s (Waite et al. 2009; Herbenick et al. 2010; Fisher 2010).

Challenges, Considerations, and Future Directions

Given only a few studies have investigated the prevalence of sexual activity in later life, it is difficult to generalize from these findings about what may constitute a "healthy, sexual relationship" in people aged over 50 years. Further research is required in order to obtain a good understanding and awareness of how to provide adequate support and accurate information for older people who want to remain sexually active. It would also be useful to gain a deeper understanding of the meaning of sexuality in older age persons by utilizing qualitative research methods.

In this way we can better understand not only what older people are currently experiencing in their sexual lives but also what they would like to experience. This information would not only enhance understanding but could be used to facilitate the development of interventions to assist older people to achieve their goals.

Training for Medical Practitioners

Research has shown that older people tend not to seek assistance from their medical practitioner, largely due to the assumption that the sexual difficulties are a "normal" part of aging. This would be better managed were medical practitioners, health-care nurses, and psychologists given additional training to enhance screening, assessment, and evidence-based treatments for sexual difficulties in this population. Most importantly, providing basic training and awareness to practitioners to inquire about sexual health and sexuality in older clients is imperative (Hinchliff and Gott 2011). Given the high level of shame and embarrassment of sexual dysfunctions, previous research has suggested that people were more likely to seek help for sexual dysfunctions if their doctor had asked about their sexual functioning in a routine visit during the previous 3 years (Hinchliff and Gott 2011).

Clinicians also need to utilize appropriate assessment strategies across a range of biological, psychological, and relationship factors to formulate suitable treatment recommendations for older men and women who are challenged by difficulties in sexual function. For example, research has shown that erectile difficulties are one of the most common reasons why men seek medical assistance. Screening for possible causes – whether medical, pharmacological, psychological, or relationship based – is important when men present to their medical practitioner for treatment. Moreover, there may also be a lack of education in regard to sexual expectations in older people. For example, DeLamater (2012) suggested that some people with heart conditions may fail to initiate sexual activity with their partner because of fears that it may lead to negative consequences. This demonstrates that clinicians have an important role in the education of men and women regarding their sexual health as well as appropriate strategies to address sexual dysfunction (see chapter "▶ Training Psychologists in Aging").

The Use of the Internet to Facilitate Understanding and Treatment

The use of online technologies as a way of accessing information, communicating with health professionals and groups, as well as Internet-based therapies is also worthy of consideration for this particular age group. Using Web-based programs and apps on mobiles is becoming increasingly common. This has important implications for the accessibility of information, communication with others via chat rooms, as well as the use of social media to form new friendships, seek social support, and maintain connections with others. In particular, given the embarrassment and shame surrounding seeking advice from medical professionals in regard to sexual functioning and the limited training and awareness by medical professionals to ask about sex lives, Internet-based treatments (also called e-therapy, Web-based therapy, and cybertherapy) for sexual dysfunction are likely to grow in popularity. Either group or individually based therapy provides privacy, is convenient to clients, and is accessible to geographically isolated members of the community, as well as people who find it difficult to leave the house due to limited mobility. The anonymity inherent in Internet-based therapy may be especially helpful in attracting older clients with sexual difficulties, who may otherwise delay or avoid treatment opportunities due to misconceptions with sexual dysfunction, such as sexual difficulties resulting from the "normal" aging process.

Over the past decade, clinicians and researchers in this field have begun to investigate the effectiveness of Internet-based sex therapy for a variety of male and female sexual difficulties. However, given the complexities with medication use and health factors associated with aging, Internet-based programs must also recommend screening for health concerns and biologically based factors commonly associated with sexual dysfunction by a medical practitioner. Another consideration in regard to the use of the Internet

is that given research on sexuality and aging is relatively limited, sexual information on the Internet may not necessarily be correct or relevant for older populations. Therefore, it is imperative that clinicians can provide information that is accurate, evidence based, and tailored to the needs of this particular demographic to clients.

Nursing Homes and Sexuality

It is expected that the number of people in the population above the age of 70 will increase substantially over the coming decades. The implication is that more people may need to access nursing homes and other support accommodation facilities which may not be conducive to the changing view of sexuality and positive aging. It may become difficult for married couples living apart to continue a sexual relationship. Living conditions in nursing homes and supported accommodation tend to lack of privacy, have few separate rooms, and poor staff education in regard to the importance of sexual activity for older adults – all of which curtail sexual expression between partners (Roach 2004). Moreover, sexual behavior in the nursing home may be viewed as an inappropriate behavior by staff and family members, who may resort to seeking medical interventions to alleviate shame and embarrassment of reports of sexual behaviors from their family members. In addition, although people who identify as gay, lesbian, bisexual, and transgender orientation are increasingly accepted in society, they may face discrimination when they require access to aged care facilities and wish to share accommodation with their partners. This highlights the need for education and support to nursing staff as well as a better understanding of the sexual needs of those in residential care (see "► Retirement Villages" for a more comprehensive review).

Conclusion

The importance of maintaining a healthy level of sexual activity will likely increase as more people live longer and live in better health than previous generations. More liberal attitudes toward sexuality and sexual expression are likely as the expectations of being sexual continue throughout the aging process. While a shift has occurred in the definition and awareness of what constitutes "normal" sexual functioning for the aging population, these perceptions and expectations may be based on a society that highly values medication and antiaging products. However, further research needs to investigate narratives of the meaning and understanding of aging and sexuality. Although societal and cultural factors are important in shaping expectations of sexuality, ongoing sex and sexual expression is a process that is highly individual and is based on the physical, psychological, and social health of the couple.

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Sleep Effects on Cognition with Aging

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Synonyms

Aging; Attention; Circadian rhythms; Longevity; Memory; Older adults

Definition

Sleep is important to optimizing memory and cognitive functioning in young adults. With increasing age, sleep becomes fragmented and decreases in quality. Evidence suggests that getting good sleep quantity and quality can predict how well cognitive functioning is preserved in older age.

Introduction to Sleep

Sleep has historically been conceptualized as a period of time in which the body restores itself. It is perhaps surprising then that many individuals sacrifice sleep on a nightly basis. According to Gallup polls, the percentage of Americans sleeping for 6 or fewer hours per night has risen from 11% in 1942 to 40% in 2013. Rather than validating the propensity to cut back on sleep, current research suggests that sleep serves multiple functions and could be most important for the brain. Consider, for example, the last time you only slept for 3 or 4 h. You likely experienced an inability to focus and to learn in class, as well as feeling a relentless internal drive to fall asleep.

Like hunger and thirst, the internal drive to sleep persists until the need is met, and there are serious consequences to not sleeping. When rodents are kept awake for two weeks, they die (Rechtschaffen et al. 1989). In rare cases, humans have stayed awake for several consecutive days (the longest confirmed case was 11 days), and in such cases these individuals experienced cognitive deficits and hallucinations. Thus, the functions of sleep are vital and likely more diverse than a simple shut-down-to-restore mechanism.

To understand the functions of sleep, one needs first to understand normal sleep physiology in adults. The most common approach is to use *polysomnography* (PSG), which refers to the electrophysiological recordings of brain waves (EEG), muscle activities, eye movements, breathing rates, and heart beat rhythms. PSG recordings have revealed that adults cycle through stages of sleep throughout the night. Therefore, "sleep" is actually an umbrella term that encompasses

physiologically distinct rapid eye movement (REM) stages and non-REM stages. A full cycle of the sleep stages takes approximately 90 min and most adults will have five to six cycles per night.

Adults first enter Stage 1 of non-REM sleep, which is considered to be a transitional state between sleeping and waking. Participants who are awoken during Stage 1 sleep will sometimes contend that they were not truly asleep (though they often cannot describe what was on their mind prior to the awakening). Stage 2 of non-REM is considered to be "true" sleep (Martin et al. 2000) and is represented by slower EEG activity (<8 Hz) interleaved with bursts of thalamocortical sleep spindles. Individuals next enter into non-REM Stages 3 and 4, which are characterized by even slower EEG oscillations (<4 Hz) and are therefore collectively referred to as *slow wave sleep* (SWS). Slow EEG oscillations are generated in the neocortex (particularly in frontal regions) (Massimini et al. 2004) and are believed to orchestrate the firing of both sleep spindles and hippocampal-cortical sharp wave ripples (Buzsáki 1998). Subcortical and sensory systems are largely suppressed during SWS, thus leaving a quiet background for the aforementioned neural activity (Buzsáki and Peyrache 2013; Logothetis et al. 2012). Following these non-REM stages, the sleeping brain enters into REM sleep, which is distinguished by vivid dreaming and increased cerebral blood flow in several regions such as the amygdala (Maquet et al. 1996). Humans spend the majority of the first half of the night in SWS, whereas the second half of the night is dominated by REM sleep and Stage 2 sleep.

Contemporary sleep science has capitalized on the advanced understanding of sleep physiology to link how sleeping "well" (i.e., minimal fragmentation, high levels of REM and SWS) benefits mood, body weight control, cardiovascular function, immune system function, and other aspects of health (Kryger et al. 2011). One of the most active contemporary areas of study concerns how sleep impacts cognitive functioning. Anyone who has pulled an "all-nighter" knows that their ability to maintain attention over a long period of time is greatly diminished. Even more interesting, however, is sleep's role in *memory consolidation*, which refers to the brain's ability to transfer information from short-term storage (e.g., hippocampus) and preserve it in long-term storage (e.g., neocortex).

Sleep and Memory Consolidation

Though scholars have long suspected that SWS and REM sleep actively benefit memory (e.g., Jackson 1884), scientists have only recently been able to experimentally demonstrate this effect. Initial evidence for memory consolidation during sleep arose from animal studies. In the 1990s, researchers recorded the firing rates of single cells to identify how the rodent's hippocampus learned to run a maze. These studies typically showed that particular hippocampal neurons would fire in particular locations in the maze during learning (termed place cells). A turning point for the sleep field came in 1994 when Matt Wilson and Bruce McNaughton (1994) continued to record the hippocampal firing patterns during sleep and discovered that memories (i.e., represented by hippocampal firing patterns) were replayed during sleep. Subsequent work showed that this memory replay was causally associated with memory benefits the following day (Bendor and Wilson 2012).

Since Wilson and McNaughton's (1994) seminal study, psychologists and neuroscientists have conducted hundreds of experiments to translate this research to humans (Rasch and Born 2013). For example, to mimic the paradigm used in animal studies, Peigneux et al. (2004) had participants undergo neuroimaging while learning a virtual maze and then undergo neuroimaging again while sleeping that night. The researchers found that to the extent that the hippocampus showed reactivation during sleep, participants were better at the virtual maze task the next day. Early PSG studies suggested that consolidation of episodic memories (i.e., explicit memory for events) occurs during SWS, and consolidation of procedural memories (implicit, motor, or skill memory) occurs during REM sleep (Plihal and

Born 1997). However, this sleep stage by memory-type distinction remains an area of active debate (Scullin and Bliwise 2015a).

One approach to linking sleep physiology to memory is to attempt to experimentally control memory consolidation during sleep. For example, studies that have directly manipulated features of SWS using transcranial direct current stimulation (tDCS) have demonstrated a causal role for SWS density in episodic memory consolidation. Marshall et al. (2004) had subjects learn word pairs and then tested them 3 h later after SWS or a wake-only interval. They applied tDCS or a placebo stimulation during sleep to affect the density of SWS. Relative to placebo stimulation and wake conditions, tDCS stimulation during SWS led to significantly greater SWS density and greater word retention (i.e., memory consolidation).

Similar evidence for a causal role of SWS in memory consolidation arises from the targeted memory reactivation procedure (Oudiette and Paller 2013). In this approach, participants learn a series of card pair locations on a grid (e.g., try to remember the grid locations of matching cards such as two pictures of a cat). Every time a card is studied (e.g., picture of a cat), it is paired with an associated sound (e.g., "meow" sound). Participants are tested on their memory of the card locations following a sleep or wake interval, but critically, during the sleep or wake retention interval, the experimenter plays half of the sounds that were previously studied. The central finding of this literature is that reactivating memories (via replaying the associated sounds) is more likely to improve later memory when reactivated during sleep than during wake, and especially if the episodic memories are reactivated during SWS (Rasch et al. 2007). Thus, there is strong evidence for sleep being conducive to episodic memory consolidation. One noticeable feature of this literature, however, is that the preponderance of evidence has emanated from studies of healthy young adults (ages 18–30). The remainder of this chapter focuses on how age-related changes in sleep quality, quantity, and physiology affect cognitive functioning, memory consolidation, and may even increase risk for dementia.

Changes in Sleep in Advancing Age

Of all the changes in behavior and physiology that are observed with advancing age, changes in sleep are one of the earliest and most pronounced (Bliwise 1993). These age effects on sleep are summarized in Table 1. First consider subjective evaluations (i.e., complaints) about sleeping. Individuals can fall asleep as easily as young adults, but they typically fall asleep earlier in the evening. Many older adults complain of frequent nighttime awakenings as well as waking up too early and not being able to fall back asleep. Individuals often introspect that the cause of their sleep fragmentation is due to nocturia, or the need to use the bathroom in the middle of the night. However, there exists a debate as to whether a full bladder causes awakenings from sleep or if instead individuals wake up due to other causes (e.g., sleep apnea) but simply attribute the awakening to their bladder. Regardless of mechanisms, because sleep is more fragmented in older adults, *nocturnal* sleep duration is typically shortened. Total sleep time over a 24-h period may however be preserved due to an increased frequency of napping with increasing age.

Next consider physiological studies of sleep (PSG). Several age-related changes to sleep stages are consistently observed (Table 1). Older adults spend more time in the "light" stages of sleep (Stages 1 and 2 of non-REM sleep) than young adults, which may contribute to their sleep fragmentation because one is easily awoken during Stages 1 and 2 of sleep. REM sleep may also demonstrate some changes with normal aging (and particularly with Alzheimer's disease) such as decreased density of REM burst activity. The most profound age-related change in sleep physiology appears to be to SWS. Older adults show about half the amount of SWS as young adults, and there even exist studies in which *zero* minutes of SWS were observed at night in *any* of the older adults who participated. Such observations are most likely to occur in very old men, because on average females display more SWS than males. Almost every EEG aspect of a slow wave is affected in older adults: slow waves are smaller (lower amplitude), faster

Sleep Effects on Cognition with Aging, Table 1 Changes in sleep behavior and physiology with increasing age

Sleep issue	Effect of aging	Description
Subjective (self-report) observations		
Sleep onset latency (falling asleep)	None or minimal	Older adults can usually fall asleep as easily as young adults
Nighttime awakenings (fragmented sleep)	↑ with aging	Increased nighttime awakenings indicate fragmented sleep and can affect perceived sleep quality
Nocturia (waking up to void)	↑ with aging	Need to use the bathroom in the middle of the night may fragment sleep
Early morning awakening	↑ with aging	Waking too early may decrease total sleep time
Phase advance (timing of sleep/wake cycle)	↑ with aging	Older adults fall asleep earlier in the evening, which may contribute to early morning awakenings
Physiological (polysomnography) data		
Stage 1 NREM sleep	↑ with aging	Increased time in these "light" sleep stages may contribute to sleep fragmentation
Stage 2 NREM sleep	↑ with aging	
REM sleep	↓ with aging	Density of REM burst activity decreases and may precede development of dementia
Slow wave sleep (SWS)	↓ with aging	Decreased SWS may impair episodic memory consolidation during sleep
Sleep apnea	↑ with aging	Sleep apneas cause sleep fragmentation and hypoxia and impair memory consolidation

(i.e., higher frequency), less continuous (i.e., lower density), and are altered in morphology (e.g., the slope of the slow wave is affected) relative to young adults.

Beyond sleep stages, PSG studies show that older adults are at increased risk for developing several sleep disorders, for example, sleep apnea, which is a condition in which individuals may stop breathing for $\geq$10 s and, in particularly severe cases, for over a minute. Apneas may repeat hundreds of times every night and go unrecognized for years, but they are problematic because they cause sleep fragmentation and deprive the brain of oxygen (hypoxia).

The causes of poor sleep with advancing age are still being studied, but several factors such as a sedentary lifestyle, physical pain, depression and anxiety, reduced exposure to zeitgebers (e.g., sunlight), nocturia, use of medications that disrupt sleep architecture, and atrophy in regions that are important to sleep maintenance (e.g., ventrolateral preoptic area, suprachiasmatic nucleus) (Kryger et al. 2011). The take-home message from sleep and aging studies is that most indicators of good sleep quality in young adults are impaired in older adults.

Cognitive Consequences of Diminished Sleep Quality with Aging

If sleep is critical to cognitive functioning in young adulthood (Rasch and Born 2013), but is diminished in quantity and quality with increasing age (Bliwise 1993), then poor sleep may contribute to cognitive aging. The approaches toward addressing sleep's role in cognitive aging have ranged from basic science experiments in animal models to experimental cognitive psychology studies to population-based epidemiological studies (Scullin and Bliwise 2015a).

Self-Report, Population-Based Studies

In many epidemiological studies, individuals self-report how much sleep they are getting, how much they are waking in the middle of the night, and how sleepy they feel during the day. There are now approximately 50 papers that have evaluated subjective sleep quality in relation to objective measures of cognitive functioning in aging adults. These studies often have very impressive sample sizes ($N >$ 100,000 in ref (Sternberg et al. 2013)

that are generalizable to the population. In cross-sectional studies of middle-aged adults (40s and 50s), short sleep and fragmented sleep were frequently associated with poorer cognitive performance on a range of memory and attention tasks (Scullin and Bliwise 2015a). In older age, these correlations were more sporadic. For example, Miller et al. (2014) examined the association between episodic memory and short sleep duration in middle-aged (50–64 years) and older-aged (65+ years) adults and found that short sleep in middle age, but not older age, was associated with poor episodic memory performance.

An interesting theme that has emerged from longitudinal epidemiological studies is that short sleep and fragmented sleep in middle age might accelerate cognitive decline observed by the time one reaches their 60s, 70s, or 80s. There are at least six longitudinal studies that have found that short sleep in one's 40s, 50s, or 60s predicts faster cognitive decline as much as two decades later (e.g., Kulmala et al. 2013; Virta et al. 2013), even after controlling for many demographic and comorbidity variables. The implication is that investing in sleeping well when one is relatively young may have cumulative benefits as one ages.

Polysomnography Correlational Studies

As informative as epidemiological studies have been to showing that sleep complaints are associated with – and can even predict – cognitive decline, such studies are limited by their lack of precision. Using PSG, researchers have attempted to identify the sleep physiological correlate of cognitive decline. Though a few PSG studies suggest that short sleep per se is important to cognitive decline, the majority of the literature suggests that fragmented sleep and REM sleep dysfunction are markers (or potential causes) of cognitive decline (Scullin and Bliwise 2015b). The evidence for poor REM sleep (e.g., low duration or density) exacerbating age-related cognitive decline spans nearly 50 years (Feinberg et al. 1967) and was recently supported by the large-scale Osteoporotic Fractures in Men (MrOS) sleep study. In the MrOS study (Song et al. 2015), 2,601 older adults underwent PSG and cognitive testing (MMSE and Trail Making B) at Time 1 and then repeated cognitive testing 3–4 years later. They found that individuals with low REM sleep and high Stage 1 sleep (i.e., a marker of light, fragmented sleep) showed a twofold increased rate of cognitive decline.

Memory Consolidation Studies

A quickly developing area of research concerns how sleep benefits memory consolidation. Though some of the more exciting recent advances in this area have arisen from the tDCS and targeted memory reactivation approach (Oudiette and Paller 2013), such approaches have yet to be successfully applied in older adults (Eggert et al. 2013). The more common approach to testing for memory consolidation is to teach individuals a memory task in the evening and then retest them following sleeping. Relative to wake-only control groups (i.e., learning in the morning and testing in the evening), this sleep condition is typically associated with better memory. Circadian factors (e.g., morning versus evening testing) tend not to strongly influence consolidation effects (Scullin and Bliwise 2015a), and though reduced daytime interference during sleep has some impact on memory (Jenkins and Dallenbach 1924), qualitative changes in memory traces with sleep suggest active consolidation mechanisms (e.g., Ellenbogen et al. 2006; Payne et al. 2008; Scullin and McDaniel 2010).

If sleep benefits memory consolidation in young adults and if sleep quantity and quality are impacted detrimentally by aging, then one would predict that memory consolidation should also decline with aging. Animal studies support the view that memory consolidation declines with aging. When applying the same hippocampal memory replay procedure used in the classic Wilson and McNaughton (1994) work, researchers have found that memory replay is absent in older rodents (Gerrard et al. 2008). Similar patterns of decreased memory plasticity during sleep have even been observed in *Drosophila melanogaster* (fruit fly) models (Donlea et al. 2014).

In human subject research, most studies have also suggested that memory consolidation declines with aging. Most memory consolidation

and aging studies have used either procedural memory tests or verbal episodic memory tests. Nearly all of the experimental studies (seven of eight) that compared procedural memory (i.e., skill memory or motor memory) consolidation across sleep and wake intervals in middle-aged or older adults have suggested that there is a gradual loss of procedural memory consolidation with increasing age (Scullin and Bliwise 2015a). For example, Wilson et al. (2012) compared 24 healthy young adults, 32 healthy middle-aged adults, and 31 healthy older adults on a motor sequence learning task following wake-only and sleep intervals (within-subject manipulation). They found that the benefit due to sleep on procedural memory improvements was large in the young adults, reduced but present in middle-aged adults, and absent in older adults.

Identifying the PSG correlate of reduced procedural memory consolidation in aging adults has been difficult. In young adults, prospective memory consolidation is typically associated with REM sleep (Plihal and Born 1997) or sleep spindle density (Fogel and Smith 2011). However, attempts to experimentally increase REM sleep or spindles in older adults have had inconsistent effects on procedural memory (Hornung et al. 2007). Other studies have investigated brain activity during sleep *after* learning a procedural memory versus no learning. The idea here is that recently learned tasks should be replayed during sleep and that such replay will be evidenced by greater hemodynamic (fMRI) or electrophysiological (EEG spindles) activity. Using neuroimaging, Fogel et al. (2014) found post-training increases in activation in several frontal, parietal, and hippocampal regions in healthy young adults. No such post-training increases in activation were observed in older adults, suggesting that these older adults were not "replaying" the trained procedural memory task.

Similar age effects emerge for consolidation of episodic memories (explicit memory for events). Scullin (2013) compared the retention of paired word associates across sleep and wake intervals in 57 healthy young adults and 41 healthy older adults. The young adults demonstrated greater episodic memory retention following the sleep interval than the wake interval, as well as a strong positive correlation between retention and amount of SWS. The older adults showed low SWS overall and no sleep benefit to episodic memory retention. This age-related decline in episodic memory consolidation seems to begin well before older age. Backhaus et al. (2007, 2006) found that episodic memory consolidation was impaired in a group of adults in their 40s and 50s, particularly for middle-aged adults who showed very little SWS.

Some of the age-related declines in episodic memory consolidation may be due to declining SWS, but other factors such as age-related atrophy of prefrontal regions and hippocampal regions and diminished prefrontal–hippocampal connectivity likely contribute (Mander et al. 2013). Memory consolidation may even depend on the amount of oxygen saturation levels in the prefrontal cortex during sleep. Most young adults show an increase in oxygen saturation levels from wakefulness to SWS (measured via cerebral oximetry), but most older adults show the reverse pattern (i.e., reduced prefrontal oxygen saturation levels during SWS (Carlson et al. 2008). However, older adults who showed increased prefrontal oxygen saturation levels during SWS performed better on episodic memory tasks (Carlson et al. 2011). Furthermore, Scullin et al. (2012) observed that individuals whose oxygen saturation levels dropped below 90% for 5 or more minutes (measured via pulse oximetry) during sleep showed no sleep-dependent memory consolidation.

Can Sleep Disorders Cause Dementia?

If poor sleep is associated with poor cognitive functioning, then one might wonder whether sleep disorders could increase risk for dementia.

One sleep disorder that is consistently linked to the later development of dementia is REM sleep behavior disorder (RBD). In normal REM sleep, there is muscle atonia (i.e., individuals are paralyzed). The function of this muscle atonia is to prevent individuals from acting out dreams and

hurting themselves or their bed partners. RBD patients, however, will commonly act out violent dreams including fighting pirates, hunting and stabbing deer, and defending oneself against home intruders. There are even dramatic cases of suicide or homicide during sleep. For example, in July 2008, Brian Thomas was dreaming that he was fighting an intruder and woke up to find that he had strangled to death his wife of nearly 40 years. The charges against him were dropped, in part due to his history of sleepwalking, but also due to irregularities in his REM sleep that were observed during a PSG test.

Not only can dream enactment be dangerous, but RBD is often a sign of neuropathology. RBD is associated with dopamine dysfunction and brainstem pathology (including alpha-synuclein deposition and Lewy bodies). Individuals diagnosed with RBD – typically older men – have a 30% chance of developing Parkinson's disease within 3 years and a 66% chance within 8 years (Postuma et al. 2015). In one documented case, RBD symptoms predated the development of Parkinson's disease by 50 years. RBD patients tend to show deficits in episodic memory, executive function, and visuospatial processing and an increased risk for clinical dementia (Vendette et al. 2007).

Though the association between RBD and later Parkinson's disease and dementia is strong, the RBD sleep disorder per se is unlikely to be the cause of the dementia (i.e., the Lewy body neuropathology is presumed to be the cause of both RBD and dementia). The causal link between dementia and sleep may be more direct in Alzheimer's disease. Several PSG studies have found that sleep architecture differs between patients with Alzheimer's disease relative to healthy controls (Bliwise 1993), with the largest deficit being to REM sleep (but also sleep fragmentation and SWS). Moreover, epidemiological studies have found that subjective reports of short and fragmented sleep in middle age are longitudinal predictors of Alzheimer's disease decades later (Benedict et al. 2014). Several studies have also connected poor sleep to the hallmark pathology of Alzheimer's disease – amyloid plaques and neurofibrillary tangles (tau) – by using Pittsburgh Compound B neuroimaging and cerebrospinal fluid (CSF) measures (Ju et al. 2013; Spira et al. 2013). Highly controlled animal studies have experimentally demonstrated that depriving a rodent of sleep leads to a buildup of amyloid plaques and tau deposition (e.g., Kang et al. 2009). Perhaps the most interesting recent advance in this literature is that one of the functions of sleep may be to clear the brain of harmful metabolites. Xie et al. (2013) found that CSF flow increased by up to 60% during sleep and this increase in CSF flow was instrumental in clearing amyloid out of the brain. Thus, losing out on sleep may cause a buildup of amyloid deposition whereas gaining normal sleep may help clear the brain of amyloid. Whether treating sleep disturbances in young and middle-aged adults reduces the risk of Alzheimer's disease or slows general cognitive decline remains a provocative question for future research.

Conclusions

One of sleep's normal functions appears to be bolstering memory consolidation and cognitive functioning. With increasing age, sleep becomes shortened, fragmented, and changed in architecture (e.g., less SWS). These changes are paralleled by declines in cognitive functioning, such as a reduction in memory consolidation. Whether improving sleep in older adults could help ameliorate or reverse cognitive declines is an open question; however, there is now ample evidence that the quality of sleep in youth and middle age has predictive value for how rapidly cognitive functioning will decline years into the future. The practical implication is that people should invest in their sleep throughout the lifespan and, at the very least, during youth and middle age, to promote health, well-being, and graceful aging.

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Cross-References

- ▶ Individual Differences in Adult Cognition and Cognitive Development
- ▶ Memory, Episodic
- ▶ Memory, Procedural
- ▶ Prospective Memory, New Perspectives for Geropsychological Research
- ▶ Psychological Theories of Successful Aging

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Small-Scale Homelike Care in Nursing Homes

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Synonyms

Autonomy; Group living; Person-centered care; Small-house nursing homes; Small-scale living facilities

Definition

Small-scale, homelike nursing homes are an innovative example of long-term institutional care for people with dementia. They reflect a common psychosocial care concept, focusing on residents' autonomy and opportunity for choice, and aim to sustain a sense of self and control. A small number of residents (usually six to eight) live together in a homelike environment, and nursing staff is part of the household. Residents are encouraged to participate in daily household activities, emphasizing normalization of daily life with person-centered care. The physical environment resembles an archetypal home.

Cultural Change

Small-scale, homelike nursing homes are the result of a changing care concept that has been developed during the past decennia's in health and dementia care, in which quality of life and well-being have a prominent place (White-Chu et al. 2009). In dementia care, there is a trend toward deinstitutionalization. Older people want to live at home for as long as possible (also referred to as aging in place), although this is not always feasible as care needs increase. Dementia in particular has a large impact on the ability to live within the local community, and approximately one third lives in long-term institutional care. Long-term institutional care for people with dementia has shifted in terms of philosophy and practice from a medically oriented care environment toward a resident-centered, individualized care environment (Verbeek et al. 2009a). Traditionally, nursing homes for people with dementia were based on a medical-somatic model of care, emphasizing illness and treatment of underlying pathology. Nursing homes were institutions, protected settings in which basic nursing and medical care services were provided aimed at keeping residents safe. Physically, they would resemble hospitals, with long corridors, a nurses' station, and staff uniforms. Their rules and routines governing daily life permit little individualization.

Nowadays, person-centered models of care are prominent in dementia care and emphasize strengthening residents' autonomy and overall well-being. Older people should be enabled to continue their lifestyle as before admission to a nursing home. Program design ensures that residents are known as people. Families are an important part of the care process in small-scale, homelike settings and prepare, for example, biographies for staff (Verbeek et al. 2009a). Furthermore, they not only focus on their own relative in the home but look after other residents as well. Adopting a homelike, person-centered care approach has proven to be very difficult in existing traditional large-scale nursing homes. The care environment often does not match with the therapeutic goals, which is perceived as an important barrier. As a result, new initiatives have been developed in the world that provide health, social, and nursing care in a small-scale and homelike environment. Radical alterations have been made in comparison with traditional nursing homes, implementing changes in the organizational, physical, and social environment of settings.

Worldwide, several small-scale, homelike concepts have been implemented, such as group living in Sweden, group homes in Japan, shared housing arrangements in Germany, the Green House concept in the United States, and small-scale living arrangements in the Netherlands. Some of these have become regular dementia care settings, such as group living in Sweden and small-scale living arrangements in the Netherlands (Verbeek et al. 2009b).

Environmental Characteristics

There is a wide variation of small-scale, homelike care environments for people with dementia across and within countries. The location varies from units in a larger nursing home, toward purpose-built stand-alone facilities in the community. Some small-scale, homelike facilities are situated on the area of a larger nursing home. Stand-alone facilities prevent institutional characteristics to reappear in small-scale, homelike

settings, and being built in the community aims to maintain residents' social network. However, such facilities are often not feasible due to financial constraints and organization of (mental) health care. Physical characteristics of buildings resemble an archetypal home, including a kitchen, laundry area, dining room, and living room (Verbeek et al. 2009b). The vast majority of small-scale, homelike settings have private bedrooms, and some have also private bathrooms. The care environment can be considered as an active component in the dementia care process. Current theories stress that a match is needed between the person's needs, his/her abilities, and environmental demands to elicit adequate behavior in people with dementia, also referred to as person/environment fit (Lawton and Nahemow 1970; Cohen-Mansfield 2000). If environmental demands exceed patients' ability to cope, they have more difficulty to maintain adequate behavior, which decreases their quality of life. These principles have important implications for care environments, especially for people with dementia, as they experience diminished physical and/or mental disabilities due to their illness, increasing the environments' influence on their behavior. Several guidelines have been established on how to design dementia care environments. Most evidence exists for unobtrusive safety measures such as camouflaging exit doors; varying the ambience, size, and shape of space; private bedrooms, big enough for a reasonable amount of personal belongings; and control of stimuli such as noise and lighting (Fleming and Purandare 2010; Calkins 2001). Less evidence exists about the use of signage of various sorts (e.g., colors, objects).

However, to create a homelike environment, changing the physical setting alone is not sufficient as it can only facilitate (Judd 1998). Social and organizational aspects of the environment are necessary components in the development of a small, homelike therapeutic setting. The number of residents usually is between six and ten residents per unit in small-scale nursing homes. The main aim of a small group is to promote social activities and create a family-like structure, although in practice group, size may also be determined by practical considerations such as available space, staffing, and financial issues. A small and fixed team of nursing staff takes care of the residents, which allows for close contact and communication. As nursing staff, residents, and family caregivers form a group, there is opportunity to become familiar with each other. The organizational environment in small-scale, homelike nursing homes is very different from traditional institutional care. In small-scale, homelike nursing homes, residents and their caregivers mainly determine daily life. They can decide, for example, when they want to get up in the morning and have their meals. On the contrary, in traditional nursing homes, the routines of the organization mainly determine daily life. Furthermore, nursing staff has integrated tasks in small-scale, homelike nursing homes, meaning that they are not only responsible for personal and medical care but also organize activities and do domestic chores such as cooking. In traditional large-scale nursing homes, tasks are highly differentiated with separate personnel to assist meals, do activities, and provide nursing care.

Target Population

In general, small-scale homelike care facilities provide 24 h of nursing care to residents with dementia. In practice, characteristics of residents are heterogeneous across settings. Some small-scale, homelike nursing homes are designed for people with dementia in the earlier stages of their disease. Admission criteria to these settings may apply then, such as sufficient mobility and being ambulatory, being able to participate in social activities, or having communication skills. These settings manifest themselves as intermediate care facilities between home care and institutional nursing care. Residents may be transferred when criteria are no longer met. Challenging behavior, such as aggression, is perceived as especially problematic in small groups and that is often seen as a reason to relocate residents in larger nursing homes. Other small-scale, homelike care settings, however, are aimed to provide a home for life and are seen as an alternative to traditional

large-scale nursing homes providing all necessary health and social care services. Despite a similar level of care needs, residents in small-scale, homelike care settings appear to have a better cognitive and functional status compared with residents living in traditional nursing homes.

Experiences

Residents with dementia, their family caregivers, and nursing staff have mainly positive experiences with small-scale, homelike care settings. Research shows that residents with dementia expressed feeling at home because they could maintain their personal characteristics and experience being connected and united within the household. Providing small-scale, homelike care in nursing homes creates structural opportunities for individualized care and attention to the residents' personal needs. The extent to which a nursing home has small-scale and homelike characteristics positively influences occupation of residents with their preferred and diverse activities.

Family caregivers highly appreciate personal contact and attention from nursing staff, not only with the residents but also with family caregivers themselves. They feel a strong sense of involvement and welcome the freedom that small-scale, homelike care puts on making one's own choices. This makes it easier for them in accepting that their relative can no longer live at home, since the environment is adapted to support residents in their autonomy. Furthermore, nursing staff appreciated the broadening of their tasks and had the feeling that they could spend more time with residents. They not only interact with residents during standard nursing care moments but also encourage residents to participate in daily activities. These household chores may serve as a handle for undertaking meaningful activities and provide opportunity for reciprocity. Negative aspects were mentioned as well. Family caregivers indicated a lack of amenities and general facilities such as a restaurant in some small-scale, homelike care settings. Furthermore, nursing staff worked alone a lot, and some missed a team to discuss difficulties and share responsibility.

Effectiveness

Despite the fact that experiences with small-scale, homelike care environments are mainly positive, effects on residents, family caregivers, and nursing staff are limited. Several studies have been conducted in various countries comparing small-scale, homelike care settings with traditional large-scale nursing homes showing mixed results. The most consistent evidence suggests that residents living in small-scale, homelike care environments have more social interaction (de Rooij et al. 2012; Verbeek et al. 2014). Small-scale, homelike settings seem to offer a more attractive environment for people with dementia to encounter meaningful stimuli, thereby enhancing social engagement. Environmental stimuli can influence social engagement, especially when related to real-world tasks (Cohen-Mansfield et al. 2010). This may be due to a lifetime exposure, and, for example, household activities have meaning in themselves, which is an important characteristic fulfilling residents' desire to make oneself useful. Additionally, it is of great importance to individualize activities to residents' self-identity roles by tapping into past experiences, hobbies, and interests as this also increased engagement. Furthermore, less physical restraints are used in small-scale, homelike care settings. This may reflect the difference in care philosophy and organizational context in comparison with traditional nursing homes. For other resident-related outcomes, such as quality of life and neuropsychiatric symptoms, no evidence was found (Verbeek et al. 2010; te Boekhorst et al. 2009; Wolf-Ostermann et al. 2012). Neuropsychiatric symptoms appear similar for residents in small-scale, homelike care settings and traditional nursing homes, although residents in small-scale, homelike care may express sometimes more agitated behavior (e.g., restlessness). Family involvement is similar for both settings. Family caregivers visit equally frequent and perform similar activities. Furthermore, indications for less perceived caregiver burden were found, although more research is needed. In general, higher satisfaction is found among family caregivers in small-scale, homelike nursing homes (Verbeek et al. 2012).

When nursing staff members become more involved with family caregivers and keep open lines of communication as they do in small-scale, homelike nursing homes, family caregivers' satisfaction increases. This may improve their feeling of confidence that their loved one is well being cared for.

Implications for Staff

Nursing staff who work in small-scale, homelike care settings have different roles and tasks compared with staff employed in more traditional facilities. Overall, staff working in small-scale living facilities inclines more toward integrated care: nursing staff members are part of the household and have integrated tasks, including personal and medical care, organizing activities, and daily household chores. For example, in small-scale homelike care environments, daily nursing activities are characterized by working all around and independently, whereas nursing staff in traditional wards collaborate with each other and have differentiated tasks. This affects their job characteristics, such as perceived autonomy, social support, workload, and demands. Nursing staff report a higher perceived autonomy and more social support and experience a lower workload compared with staff working in traditional large-scale settings (Willemse et al. 2014). Furthermore, staff in small-scale, homelike nursing homes encourage residents in their autonomy instead of focusing on disabilities and taking over tasks from residents. Therefore, a culture change within formal care is necessary, as staff should focus on the remaining functional capacities of people with dementia and to encourage their autonomy. The organizational policy of small-scale, homelike nursing homes is important in establishing meaningful social interactions with residents, developing a sense of community, and preserving community roles, thereby creating a supportive environment. Staffing patterns focus on meaningful activities and integrated tasks in a nonhierarchical structure (Smit et al. 2012).

For staff working in small-scale, homelike nursing homes, there might be a tension between the focus on everyday life and the medical needs of older people with complex chronic diseases such as dementia. When normalization of living for older people with dementia is the main focus of interest, there is a risk that professionalism in dementia care may be lost. Social care aspects and the creation of a homelike environment are integral to residents' quality of life and quality of care. However, an exclusive social model of care is inadequate to meet the needs of vulnerable older nursing home residents with dementia (Tolson et al. 2013). Skilled staff with adequate training and education is essential for future dementia care. In small-scale, homelike nursing homes, this is especially relevant as nursing staff work alone during a great extent of the day. They have a large responsibility for residents' care and require skills such as being able to observe, being alert for changes, and being able to respond adequately. Training (both in educational models as training on the job) should focus on dementia and consequences of the disease for caregiving, taking into account the whole residents' system. Since multimorbidity is present in many residents, more knowledge of other chronic diseases highly prevalent in older people (such as cardiovascular diseases or diabetes) and the interplay among diseases are essential. Nursing staff need to know the consequences of the disease for daily functioning and how to support this, taking into account what residents themselves are still able to do.

Future Directions

Small-scale, homelike nursing homes have promoted a continuation of self and normality: knowing the person, welcoming the family, providing meaningful activities, being in a personalized environment, and experiencing flexibility and continuity. This development has encouraged changes in institutional care for people with dementia in a positive way, both in regular nursing homes as well as in the development of new dementia care facilities. The key question in realizing dementia care facilities should focus on how to reach optimal well-being for residents, their family caregivers, and nursing staff in the actual

care provided. This provides opportunities for residents and their family caregivers to make a choice on which care facility suits their wishes and beliefs best.

The working mechanisms of small-scale, homelike care environments and how they exert an effect remain unclear. As a result, changes are implemented in daily practice without knowledge on which components in the physical, social, or organizational environment should be altered and are most effective. The main focus in research and practice has often been on physical aspects of the environment, such as location, design features of an archetypical home (e.g., doorbell, kitchen, and bringing own furniture), and (group) size. This is understandable, since physical aspects are visible, relatively easy to measure, and therefore provide a clear distinction with traditional nursing homes. However, it is the interplay among physical, organizational, and social aspects of the care environment that should be taken into account to realize timely, effective care tailored to the needs of people with dementia.

Cross-References

- ▶ Assisted Living
- ▶ Environmental Influences on Aging and Behavior, Theories of
- ▶ Housing Solutions for Older Adults

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Social Cognition and Aging

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Definition

Social cognition refers to the processes through which people make sense of themselves and others to engage with their social context (Fiske and Taylor 2013). Social-cognitive research draws from models developed in cognitive psychology as a tool for understanding social functioning. A social-cognitive perspective is useful for enhancing our understanding of the aging process, particularly because of the extensive research literature documenting age-related changes in cognition (Salthouse 2012). The cognitive changes that emerge with age paint a complex picture of loss and gain, as some losses in cognitive functioning interact with some gains in knowledge or ability in other domains. Social-cognitive changes with age are made even more complex by the fact that motivational and emotional changes brought about by changes in life goals (Charles and Carstensen 2010) interact with changes in cognitive function to produce diverse patterns of responding.

Determinants of age-related social-cognitive change

Two broad determinants of social-cognitive change with age are investigated in this entry. First, research on cognitive function generally paints a picture of loss as the norm with aging, with older adults typically showing a decline in areas that tap the "mechanics of the mind" such as processing speed, memory, executive function, and complex reasoning (Salthouse 2012). These deficits in cognitive processing often co-occur with other age-related losses, such as reduced physical and perceptual functioning, suggesting an underlying general physical decline. Despite these losses, however, there are also important areas of preserved and even enhanced function in late life. These are usually in domains that tap "experience of the mind" such as vocabulary and general knowledge (Salthouse 2012). In these domains, smaller age differences emerge, and older adults often outperform younger adults. Thus, the first key determinant of social-cognitive change with age is whether the task relies more on mechanics or experience.

Social cognition involves dual processes, with automatic and controlled processes each contributing to, or competing for, social outcomes (Smith and DeCoster 2000). Although aging disrupts processing speed and other factors that play a role in automatic processes, the primary impact of age is on controlled processes (von Hippel and Henry 2012). Because controlled processes are sometimes recruited to inhibit automatic ones, as the influence of controlled processes declines with age, the influence of automatic processes can become more apparent. This interaction between controlled and automatic processes is also influenced by the fact that the two processes appear to operate in a compensatory fashion, such that some automatic processes peak when controlled processes are at their weakest. Thus, a second important determinant of social-cognitive change with age is whether the task at hand relies more on automatic or controlled processing and whether the two tend to work together or in opposition. This entry will outline the broad categories of social-cognitive change with age and the role

that mechanics, experience, and automatic and controlled processes have in determining these changes.

Emotional and Motivational Changes

One group of age-related changes occurs in emotional goals and functioning (Charles and Carstensen 2010). These changes have an important impact on the ways in which older adults process social and emotional information. One marked change in older adults, compared with those who are younger and in middle age, is in the processing of positive and negative information. Many studies have demonstrated an "age-related positivity effect" whereby older adults preferentially attend to and remember positive over negative information (Charles and Carstensen 2010). Interestingly, several studies find that cognitive control resources are recruited to maintain the positivity effect: The positivity effect does not occur when cognitive resources are diverted to a secondary task. In addition, older adults recruit medial prefrontal regions, which have been implicated in top-down emotion regulation processes, when processing negative but not positive stimuli, indicating controlled downregulation of negative emotion (Reed and Carstensen 2012). It has also been demonstrated that older adults with better executive function, that is, older adults who demonstrate greater cognitive control on tasks demonstrated to require top-down, controlled processing, show a greater positivity effect (Reed and Carstensen 2012). This possibility is currently debated, but it suggests that older adults may recruit their limited cognitive resources in an attempt to maintain a positive outlook, a step that is indicative of the potential importance of positivity to older adults.

Emotion regulation is the process by which emotions are increased, decreased, or sustained. When compared with younger adults, older adults also show maintained or even improved emotion regulation (Charles and Carstensen 2009). They are able to implement emotion regulation strategies both before and after the onset of the emotional response with similar effectiveness to younger adults. In some areas, older adults even show better emotion regulatory functioning than younger adults. For example, some studies have demonstrated that older adults are better able to suppress the expression of emotion than younger adults. This strategy is usually cognitively costly; however, other research has demonstrated that emotion suppression incurs fewer cognitive costs for older than younger adults: After suppressing their emotions, younger adults showed reduced working memory performance, but older adults did not. Research examining emotion in daily life has also found that older adults may be better at emotion regulation: after an experience of negative effect, older adults returned to a neutral or positive state more quickly than younger adults. Finally, older adults appear to rely on more effective emotion regulation strategies (e.g., cognitive reappraisal) than younger adults (e.g., expressive suppression). Taken together, this work suggests that older adults rely on the emotion knowledge accrued during their lifetime to implement emotion regulation strategies in a more emotionally intelligent and perhaps less cognitively demanding way.

Cognitive Changes

Executive functions are a group of mental processes responsible for initiating, planning, and coordinating basic cognitive processes. Executive functions include task switching, working memory, and inhibition of thought and behavior. As such, executive functions are not a single ability, but a group of higher-order processes that permit the regulation of cognition. Executive functions recruit frontal brain regions, and these areas are among those affected by age-related deterioration. As a result, aging is associated with declines in executive functioning (Salthouse 2012). These declines in executive function are associated with a wide range of outcomes, which we will briefly discuss below.

Behavioral restraint. Age-related declines in executive function have been linked to a broad range of cognitive deficits, such as disruptions in attention and memory. The consequences of a

decline in executive function, however, are broader than just these cognitive deficits. Executive functions play a central role in social processes, and as a result, the age-related deficits observed in executive function have been found to lead to problems with social behavior across a variety of domains (von Hippel 2007). In particular, deficits in inhibitory processes have been linked to socially disinhibited behavior with age. As a result of decreased inhibitory ability, older adults are more likely than younger adults to talk excessively about topics that are irrelevant to the conversation, to inquire about private issues in public settings, and to engage in a variety of socially inappropriate behaviors than younger adults (von Hippel 2007). Importantly, this effect of executive decline appears to be independent of the effect of general cognitive decline, suggesting that executive deficits have an important unique effect on social appropriateness.

Stereotyping and prejudice. Devine (1989) proposed that our environment is filled with stereotypes, and as a result, these stereotypes are automatically activated upon encountering a stereotyped group member. She suggested that this automatic activation of stereotypes occurs among both prejudiced and non-prejudiced people, but that non-prejudiced people reject and inhibit these stereotyped thoughts, whereas prejudiced people do not. Older adults are less capable of inhibiting their automatically activated thoughts than younger adults, and thus, one implication of this model is that older adults may be more prejudiced. Several lines of research now support this idea (von Hippel and Henry 2012; von Hippel 2007). Older adults show greater prejudice on self-report scales and are rated by their peers as being more prejudiced than younger adults, and these age differences in prejudice appear to arise through executive function decline. Older adults do not seem to show greater automatic bias when compared with younger adults; they are just less successful at inhibiting this bias. These findings suggest that age differences in prejudice emerge in response to executive function decline and are not simply the result of a greater willingness among older adults to express their prejudices.

Understanding others. As outlined earlier, older adults tend to prioritize emotional and social goals. One implication is that aging might lead to improvements in social understanding. In contrast to this suggestion, however, research finds important losses in understanding others' emotions, intentions, and mental states with age. Broadly, there seems to be an age-related decline across all modalities of emotion recognition, although there is some evidence that unconscious emotion recognition may be better preserved than conscious emotion recognition (von Hippel and Henry 2012). Additionally, in some contexts, older adults seem to use more sophisticated heuristics than younger adults in forming social judgments, suggesting that the accumulation of social experience across the adult life span can lead to some benefits in understanding others (Peters et al. 2007).

Emotion recognition and empathy. Emotion recognition is an important skill for social interaction, and indeed, emotion misrecognition in older adults is associated with reduced social and interpersonal functioning, poor communication, and inappropriate social behavior (von Hippel and Henry 2012). Across most emotions the pattern is of age-related decline, and the recognition of anger and sadness is particularly impaired (Ruffman et al. 2008). This specific decline in recognition of negative emotions may be a function of the tendency for older adults to focus on positive over negative information in processing, as inattention to negative expressions may make their identification more difficult.

Older adults also show deficits in cognitive empathy, that is, they have a poorer understanding of others' complex emotions and mental states (von Hippel and Henry 2012). As with social dysfunction, deficits in cognitive empathy appear to emerge as a result of age-related decline in executive function, with older adults showing greater impairment on measures where greater executive control is required. Relatively less research has been conducted examining older adults' emotional empathy or their emotional responses to the cognitive or emotional state of another. The research in this area so far has examined mimicry and found that although

subconscious mimicry seems to be spared in later adulthood, later stages of mimicry may be interrupted by difficulties in emotion recognition.

Attribution and social inference. The processes covered earlier in this section rely primarily on the mechanics of the mind and thus are negatively affected by brain atrophy. There are, however, some aspects of social inference that rely more clearly on the experience of the mind, and in these areas, age has the potential to result in improved function. Indeed, across some domains of social inference, older adults are able to use more adaptive strategies (Peters et al. 2007; Blanchard-Fields 2007). For example, older adults require fewer cues than younger adults to form clear impressions of others, perhaps because they can rely on their greater social experience. Older adults are also more skilled at making trait inferences about others and are more able to use important diagnostic trait information in making social judgments. Finally, older and middle-aged adults are more sensitive to social context than younger adults, which can provide helpful information for understanding others.

Attitudes and persuasion. Attitude change involves a number of cognitive and motivational processes that change in older adulthood, suggesting that there are likely to be corresponding changes in persuasibility, that is, the degree that one is able to be persuaded of an idea, with age. Consistent with this possibility, attitude change follows a U-shaped curve with age, with younger and older adults being the most susceptible to attitude change (Visser and Krosnick 1998). This effect seems to emerge in part because younger and older adults also report lower attitude certainty, attitude importance, and attitude-relevant knowledge than middle-aged adults. One source of these changes may be cognitive losses with aging, which limit older adults' ability to counterargue against persuasive messages. Two other noncognitive mechanisms may also underlie age-related susceptibility to attitude change: reduced social support for attitudes and role changes with age that bring about attitude changes. That is, older adults may find that there is no longer social support for the attitudes they used to hold and so change their attitude accordingly. They are also less likely to have a social role involving power: Powerful roles call for a resolute approach in the face of persuasion attempts, and because older adults do not usually hold these roles, they are likely to be more persuasible. At this point we do not know the degree to which these factors may underlie changes in persuasibility among older adults.

Decision-making. Decision-making is affected by both age-related gains and losses. As with other domains, the general cognitive decline observed with aging is often associated with poorer decisions. It is also the case, however, that older adults make better use of cognitive shortcuts in decision-making and benefit from their greater life experience, and emotional and motivational changes mean that they are often happier with their choices (Peters et al. 2007). Broadly, the research literature shows age-related deficits in the decisions necessary for everyday life (Thornton and Dumke 2005). This effect is robust across most markers of decision quality, with the exception that older adults' self-ratings suggest either preserved decision-making or even better everyday decision-making than younger adults. These findings suggest that older adults perceive themselves as making better decisions despite actually making worse decisions. Because older adults tend to focus on the positive, it is possible that older adults are simply happier with their decision outcomes than younger adults and thus rate themselves as better decision-makers despite their objective deficits.

Although older adults show decline in most domains of decision-making, they show preserved ability and even improvements in interpersonal decisions (Blanchard-Fields 2007). Older adults may outperform younger adults in interpersonal domains because of their accumulated life experience, but they also have some additional advantages. First, they tend to take a long-term perspective and focus more on preserving interpersonal relationships than on solving personal problems (Blanchard-Fields 2007). Second, they do not overweight negative information, which may be helpful in some interpersonal decision-making domains (Charles and Carstensen 2010). Third, they are strategic about when they use

controlled processing strategies, correctly perceiving cognitive control as a limited resource (Peters et al. 2007).

Various types of decision processes are also impacted by the age-related pattern of deficits in cognitive control processes but preservation of automatic processes. For example, controlled processes are often required to correct for possible sources of bias in decision-making, and as a result, older adults are less able to correct for biases (Peters et al. 2007). Cognitive control processes are also required in generating counterfactual simulations of possible alternative outcomes to decisions, and as a result, older adults are less able to create detailed simulations of the future. Naturally, this deficit has the potential to negatively impact their decision-making.

In contrast, the relative preservation of automatic processes in older adults allows them to make use of a number of automatic heuristics, which are fast, effortless, and generally accurate enough for most everyday purposes (Peters et al. 2007). The use of these heuristics may be helpful in allowing older adults to make rapid decisions while relying less on controlled processes. It is also the case, however, that older adults may be less able to suspend their reliance on automatic heuristics by implementing cognitive control processes when it is necessary to do so.

Individual Differences in Loss

In assessing cognitive loss with age, it is also important to consider whether these losses can be prevented and whether there are traits that may buffer age-related deficits in social-cognitive functioning.

Age stereotypes. There are number of stereotypes about cognitive loss with age, and these stereotypes are widely endorsed by older adults themselves (Levy 2003). Not surprisingly, research suggests that age stereotypes can have a causal effect on cognitive outcomes. For example, older adults who are led to think about aging and wisdom perform better on a memory test than older adults who are led to think about aging and senility. These acute stereotype effects may be induced through stereotype threat (or the concern that one may be judged on the basis of negative stereotypes about one's group), which has been shown to lead to performance deficits in a wide variety of domains. The more chronic consequences of age-related stereotypes are likely to be induced through a combination of stereotype threat and self-stereotyping (Levy 2003). That is, to the degree that older adults expect to show stereotypic age-related losses, they are likely to do so. This has been demonstrated across many domains, but perhaps the most striking is research demonstrating that negative stereotypes of aging measured early in life predict poorer health and earlier mortality in late adulthood. Overall, the data suggest that negative stereotypes about aging are likely to exacerbate age-related cognitive decline. They also suggest, however, that promoting positive stereotypes of aging may be an important intervention tool.

Mental activity. Mental activity levels may also play an important protective role in the cognitive aging process. Complexity in education, work, and in everyday life all delay the onset of cognitive decline (Valenzuela and Sachdev 2006). The facilitating effect of mental activity may be analogous to that of physical exercise. Even short-term mental activity may have beneficial effects, and thus, it may be possible that older adults could benefit from acute cognitive training (Lustig et al. 2009). A systematic review concluded that cognitive training in healthy older adults produces strong and persistent protective effects on cognitive performance, particularly in the domains that were the major focus of the intervention (Valenzuela and Sachdev 2009). That is, cognitive training seems to be most helpful when it is targeted: For example, training in attention enhances attention but does not always enhance memory, and training in memory enhances memory but does not always enhance attention.

Mental activity does not just delay the onset of cognitive aging; it can also compensate for it. One important example of compensation shown by older adults is neural "over-activation," in which additional brain regions are recruited by older adults to solve the same problems as

younger adults (Reuter-Lorenz and Cappell 2008). Although there is no single explanation for over-activation, it appears to be at least in part a compensatory process to attempt to address declines in cognitive function.

Conclusions

It is clear from the phenomena discussed in this entry that social-cognitive aging is a complex process, influenced by a variety of different sources. Age-related decline in cognitive control processes can sometimes be offset by preservation of automatic processes, but sometimes the inability to inhibit automatic processes can itself lead to poorer performance in older adults. In contrast, age-related changes in experience and knowledge accumulated throughout life can enhance social-cognitive function in some domains, and it is important to understand these experiential changes that occur in tandem with cognitive decline. Finally, motivational and emotional changes with age also play an important role in any attempt to understand social-cognitive outcomes, and the interactions between cognitive, experiential, and motivational changes can create complex patterns of behavior. It is clear that social cognition changes in many important ways with advanced age, and research is only just beginning to understand this complexity.

Cross-References

- ▶ Attitudes and Self-Perceptions of Aging
- ▶ Cognitive Control and Self-Regulation
- ▶ Emotional Development in Old Age
- ▶ Positive Emotion Processing, Theoretical Perspectives
- ▶ Socioemotional Selectivity Theory

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Social Connectedness and Health

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Synonyms

Social capital; Social integration; Social networks; Social participation; Social support

Definitions

The above synonyms are often used interchangeably to imply social connectedness, but they do not fully capture the breadth of the construct. Social network refers to the structure of relationships and their interconnections. Social support is typically derived from social relationships and is broadly defined as the care that is either provided or perceived to be readily available in times of need. These are all interrelated concepts. For instance, you are more likely to receive social support from those with whom you are socially networked. Other synonyms, notably social integration and social capital, while intended to capture wider dimensions of connectedness, can be vague and are often used inconsistently. Social integration encompasses the behavioral (or participatory) and cognitive (a sense of belongingness) elements of social relationships. Social capital is typically defined as the network of relationships between people who live and work in a society or community that support their effective functioning. These constructs imply, but do not fully capture, what it means to be socially connected. In this entry, social connectedness is defined as the sense of belonging and subjective psychological bond that people feel in relation to individuals and groups of others. This definition also captures the idea that identification with others is the basis for social connectedness – something that we explore further in this entry as a possible mechanism for the health-enhancing effects of social relationships.

Social Relationships and Health

It has long been recognized that mortality and morbidity rates vary dramatically as a function of the social conditions in which we are born and raised, live, work, and age. The extent of these is considerable, with life expectancy 48 years lower in the least advantaged nations (e.g., Sierra Leone) and 20 years shorter among the most disadvantaged within the same nation (Marmot 2005). Many have argued that such disparity in life expectancy should not be inevitable, particularly as there is nothing fundamental in our biological makeup that should make this so. Rather, the cause of such disparity is fundamentally *social*, created through inequality in opportunities for stable education, work, housing, and wealth. These upstream factors not only affect our exposure to, and experience of, illness, but they also affect our response to illness – which is driven primarily by our knowledge, attitudes, beliefs, and behaviors around health. Clearly, then, when it comes to managing health, interventions that target these social determinants are as vital as those that target the medical.

Various strategies and policies have been proposed at national and international levels to overcome these health disparities. However, there is also recognition of the importance of understanding the social conditions that reduce such inequality at more local, or community, levels. Explanations for the presence of health disparity at this level tend to be framed in terms of social capital, which tends to be represented by a range of indices (e.g., number of social ties, whether one

lives alone or with others, trust, engagement with civic associations) measured at both individual and community levels. However, researchers have questioned the extent to which this captures the subjective and experiential aspects of social relationships that are integral to one's sense of social connectedness, which is lacking or markedly reduced among members of disadvantaged groups in unequal societies. Addressing this point, researchers have incorporated concepts such as social engagement, participation, social support, and influence into their analysis, in addition to documenting the number of objective social resources that a person or group has. Increasingly, the contribution of social *identification* – defined as the sense of self that people derive from their membership with various social groups (e.g., family, work team, church) – is also gaining prominence, due to its capacity to explain why not all relationships are beneficial for health and why we seek engagement and support from particular people but not others. Other developments have focused on the types of relationships (spousal versus friendship and one-to-one versus group-based relationships) that might be more beneficial for health.

We address these developments in this entry as mechanisms proposed to account for the benefits that arise from social connectedness, after considering the evidence of the impact that social relationships have on the health of older adults in domains of life expectancy, mental health, and cognitive health.

Social Connectedness and Life Expectancy

The relationship between social engagement and mortality was first identified in a pioneering study conducted by Berkman and Syme in 1979 (Berkman and Syme 1979). This research focused on Californians aged between 30 and 69 years and found that those who lacked social contacts were more likely to die earlier than those who were well connected. This relationship held after statistically controlling for physical health, health behaviors (e.g., smoking), health practice, and use of health services. Further analysis of these mortality data, following people over a period of 17 years, found that social connectedness was particularly important for the life expectancy of people aged over 70 years (Seeman et al. 1987). Indeed, those with the lowest social network index scores (based on ratings of marital status, perceived isolation, contacts with friends and relatives, and membership of church and other groups combined) had a 50% greater risk of mortality than those with the highest scores.

Findings from these studies were later replicated in longitudinal investigations involving American (Glass et al. 1999), Australian (Giles et al. 2005), and European (Bennett 2002) populations. Other studies also show that it is not just the leisure or physical activity, but rather productive engagement with others in the process of participating in these activities that confers a survival advantage (Maier and Klumb 2005). Findings also show that these relationships hold over the age span with social networks predicting longevity among the older-old (Giles et al. 2012). In the study conducted by Giles et al. (2012), relationships with friends were found to be more beneficial for survival than those with children and relatives, though this is not always the case. Other studies that include wider social networks (e.g., community and other group activities) also find evidence of increased life expectancy (Glei et al. 2005).

Social Connectedness and Mental Health

The findings from the life expectancy literature extend to the mental health literature. It has been shown that older people with integrated social support networks (comprising family, friends, neighbors, and community groups) are generally less depressed and report greater well-being (Wenger 1997). While the impact that social relationships have on mental health is seen across all age groups, older adults are particularly vulnerable to mental health problems arising from social isolation due to their increased risk of physical disability and illness. Loneliness is a specific risk factor for depression in older adults (Cacioppo

et al. 2006), with Golden and colleagues (2009) reporting that where loneliness is experienced among people over 65 living in the community, 35% present with an associated depression.

However, not all relationships are created equal, and some can be more supportive of mental health than others. Speaking to this point, Litwin (2001) found that intensive family ties were more restrictive for older adults in Israel and generally less supportive of health than diffuse network ties that were characterized by large and diverse networks with variety in potential sources of social support. These data highlight the importance of multiple resources for health, combining notions of both relationship quantity and relationship quality.

Further studies have indicated that these findings are robust and generalizable to other populations, including older people living in the United States (Fiori et al. 2006). Here again, it was found that people with diverse networks (typically involving interaction with family, friendship, and religious and other informal group memberships) reported fewer depressive symptoms. Those with restrictive networks, whether confined largely to family or through having very limited social ties, had worse outcomes – all consistent with earlier findings. This suggested that network diversity is important to mental health in many different cultural contexts.

An important implication of these findings is that particular types of relationship may be more important for mental health. Taking this a step further, Cruwys et al. (2013) investigated the contribution that social group memberships made to depression outcomes in older adults. This study drew on data from the English Longitudinal Study of Ageing and found that participation in social group activity was not only protective against the development of depression in healthy participants but also preceded recovery and reduced the risk of relapse among those with a history of depression. Of particular interest was the fact that risk of relapse reduced incrementally as a function of the number of groups to which people belonged. Specifically, an increase in one group membership reduced the risk of relapse by 24%, but an increase of three group memberships reduced the risk of relapse by 63%. As the authors conclude, these data show that one's connectedness to social groups can both protect against the development of depression and provide a "social cure" (p. 185) (Cruwys et al. 2013) for existing depression.

Social Connectedness and Cognitive Health

There is equally strong evidence of the role that social relationships play in protecting against cognitive decline. Most studies in this area are longitudinal and involve older adults living independently in the community. The majority draw the same general conclusion: that people with greater social connectedness enjoy better cognitive health and are less vulnerable to progressive decline (Haslam et al. 2014a).

The size of these effects is considerable. To illustrate, Barnes and colleagues (2004) found that the rate of cognitive decline was reduced by 39% for those in their sample of older people who had the greatest social network size. This was reduced even further, by 91%, where people actively participated with others in those networks – confirming the point made earlier that quantity alone fails to capture fully the protective benefits of social connectedness. There is also evidence that the rate of memory decline is halved among those who are most socially connected (Ertel et al. 2008).

Data from Bennett et al. (2006) provide an interesting biological perspective on the role of connectedness. These researchers followed healthy older people who, on first contact, showed no signs of Alzheimer's disease pathology. Yet, at postmortem examination years later, they found greater evidence of tangle density (a marker of such disease) among those who were least socially connected. Clearly, as Cohen (2004) suggests, social relationships have the capacity to get "under our skin" in ways that shape the biological processes that are detrimental to health.

There are questions, though, about causality in the cognitive health literature. This is because the correlational nature of much of this research limits the conclusions that can be drawn – in particular,

due to the possibility of reverse causality. That is, it may be the case that people who are in better cognitive health have greater capacity to engage actively with their social networks, rather than the other way around. In support of this argument, there are a few studies that observe a positive association between social connectedness and cognitive health cross-sectionally, but not longitudinally. Other studies have directly addressed this issue by focusing only on higher-functioning seniors with low likelihood of existing cognitive impairment or by analyzing subgroups of respondents whose abilities were preserved at the start of data collection (Bennett et al. 2006; Ertel et al. 2008). While findings from these latter studies support the conclusion that social connectedness influences cognitive integrity and reserve, only experimental studies can definitively establish causality.

A parallel debate concerns the types of relationships that are particularly advantageous for cognitive health. As noted earlier, having more connections with friends in particular is associated with increased life expectancy (Giles et al. 2012). However, in the cognitive domain, researchers have tended to base their analyses on a social network index that combines information about one's relationships and activities both with significant others (i.e., spouse, children, friend, relative) and with other social groups (e.g., church, voluntary, recreational clubs). This makes it difficult to establish whether any particular type of relationship is especially protective. This is exacerbated by the tendency for researchers intuitively to place greater emphasis on one-to-one relationships with significant others than on group-based relationships. In an attempt to disentangle these influences on cognitive health, Haslam et al. (2014b) examined the separate contribution that group and one-on-one social interaction made to cognitive integrity over time. Drawing on three waves of data from the English Longitudinal Survey of Ageing, they found that group activities were especially protective against cognitive decline and that this effect was more impactful with increasing age. More specifically, above-average group engagement was of moderate importance for the youngest respondents, such that those aged 50 years functioned cognitively at the level of a person aged 46 years. However, the functional savings were more substantial at the older end of the age spectrum, with the more socially engaged 80-year-olds performing cognitively like the 70-year-olds. These data are also consistent with those of Glei et al. (2005) and Sugisawa et al. (1994), who found that relationships with significant others, such as a relative or friend, did not reduce the risk of cognitive decline and mortality, respectively. Instead, Glei found that those who participated in one or two group activities displayed 13% fewer cognitive deficiencies 3 years later and that those who participated in three or more groups had 33% fewer deficiencies. Individual relationships were not associated with the same positive cognitive outcomes. Such data suggest that there may be particular value in targeting and developing group-based relationships when it comes to preserving cognitive health.

Mechanisms Underlying Social Connectedness

In most of the above studies, enhanced health outcomes were independent of sociodemographic factors, physical and psychological health status, and baseline physical and cognitive abilities. So, when we control for these factors, how exactly does social connectedness enhance the health of older people? A number of mechanisms have been proposed across these domains of health that can be broadly conceptualized as physiological and psychological. Although we describe these separately below, it is clear that these factors do not operate independently. The psychological experience of stress, for example, produces physiological changes, and these changes will feedback into our appraisal and response to that stress. Thus, the pathways through which social connectedness enhances health are multiple and interactive.

Physiological Mechanisms

One means through which social isolation might influence mortality is through its action on the biological pathways of stress. In the wider context

of the social determinants of health, social disadvantage (whether due to financial hardship, social stigma, or discrimination) is only one of the many recognized causes of ongoing stress (that include loss of one's spouse, being diagnosed with illness) – all of which can have damaging effects on the body. Stress triggers the release of cortisol, cytokines, and other substances that put pressure on immune and other physiological systems. The hypothalamic-pituitary-adrenal axis is particularly important in this regard as it is responsible for adapting to stressful circumstances and environments. In the absence of factors, such as social support, to buffer against the stress response, there is slower adrenocortical recovery which, when cumulative, can accelerate physiological decline. Supportive networks are believed to buffer these effects, controlling the body's response to heightened arousal and stress (Uchino 2006) and, through this, providing protection against damaging neurodegenerative outcomes.

Additionally, neuroendocrine and immune function regulation appears to be enhanced among people who are more socially connected. It has been argued and found that social networks provide a basis to suppress neuroendocrine responses, which reduces vulnerability to disease development. Lower overall cortisol (Turner-Cobb et al. 2000) and higher oxytocin levels (Knox and Uvnas-Moberg 1998) have been found among those with greater social support from their network ties.

An alternative perspective argues that it is the damaging effects of social isolation, rather than the protective effects of social connectedness, that is the cause of these findings. Social isolation is a stressor in its own right, increasing neuroendocrine responses and cardiovascular reactivity, which has the effect of suppressing immune function (Cohen 2004). In line with this proposition, in studies of patients with HIV, those who were more disconnected socially were found to have fewer helper T cells over time to combat the disease (Theorell et al. 1995). More diversity in social networks has also been found to reduce vulnerability to developing the common cold after exposure to the virus (Cohen et al. 1997). Greater cardiovascular reactivity in response to stress is associated with higher blood pressure, which can be reduced in the presence of a significant other or friend (Kamarck et al. 1990). Moreover, there is evidence that blood pressure is lowered in general among people who are more socially connected (Steptoe et al. 2000).

The physiological effects of social connectedness appear to go further to protect against the development of carotid artery atherosclerosis and progression of cardiovascular disease. Like the above studies, these examined the impact of social connectedness via perceptions of social support – highlighting again the dynamic relationship between physiological and psychological processes in protecting against health decline.

Psychological Mechanisms

Social connectedness increases access to the psychological and material resources that buffer against stress, thereby reducing its impact on physiological processes that are associated with disease. Of these resources, *social support* is recognized as pivotal and comes in various forms – emotional, instrumental, and informational. Social support has been shown to offer some protection against the damaging physiological effects of stress and is associated with more functional, or adaptive, coping styles (Cohen and Wills 1985). Emotional support, in particular, appears to reduce the impact of stressful life events and has been repeatedly linked with greater longevity.

Interestingly, though, not all forms of support seem to lead to positive outcomes. Penninx et al. (1997) found that receiving high levels of instrumental support, that can arguably promote greater dependency, is associated with greater risk of early death. Moreover, *perceived* support appears to be key, with evidence showing that it is not the receipt of support that is critical, but the belief that it is (or will be) available when needed.

Self-efficacy, defined as the confidence with which we perform particular behaviors, is another psychological resource believed to carry protective properties. It has been argued that greater self-efficacy enhances one's sense of control and purpose in life which, in turn, reduces the impact

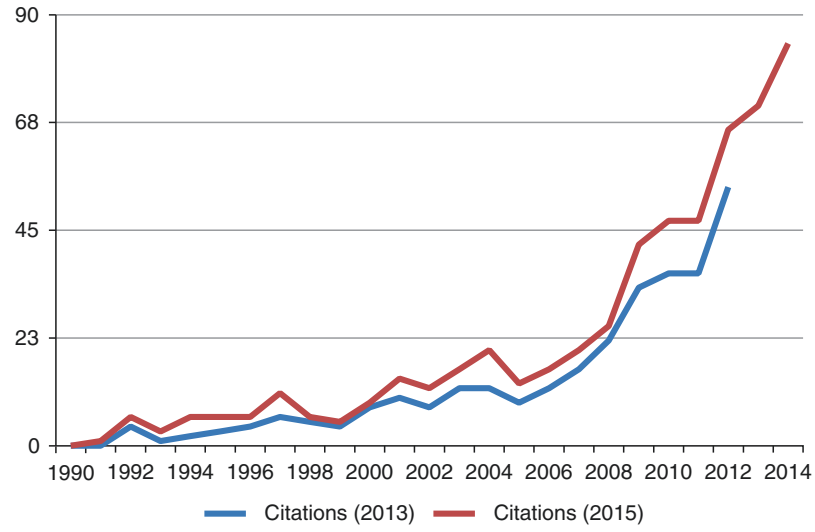
of age-related changes and disease processes. Indeed, research suggests that having purpose in life confers a survival advantage, mediating relationships between social networks and health outcomes in depression and exercise. Among older adults in particular, a reduction in social contact is associated with a decline in self-efficacy, which can impact further on one's engagement in health-productive behaviors (McAvay et al. 1996). There is also a relationship between social support and perceived efficacy. Where social support is perceived positively, it can enhance one's sense of control and efficacy, but where it reinforces dependence and is disabling, it can erode self-efficacy and self-esteem.

Berkman, (Cohen et al. 2004; Berkman et al. 2000) also recognize the important role of social influence, arguing that active participation in social networks makes people open to the influence and control of others. When our social networks encourage positive health norms, such as good eating habits and regular exercise, then they are likely to rub off, increasing our openness to engaging in these same productive behaviors. But we are also likely to be guided by those in our social networks who set negative examples. For example, we engage in more smoking and drinking when we are in the company, or the influence, of network ties for whom this behavior is normative. As these examples illustrate, our social relationships have a major influence on our attitudes to health (e.g., about the benefits of exercise and a healthy diet) and how we respond when health might be compromised (e.g., by seeking health services and adhering to treatment adherence). Notably, greater exposure to these effects, as you might expect with age, does not make us less susceptible to social influence. However, the one advantage of longevity is that with increasing age, the physiological effects of social support appear to be cumulative, with evidence of lower resting blood pressure among older adults who have greater perceived access to support (Uchino et al. 1999).

Missing from this discussion of psychological mechanism is an explanation of *why* only particular networks influence our attitudes about health behavior, impact on our self-esteem and self-efficacy, and provide a basis for giving and receiving support. Researchers from the social identity tradition argue that *identification* with significant individuals and groups of others is what makes social participation possible. This is because social engagement does not occur in a psychological vacuum. There must be a basis, reason, and motivation to participate, and this is more likely to be present when people perceive themselves as sharing a common bond or connection with others (as members of the same family, neighborhood, or a community group).

This reasoning has driven recent development of the Social Identity Approach to Health (Haslam et al. 2009; Jetten et al. 2012). This framework draws on social identity theorizing to account for the conditions in which social connectedness enhances health. It has recently been applied to account for the beneficial effects of social relationships for cognitive (Haslam et al. 2014b) and mental (Cruwys et al. 2013) health, with a particular focus on the value of our connectedness with social groups. Fundamental to this framework is the idea that social groups (whether they comprise family, friendship, religious groups, or community groups) provide an important and distinctive basis for self-understanding and self-definition. Groups frame and inform our beliefs and values, drive our thoughts, influence our emotions, and shape our behavior only when, and to the extent that, they are internalized as part of our self-concept.

Importantly, this sense of social identification with others also influences the dynamics of social support. Here, it is often assumed that social support will have positive implications for health, but, as intimated above, research shows this is not always the case. Indeed, speaking to this point, meta-analyses indicate that the effects of across-the-board support on mortality and health are close to zero – explained largely by these data combining both positive and negative perceptions of support (Schwarzer and Leppin 1991). So what is it that makes support more (or less) beneficial for health? The social identity approach helps to answer this question, explaining the dynamics of support with reference to two key ideas. First, when people define themselves in terms of a



Social Connectedness and Health,
Fig. 1 Number of journal articles on social identity and health cited from 1990 to 2014 (Data abstracted from Web of Science, March, 2015 and updated from that reported in (Haslam 2014))

given social identity (as an older adult, a member of the Taylor family), they will see other ingroup members as *part of the self* (rather than as external to self). Second, this sense of shared identity then provides a basis and motivation for people not only to promote their own health and well-being but also to advance the interests of other ingroup members (other seniors and Taylor's) through the provision of useful forms of help. At the same time, this shared social identity also provides a basis for interpreting the helping behavior of others in positive ways – so it is seen as constructive (e.g., as an act of kindness or in their best interests) rather than regarded with suspicion.

Drawing on these ideas, we can make several predictions about the health benefits that our connectedness to these groups makes possible. Because social identification underpins positive forms of influence and support, groups will tend only to enhance health when (and to the extent that) their members identify strongly with them. Accordingly, I am more likely to benefit from my connectedness with other seniors when they are a group that is particularly important to me and one with whom I share strong bonds. When this is the case, group membership and group connections will serve as a psychological resource from which we can draw strength and positive support, particularly when facing challenges that threaten health. Yet, in the absence of such identification, proffered support and social contact are more likely to be perceived as unnecessary or undesirable and indeed may only impose further strain – and hence may actually be detrimental to health.

Put simply, this theorizing suggests that the active ingredient in social relationships is social identification. This can account for the helpful and harmful effects of social group relationships, the dynamics of support and influence, and the particularly beneficial effects of group-based relationships. While this index of connectedness has yet to be incorporated into the broader literatures on social capital and social determinants of health, it is gaining momentum. This is also true of the Social Identity Approach to Health more generally – as the growth in research on social identity and health attests (see Fig. 1 (Haslam 2014)).

Conclusion

There is no doubt that social relationships matter for health, whatever our age, and that some relationships are more protective than others. Our knowledge of the mechanisms through which social connectedness protects health is growing, with increasing evidence of the interrelationships between psychological and

physiological processes. There is also growing recognition in the literature of the need to clarify the vital ingredient through which social connectedness builds key psychological resources, such as support and influence. To this end, there is increasing evidence of the important role that social identification plays in health, not least through its capacity to provide a basis for meaningful forms of social connectedness. Targeting these social processes in intervention is as important as targeting medical factors when seeking to protect and enhance health. Aging is inevitable, but its impact on increasing vulnerability to health disparities that hinder social connectedness need not be – particularly when we have the means to develop the social interventions, needed to promote social cure, at our disposal.

Cross-References

- ▶ Aging, Inequalities, and Health
- ▶ Loneliness and Social Embeddedness in Old Age
- ▶ Mental Health and Aging
- ▶ Social Cognition and Aging
- ▶ Social Group Interventions for Older Adults

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Social Exchange Theory and Aging

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Synonyms

Lifespan; Relationship development; Social network

Definition

Social exchange and aging is defined as the change and stability of exchanges among individuals across the lifespan.

Introduction

Social exchange theory proposes that social behavior and interactions among individuals are a result of an exchange process. This perspective suggests that the relationship between individuals is generated by the pursuit of rewards and benefits and the avoidance of costs and punishment. In this entry, social exchange theory is defined and discussed as it applies to the aging process.

First, social exchange theory, which is rooted in economic, psychological, and sociological foundations, is introduced, followed by a description of how social exchanges change and develop as individuals age, why they are important, and innovative perspectives on social exchanges. Next, major psychosocial and sociodemographic factors that can influence the development of social exchanges over the life course are considered. Finally, the chapter concludes with a summary of how best to apply social exchange theory to later life.

Social Exchange: An Overview

Social behavior as an exchange process is a concept introduced by the sociologist George Homans in 1958 (Homans 1958). Grounded in sociological and psychological perspectives, Homans suggests that social exchange can be viewed as reinforcement. Individuals ascertain and learn from their past interaction experiences whether their behaviors are rewarding or costly. These positive or negative behavioral consequences reinforce, extinguish, or modify future behaviors in order to achieve desired outcomes and minimize costly ones. As individuals interact with others over time, they tend to select social exchanges that have positive consequences and do their best to minimize those that have negative consequences.

Social Exchange, as Interdependence. Behaviors performed by individuals in a dyad, and among individuals in a group, are interdependent (Thibaut and Kelley 1959). Relationships are invested in depending on whether there is a strong enough value or reward relative to the cost or alternative outcome. For example, one may choose to stay with a romantic partner if one feels that love and support are both given and received, but may choose to terminate the relationship if one feels that the relationship is unbalanced or inequitable, i.e., one party is giving more than receiving in the relationship. The evaluation of equitability, however, may be complicated. One could evaluate a relationship as equitable if one partner provides emotional support and the other tangible support. The evaluation of this type of exchange is very likely dependent on the nature of the relationship between the partners. For example, there is more of an expectation of mutual affection and support between spouses, but less so among friends or neighbors. Interdependence influences with whom individuals continue to interact, as well as the kinds of social exchanges in which they choose to engage as they move through time and live our lives.

Social Exchange, as Economical. Apart from sociological and psychological perspectives, which will be considered more fully below, social exchange has been viewed from economic and utilitarian perspectives. Assuming that people are rational, interactions are shaped by a reciprocal exchange of tangible (e.g., financial) and intangible (e.g., emotional) resources. A profit is calculated by subtracting the costs from the rewards. Within an exchange context, power dynamics are created when there is an unequal exchange and one person gets more rewards than the other (Blau 1964; Emerson 1976). Economic exchanges are relatively straightforward assessments of money, status, and power. While economic equal and unequal exchanges are direct and uncomplicated, evaluation of social exchanges can be more complicated as they are influenced by the nature and type of social relationships over the course of our lives. Social relationships involve psychological and social characteristics, although how these are evaluated may not always be evident. Thus, some forms of support (e.g., emotional support) might be worth more than other types of support (e.g., money) to some people. Such assessments might not be readily ascertainable to the neutral observer.

Aging as a Social Exchange Process

A core principle to these perspectives on social exchange is that they develop over time and accumulate as individuals learn from past interactions, assess their current reciprocal or nonreciprocal exchanges, and decide on future behaviors. James Dowd expanded on the basic social exchange theory to address the circumstances of

older people (Dowd 1975). He argued that as people age, the ratio of rewards to costs associated with social interactions might shift based on social status (e.g., being an elder) and personal resources (e.g., money, power, the ability to work or provide care to others). In his exchange theory of aging, Dowd highlighted the perceived loss of status and power that he assumed are associated with aging (Dowd 1975). He argued that because resources decline with age (e.g., health, income, loss of work or community roles, etc.), older people are more likely to be in unequal or imbalanced social exchanges. These imbalanced relationships can result in a power disadvantage, wherein the older person is required to depend or rely on others to meet their basic needs.

Fortunately, this negative exchange theory of aging has not been widely supported by empirical evidence. People seem to adapt exchange calculations to the individual situation and life circumstances. Rather than taking a contemporaneous and rigid view of exchanges which would often leave the elder at a disadvantage, people appear to take a long-term and flexible view of exchanges with respect to close and\or loved elders. Taking a long-term or lifespan view allows the provision of support to an elder to be considered repayment for support received at an earlier point in time. An adult child might repay financial assistance from a parent during her young adulthood with financial assistance or caregiving during the parent's old age. The provision of one type of support might also be seen as an equitable exchange for the receipt of another type of support, e.g., care of grandchildren by a grandparent might be seen as an appropriate and equitable reciprocation of assistance received from an adult child in negotiating the health care system.

Another unique perspective on the social exchanges of older people is the developmental stake hypothesis first proposed by Bengtson and Kuypers (1971). Their focus was on intergenerational exchanges. Taking an intrafamily multigenerational perspective, they argued that older people have more experience and a lifetime of family relations, which creates a greater investment in the family and shared family values. As a consequence, older people are more interested in highlighting the closeness of relations with the younger generation, while younger people, more interested in establishing their own adulthood, may be less inclined to do so. The goal of the older generation is to encourage the transmission of important unique family characteristics to the younger generation. The older generation has a developmental stake in such transmission and is, therefore, more likely to emphasize similarities than dissimilarities and closeness rather than distance. Data from the Longitudinal Study of Generations supports this case. Given the older generation's enhanced investment in passing on their values and norms to the younger generations, they maximize the probability of positive exchanges by perceiving their relationship with the younger generations as closer than the younger generation perceives them to be. The older generation is seeking to maintain and optimize connectedness, while the younger generation may be more interested in creating their own contributions. They may see the only way to do so is by establishing distance and independence (Bengtson and Kuypers 1971).

There is considerable evidence suggesting that taking a long-term or lifespan view will offer greater insights into the nature of social exchanges, especially those where the relationship is close. Fung, Yeung, Li, and Yang found that negative exchanges were associated with greater feelings of closeness 2 years later (Fung et al. 2009). One might interpret these findings as indicative of investment, i.e., one cajoles, reminds, and persists with the loved ones one cares about in order to persuade or convince them of one's perspective. Successful investment may create an increased perception of similarity across close relations, especially across generations. Additional supportive evidence of the developmental stake hypothesis can be seen in a recent study. Birditt et al. (2015) found that parents reporting that they felt their relations with their children were important but also more negative had higher feelings of well-being. On the other hand, adults who felt their relationships with their own parents were more important than their relationships with their adult children had poorer well-being. Clearly, lifespan and family

transmission perspectives as illustrative of the developmental stake hypothesis provide a useful framework for interpreting these exchanges and their effects.

Developmental stake is likely to change over time and over the lifespan of generational family members. A more nuanced approach suggests that younger generations may wish to achieve independence and accomplishments on their own, but not necessarily by rejecting their indebtedness to the older generations. The younger generation recognizes that the older generation cared for them when they were young. They appear to be quite willing to reciprocate by providing assistance to the older generation when vulnerabilities emerge, as they often do with increased age. The types of assistance provided are wide-ranging and are likely to depend on the particular circumstances, relationship, and history. They might include needs resulting from declining health, widowhood, functional limitations, or financial strain. Provision of assistance can be considered a continuation of the exchange process. The young are now fulfilling a debt incurred when they were younger by providing to their elders as needed. This type of exchange is more flexible and may not represent a specific payback, i.e., from individual to individual, but rather a broader sense of social exchanges. Thus, an exchange might skip a generation with grandchildren reciprocating for support provided by a grandparent to a parent, when and if the parent is not available.

It should be noted that there are additional potential influences on the interpretation of social exchanges. Not all social exchanges in aging imply negative balances. In some cultures, for example, aging is associated with the higher social status of being an elder, which is associated above all else with respect and power. In addition, older individuals are more motivated to seek out relationships and experiences that provide emotional meaning. They, therefore, adopt strategies that optimize positive social exchanges and minimize negative ones by avoiding conflicts (Carstensen et al. 2003). These strategies allow older individuals to focus on maintaining or increasing the rewarding social interactions with close friends and family members who are most meaningful to them. As noted above, older individuals can continue to provide in different ways, including caregiving for grandchildren as well as providing financial help to needy adult children. In the following section, a discussion is provided on the development of social exchanges across the lifespan and why they are important.

Changes in Social Exchanges over the Lifespan

The concept of social convoy represents a useful heuristic for examining changes in social exchanges across the lifespan. A convoy is defined as a group of close social relationships that surround an individual. This convoy moves with individuals across time as they age and can consist of family, friends, and other close ties, such as colleagues or neighbors. The convoy model of social relations highlights this dynamic nature of social exchanges as it pertains to adulthood and aging (Antonucci et al. 2011). The framework of the convoy model is developmental by nature and it represents social exchanges as complex, multidimensional, and changing over the life course. It accounts for personal characteristics, such as age, gender, race, and education, as well as contextual characteristics, such as role expectations, community, and work environments. These characteristics are crucial to shaping our social relationships as well as our social exchanges.

Over the life course, convoys can change in terms of structural characteristics, for example, size and composition, as well as functional characteristics, such as providing or receiving aid, affect or affirmational support. Parents, siblings, and teachers may be the closest social exchanges to a child as they provide shelter, emotional support, and learning opportunities. Convoys can increase in size when the individual makes more connections as s/he becomes an adult. Other social ties, such as those with supervisors, colleagues, and romantic partners may become increasingly important in young adulthood as individuals start to establish careers and families. In middle and older adulthood, individuals may

have fewer social ties as aging relatives and friends pass away, and older individuals become more selective in maintaining rewarding social exchanges rather than forming new ties. Aging parents, adult children, and friends are some examples of close ties in adulthood that are often earmarked by frequent social exchanges.

Support Exchanges in Aging. An important part of close social exchanges is the exchange of support. Positive social exchanges can provide support and buffer against stress. Support can come in many different forms, including aid, instrumental/tangible support (e.g., financial, buying groceries), affect or intangible support (e.g., emotional), affirmation or informational support (e.g., advice), and companionship (e.g., spousal relationship). In the context of aging, health can be a source of stress and need for support. Support exchanges are very important to health and well-being. For example, perceiving greater support from a partner or spouse is associated with better physical health (Ryan et al. 2014). Support is also linked to better cardiovascular, endocrine, and immune health, as well as lower mortality risks (Uchino 2006).

Social exchanges can also be stressful, involving tensions, conflicts, and arguments. In fact, most social exchanges are both positive and negative. For example, one can have a loving relationship with a spouse but still experience conflicts. Although positive relationships are generally associated with lower mortality and negative exchanges are generally associated with poorer health, under certain circumstances, such as conditions of serious illness, having negative relationship quality with children and friends has been shown to be associated with lower mortality (Antonucci et al. 2010). One possible explanation for this counterintuitive finding is that the negative relationship stems from increased demands from children and friends to engage in healthier behaviors, such as exercising and adhering to prescribed medical regimens. Furthermore, the absence of close social ties, which are usually associated with frequent exchanges, seems to have greater negative implications than having a low positive or high negative relationship as it is related to loneliness. Older individuals who report feeling lonely have higher mortality risk, which highlights the importance of having close social ties in old age (Luo et al. 2012).

Factors Influencing Social Exchanges

There are many factors that influence the quantity and quality of social exchanges as individuals age. In keeping with the concepts of social exchange and the convoy model, two major factors that play a role in shaping close relations are considered. These are: (1) psychosocial characteristics, such as reciprocity and the related concept of a support bank and (2) sociodemographic and contextual characteristics, such as age, gender, race, and culture.

Psychosocial Factors

Reciprocity. Reciprocity is the norm in the American culture. An equal or comparable exchange of tangible aid, emotional affection, advice, or information between people or groups is preferred as optimal in social exchanges. This norm can be complicated by considerations of whether there are expectations that the reciprocity be achieved immediately or over the long run, which in turn depends on the relationship to the person with whom the exchange or reciprocity is being maintained. Most research suggests that the two are related. Relatively short-term and less close relationships call for immediate, in-kind reciprocity. For example, borrowing money or a cup of sugar should be returned as soon as possible with exactly what was received, i.e., money or sugar. On the other hand, long-term relationships do not have the same demand characteristics. Money or sugar received might be returned in kind, but there is also the expectation that reciprocity might be achieved over an extended period of time. Thus, the money, sugar, or any other need might be reciprocated in the distant future as needed with whatever is needed. In short-term relationships, immediate reciprocation is expected because it is unclear how long the relationship will last. With long-term relationships, however, there is an

expectation of availability into the distant future. Reciprocation can be achieved in the future and can be modified to meet the other's needs as they emerge.

Support Bank.This is a related concept that extends the perspective of reciprocity in the long term to include what essentially amounts to an accounting system similar to a savings account. Support provided at earlier points in time can be assumed to accumulate over time, much as they might in a savings account. Support deposited can be drawn upon in the future as needed and a withdrawal might be directly or indirectly comparable. A parent providing sick care to a child might expect to receive care at a future point in time when s\he becomes sick. Similarly, the provision of economic aid at an early point in time might result in an expectation of sick care or other tangible assistance in the future (Silverstein et al. 2002). Some versions of the support bank have outlined the transmission of deposits across people or generations. Supporting a child through caregiving by a mother or financial support by a father might translate to support expectations provided to a sibling, niece or nephew, other parent or grandparent. As such, the support bank works best within very close, longstanding relationships, i.e., the closest relationships in the convoy model. It provides a useful mechanism for long-term exchanges while at the same time maintains the norm of reciprocity.

Sociodemographic and Contextual Factors

There are a large number of sociodemographic factors that have been shown to influence social exchanges. Four such factors which are illustrative, especially with respect to influences on social exchanges in adulthood, are examined. These are age, gender, race and culture, and context.

Age. Initial thoughts concerning social exchange and reciprocity over the lifespan might suggest that younger compared to older people are most likely to report reciprocal relationships or that they provide more than they receive. In keeping with Dowd's argument that older people are at a considerable disadvantage as they age because they have fewer resources available to them with which to reciprocate, one might assume a linear trend. This is less the case than one might suspect. Overall, in a sample of older people from ages 50 to 74 years, everyone reports that they provide more support than they receive (Antonucci and Jackson 1990). Only among the oldest group, i.e., those over 75, does another pattern emerge. This group is about equally likely to report that they provide more than they receive or receive more than they provide. A very small proportion of people in this age group report reciprocal exchanges. Interestingly, closer examination of this pattern indicates that health and disability rather than age accounts for the change.

Gender. Gender differences in social exchanges emerge with respect to the frequency of support, the effects of stressful exchanges, and the specific kinds of support. Women have more social ties than men, provide more frequent social, especially emotional, support than men, and tend to mobilize more support from network members than men during stressful times (Kawachi and Berkman 2001). In addition, women are more affected than men by their close social network members who are stressed, with the stress of others often having a detrimental effect on both their physical and psychological health. There are also differences in the specific kinds of support provided by men and women. Women, for example, are likely to report providing more sick care than they receive across all ages. On the other hand, men report providing more financial support than women, again across all ages. Of course, this gender difference may disappear in future cohorts as women are more frequently employed outside the home and men more often involved with caregiving.

Race and Culture. A series of studies offers some unique insights into how other factors might influence the experience of reciprocity. For example, in a comparison of African American, White American, and French elders, several differences emerge. First, comparing older people in these three groups, the majority of people across all groups reported that their support exchanges were reciprocal. The next most common response

was that they provided more support than they received. Reports from African Americans indicated that they provided more support than White Americans and therefore were also less likely to report that they received more support than they provided. A comparison with the French sample of elders, however, puts these differences within a cultural perspective. While the French reported patterns of exchange more like African Americans than White Americans, French elders were unlikely to report that they provided more support than they received and extremely likely to report that they received more support than they provided. While the pattern was similar, the distribution was quite different. Interpretation of these patterns might include socioeconomic differences or cultural differences in expected patterns of exchange. Very likely both explanations are correct. For example, people of lower socioeconomic status may more frequently be in a position where friends and family need help and at the same time be less likely to be able to provide it. Yet although they may be less likely to provide support, there is a greater likelihood of providing support rather than receiving it. Similarly, some cultures emphasize providing over receiving support as the cultural norm, thus making it more likely that people in some cultures report providing support rather receiving it.

Other Contextual Factors. Apart from cultural factors, other contextual changes may lead to changes in the structure, composition, and quality of social exchanges. Common examples in the aging context include retirement, relocation, and widowhood. For adults who have been working, especially those who have been working for many years, retiring and leaving the workplace could mean reduced contact or leaving important relationships that have been formed with coworkers. If those relationships were positive, retirement could represent a loss in supportive and meaningful interactions, which is associated with worse health. However, if those relationships were negative, retirement may actually lower interpersonal stress and be beneficial to psychological and physical health. Interestingly, research has found that some work-related relationships are likely to continue after retirement, which suggests that many of those relationships are rewarding and meaningful (Cozijnsen et al. 2010).

Moving to a new location, as is often the case among older people, whether it is to another neighborhood or to another country, also leads to changes in social ties. This is particularly true in old age if these individuals have difficulty with physical mobility and cannot maintain their previous close relationships after migrating. Older adults who relocate often have to overcome stressors in addition to diminished or lost close social ties. These stressors might include discrimination and anxiety, which could then be associated with significant declines in physical health and life satisfaction. People who have moved recently and those who moved later in life are particularly at risk for depression (Bradley and Van Willigen 2010). Social exchanges, having positive social relationships, and making new social connections are important to adjusting to changes in older adults' living environment. This is especially the case for widows who move after widowhood to be closer to family and friends who provide support.

Experiencing the loss of a spouse or partner, usually one's closest social network member, can be extremely difficult. It can be even more difficult if the relationship was close and positive, if the death was sudden and unexpected (e.g., car accident), and if the spouse or partner who died was younger. On the other hand, chronic illnesses are a major cause of death as couples age. Caregiving for a spouse/partner with a chronic illness can be very stressful and can take a toll on the caregiver's physical and psychological health. In this case, while bereavement is difficult, it can bring some relief as the burden of caregiving is lifted. Close children and friends often play significant roles in the adjustment to widowhood, especially for wives who tend to outlive their husbands (Ha 2008). It is important to note that many widows, men and women, continue to lead engaged and meaningful lives after widowhood, often by engaging in new exchanges or providing support to other close relations, such as children and grandchildren.

In this section, broad psychosocial and sociodemographic factors as a means for

understanding social exchanges among older adults were examined. The concepts of reciprocity and the support bank offer two theoretical frameworks for understanding social exchanges. At the same time, consideration of age, gender, race, culture, and context as factors influencing social exchanges indicate that both broad and specific characteristics influence support exchanges in late life.

Summary and Conclusions

Evidence suggests that social exchanges are critical across the lifetime and take on added significance as people age. Some cultures, such as the United States, emphasize the importance of reciprocity in exchanges. However, how that reciprocity is achieved can vary depending on the nature of the social relationship. Classic research indicates that short-term or less close relationships require contemporaneous and precisely equal reciprocity. Yet, long-term, close relationships seem to be more flexible, thereby allowing that reciprocity to be achieved over time and in comparable, though not necessarily, identical exchanges. These differences are important for older people who often have a number of close, long-term relationships and perhaps fewer short-term, distal ones.

The changing nature of the lives of older people suggests that a new view of their social exchanges is needed. Whereas previous theories emphasize the lost power, status, and resources of older people, changing sociodemographics may call for a new perspective. Older people are living longer and are healthier for more of that time compared to previous generations. In addition, there are notable changes in their family demographics. Although they are living longer, more people are entering old age unmarried either because they have never married, are divorced, or widowed. They are likely to have fewer children, children-in-law, and grandchildren, all of whom are also not as likely as in the past to live nearby, which influences the type and frequency of exchanges provided and received.

Notions of reciprocity as explicated by the convoy model and the support bank offer potential, innovative ways for older people to maintain equitable social exchanges. Rather than considering living longer a deficit-inducing circumstance, an individual's life history and experiences, such as age, gender, race, culture, and context, can prepare them for a new old age. Family continues to be important to middle age and older people, as does their stake in the family's future. However, middle age and older people appear to be creating circumstances that will permit them to maintain reciprocal exchanges, either by developing new short-term, contemporaneous relationships, e.g., service exchanges, or by developing multiple types of innovative long-term relationships, e.g., group or congregate housing.

Each of the above theories and perspectives offers insights into how to predict and potentially influence the exchange experiences of older people. Boomers may be redefining social exchanges and aging. As the healthiest generation of older people with the longest life expectancy, boomers are creating new opportunities for exchange through second careers, traveling, education, volunteer work, increased community activism, and active grandparenting. Rather than rely on any single type of exchange relationship, the new generation of older people create new opportunities to both give and receive exchanges. They are finding ways to prepare for and minimize deficit exchanges while maximizing resource building in the experience and anticipation of a healthy, active, and extended old age.

Cross-References

- ▶ Intergenerational Relationships
- ▶ Migration and Aging
- ▶ Social Connectedness and Health

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Social Group Interventions for Older Adults

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Synonyms

Social cure; Social groups; Social treatment

Definition

Interventions in the present context are defined as actions taken to improve a state of affairs, which in the case of older adults typically involve enhancing various aspects of health, mood, and general well-being. Social interventions are those that deliberately use or target social processes and occur in a social context that involves one or more people. This entry focuses specifically on social interventions that are delivered in group format.

Social Group Intervention

There is considerable power in social groups. They provide an important basis for collective action, social influence, self-esteem and self-efficacy, and, most important for the present entry, social support. Social group interventions offer a means to harness this power, provided the group is one that enables formation of a strong sense of connectedness among its members and is a positive source of influence and support. These group-based interventions are primarily

advocated for social purposes as strategies to reduce loneliness and social isolation. Extending on this work, more recent research has promoted the use of social group intervention as a means of shaping identity and influencing broader health-related and well-being outcomes. This entry considers the range and effectiveness of these approaches in reducing loneliness and in protecting the health and well-being of older adults.

Social Interventions to Reduce Loneliness

Changing demographics are putting older adults at increased risk of social isolation. Recognition of the growing cost that loneliness poses to society has led to the development and evaluation of a range of strategies to counter its negative effects, particularly on health (Hawkley et al. 2006; Cruwys et al. 2013). As Masi and colleagues note (Masi et al. 2011), these tend to fall into four domains – strategies aimed at developing social skills, increasing social contact and interaction, facilitating social support, and challenging faulty cognitions. These differing approaches highlight the various causes of social isolation with the implication being that they should be more successful if tailored appropriately to the particular problems facing individuals. In practice though, it appears that these are offered as a function of availability and are not always systematically targeted.

Social skills training is thought to be beneficial for those who have difficulty initiating social contact or for whom loneliness appears to be an enduring trait. For the latter group in particular, increasing opportunities for social interaction is unlikely to be effective unless there is a change in their social engagement style which training may address. To this end, social skills training draws on behavioral techniques that incorporate role play, modeling, and feedback in the course of participants practicing their skills (e.g., initiating and continuing conversation) with others in and outside their group and in a range of contexts (e.g., in person, via telephone). Strategies that increase social contact focus on managing the external, or structural, constraints to social participation – notably, the lack of time due to competing demands, physical constraints that include geographical isolation, and limited funds. Methods to tackle these constraints include environmental modification to increase the availability of social spaces and the creation of more locally accessible community activity and interest groups. Relatedly, support groups are commonly offered to help people cope with loneliness arising from loss associated with separation or bereavement. These groups target awareness and understanding of emotional reactions to loss in addition to countering feelings of marginalization through sharing these experiences with others. Finally, strategies targeting faulty beliefs draw on a range of cognitive behavior therapies with the intervention focusing on challenging self-defeating and maladaptive thought patterns. Here the aim is not only to raise awareness of these cognitions but also to regard these as hypotheses that can be challenged through testing.

A number of qualitative and systematic reviews have tried to establish the effectiveness of these interventions specifically in older adults. The first, conducted by Rook (1984), highlighted many weaknesses in the methodological quality of studies, which to some extent accounts for the mixed support found across most categories of intervention targeting loneliness. Though, there was recognition in this review of the importance of social bonding that group-based interventions offered and their value in social skills training in particular. McWhirter's review (McWhirter 1990) suggested that a combination of cognitive behavioral and social skills training was more effective than either in isolation and may be particularly beneficial when it comes to managing and dealing with the consequences of ending relationships. The review conducted by Findlay (2003) found little support for using social intervention to reduce loneliness, attributing this largely to weak study designs. Consistent with this, only 6 of the 17 studies reviewed used randomized controlled trial methodology. Nevertheless, of the studies reviewed, findings indicated that loneliness was reduced in 1/5 individually based, 4/6

group-based, 1/2 service-directed, and 1/4 Internet-based interventions. Thus, despite the low quality of studies, there appeared to be greater success in group-based interventions. The two reviews conducted by Cattan and colleagues (Cattan and White 1998; Cattan et al. 2005) considered the differential contribution of group and one-to-one interventions directly, and both studies drew the same general conclusion – that the more successful interventions tended to be long-term group-based interventions that were targeted at specific populations. Being conscious of the low methodological quality of studies, the review identified 13 higher-quality studies. Among these studies, all the interventions effective in reducing isolation ($n = 6$) were group based, while four out of the five ineffective interventions were individually delivered. Notable too was the fact that the intervention strategy used in successful interventions varied and ranged from the use of support groups (self-help and bereavement) to education in association with support and physical activity. So it seemed that the more important factor was the mode of delivery rather than intervention strategy.

As a number of these reviews show, group-based interventions tend to be more beneficial than individually directed treatments in reducing loneliness in older adults. This has been attributed to a range of factors – with groups recognized as providing a good vehicle for communication and contact with others who are experiencing similar concerns and are working toward common goals. Groups also provide opportunities to test developing skills and, most fundamentally, the opportunity to actively engage in a supportive social context. In more recent investigations, researchers have emphasized the capacity inherent in group interventions to shape identity and through this counter the negative health effects of social disconnection. The effectiveness of these group interventions that aim to build a meaningful social identity is discussed in the next section.

Findings from the meta-analysis conducted by Masi and colleagues (Masi et al. 2011) are particularly pertinent given it represents the only study to date that has quantified the effect of loneliness interventions based on the four strategies noted earlier. While this did not focus primarily on older adults (i.e., people aged over 65 years), 48% of the studies meeting criteria either comprised seniors or included seniors in their larger sample. The studies included in this meta-analysis were classified according to three design types: single group pre-post design ($n = 12$), nonrandomized group comparison ($n = 18$), and randomized group comparison ($n = 20$). All design types were found to have a significant effect on reducing loneliness, with effect sizes ranging from small to large. It was only among those studies using a randomized group comparison design in which intervention strategy was a significant moderator, with studies that addressed maladaptive cognitions producing the largest effect size (mean effect size of −0.598). Irrespective of strategy, most studies incorporated group-based intervention (66%). However, the effect of group versus individual intervention was only examined in the randomized and nonrandomized group comparison studies. Only the former was found to have a larger effect in reducing loneliness in nonrandomized design studies, but this difference was not significant.

On the whole these studies suggest that perceptions of loneliness can be reduced with social intervention, but data relevant to what the intervention should comprise are somewhat mixed. Qualitative reviews of older adult studies tend to find greater support for the use of social group-based intervention. The only meta-analysis conducted recommended a focus on maladaptive cognitions due to its larger effects in reducing loneliness. However, it is also worth bearing in mind the fact that 70% of those studies addressing maladaptive cognitions were delivered in groups and that the overall analysis was based on studies conducted with participants across the age range (i.e., from 7 to 96 years). Clearly there is a need for quantitative analysis on the effects of strategy and delivery mode (group versus individual intervention) specifically in older adults to identify the optimal form of intervention.

Social Interventions that Aim to Build Social Identity

There is a growing body of evidence that speaks to the value that social group interventions play in

protecting the general health and well-being of older adults. This direction in intervention draws on evidence from the social capital literature showing that older adults who are more socially engaged are generally healthier and experience better well-being. While these data are based on the integration of different types of social relationships, there is evidence that social group relationships may be especially beneficial for health (Haslam et al. 2014, 2015). This benefit has been attributed to the contribution that social groups make in shaping our sense of self through providing us with a sense of meaning, purpose, and direction (see entry on ▶ Social Connectedness and Health). When they are a positive source of influence and support, social groups act as a psychological resource from which people can draw strength and health-enhancing support (Jetten et al. 2014). This reasoning has particular relevance to social group intervention, as it predicts that health and well-being is only improved to the extent that people identify strongly with their intervention group. Thus, unlike the social interventions described above that target loneliness, the strategy applied here is to build and strengthen social identification with others in the group to achieve health and well-being gain.

Results from a number of experimental studies conducted with older adults living in residential care support this prediction. The content and purpose of the social intervention in these studies varied widely and included reminiscence groups who collectively recollected memories and experiences from the past (Haslam et al. 2010, 2014a), design teams tasked to decorate communal spaces (Knight et al. 2010; Haslam et al. 2014b), water clubs to combat dehydration (Gleibs et al. 2011a), and men's clubs to counter social isolation (Gleibs et al. 2011b). The common factor was that all provided a meaningful basis for social interaction. This was even the case in reminiscence which is often characterized as a form of cognitive stimulation, but is also recognized as having an additional social function (Woods et al. 2005). Having a common purpose strengthened members' sense of identification with their social group, and this, in turn, was associated with enhanced cognitive health, mental health, and well-being.

Two studies were particularly notable in their investigation of the contribution that group and individual delivery of the same social intervention had on health outcomes. The first of these directly compared the effectiveness of group and individual reminiscence on memory in a randomized controlled trial (Haslam et al. 2010). Residents engaged in this activity over a period of 6 weeks, either with one member of the research team or in a small facilitated group. Thematic content and time engaged in reminiscence was controlled, as were the materials used to facilitate discussion (comprising tangible props such as objects and photographs from particular time periods). Results showed that group reminiscence, but not individual reminiscence, enhanced memory performance and that this was associated with a greater sense of maintained connectedness among those who reminisced in a social group context. Those reminiscing one on one felt very different and disconnected from others in care after the intervention. Thus, despite engaging in the same content, it took group interaction for the memory benefits to emerge from reminiscing. The second study involved residents in care learning about the benefits of water (Gleibs et al. 2011a). Here, residents were randomly assigned to a water or control intervention (focusing on news and current affairs), which was delivered either in a facilitated social group context or individually with a member of the research team. Only residents in two of these four conditions – water clubs and news clubs – showed any health enhancement which was particularly apparent in their reduced need for general practitioner appointments. Mediation analysis further showed that these benefits were achieved through provision of social support, which emerged in response to a strengthened sense of social identification that developed primarily among residents in the clubs.

One of the clearest demonstrations of the particular role that social identification plays in group intervention is provided in another reminiscence study. In this case, the standard form of group reminiscence, experienced through collective sharing of memories from the past, was compared with a form of song reminiscence involving collective recollection and singing of songs from the

past (Haslam et al. 2014a). Although not uncommon in the reminiscence field, overall analysis showed no effect of reminiscence on either cognitive or well-being outcomes. However, further interrogation of initial identification data (i.e., participants' initial sense of belonging and connectedness to their group) was more positive. These findings indicated that only those who developed a strong sense of identification with their reminiscence groups from the start showed improvement in general cognitive performance and life satisfaction. In this case, identification with others in the social group intervention was the driver of enhanced outcomes.

An interesting dimension to these studies is that engagement in socially stimulating activities had an effect on cognitive performance. Cognitive enhancement is typically associated with cognitive, and not social, stimulation. While it can be argued that cognitive stimulation is a feature of standard reminiscence, it was less prominent in the remaining activities involving water clubs and song reminiscence. Stronger evidence speaking to this point comes from a study conducted by Pitkala and colleagues (Pitkala et al. 2011). In this clinical trial, 235 lonely older adults were recruited and randomly assigned to take part in socially stimulating group activities, that they chose on the basis of preference and interest, or to receive normal community care. Only those who received the social group intervention showed an improvement in cognitive performance as indexed by the Alzheimer's Disease Assessment Scale. This led the authors to conclude that even socially stimulating activities targeting loneliness can improve cognition.

Identification processes have also been shown to be central in managing the mental health of a recognized minority in residential care – older men. Many social activities and interventions in residential care contexts are targeted toward women, and it is not surprising that these have limited appeal to older men. In response, a growing number of men's sheds and clubs have emerged, but there are few investigations of their effects on the health and well-being of older men. One exception to this was a study conducted in the United Kingdom investigating the effect that joining men's clubs had on older men in residential care (Gleibs et al. 2011b). Given the low numbers of men in the facility, the activity coordinator recruited older men from the community to join the clubs, and together the men engaged in activities that they chose (e.g., watching a sports game, going to the pub). The impact of this social group intervention was compared to that for women taking part in ladies' clubs, which represented the control condition in the study. Results showed no change in the mental health and well-being of women who were already highly identified with others and were neither anxious nor depressed. However, men experienced a significant reduction in depression and anxiety and significantly enhanced well-being in association with feeling more identified and connected with other men through the clubs.

As these data attest, group-based social interventions can be more powerful in enhancing health and well-being. However, they also show that it is not simply a case of joining any intervention group on offer. The social group intervention must be meaningful and valued by those taking part for identification to develop and strengthen. Additionally, the social group must provide a positive basis for influence and support. In the absence of a positive sense of identification, there is no reason or motivation to engage or persist with an intervention, nor any basis for health and well-being gain. Nevertheless, as the Masi meta-analysis shows, there are studies that do not find significant effects of group delivery. Establishing the reasons for these mixed findings is difficult without better process measures, particularly those indexing the extent to which people identify with their social intervention group.

Conclusion and Future Directions

Social group interventions are commonly used with older adults to target specific problems – primarily social isolation and, more recently, health. Interestingly, the frequency of group-based delivery tends to outweigh individual delivery, and this is not simply a reflection of funding constraints or efforts to make savings. There is evidence showing the greater impact of group-based interventions in reducing loneliness and in enhancing cognitive

health, mental health, and life satisfaction. However, this is not the case in all studies, and this field would benefit from a quantitative review of the effect of group-based social intervention on older adults specifically. Clarity over the best mode of social intervention delivery is just a first stage. Questions still remain about the nature of the intervention, in terms of the best strategy to apply in older adults for particular outcomes, and the dose of intervention. There are currently no clear recommendations about how often social intervention should be delivered nor for how long. Answers to these and other related questions will provide the basis for stronger guidelines to optimize outcomes from social group intervention.

Cross-References

- ▶ Aging and Quality of Life
- ▶ Loneliness and Social Embeddedness in Old Age
- ▶ Mental Health and Aging
- ▶ Psychosocial Well-Being
- ▶ Social Connectedness and Health

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Social Identity Change and Driving in Later Life

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Synonyms

Driving cessation; Social Identity Model of Identity Change (SIMIC)

Definition

Driving is a key activity of daily living, one which not only serves a functional purpose but which can influence one's self-definition and social identity (i.e., that portion of a person's self-concept derived from group membership). Continuing to drive and even the possession of a valid license to drive in the absence of actual driving have been linked to a positive social identity (e.g., belonging to a group of older adults that is still young and active). Because of this, driving cessation has also been linked, in qualitative and quantitative research, to social identity loss – the change from seeing oneself as belonging to a group of older adults that is independent and active to one that is more frail, less independent, or, simply, older with respect to perceived (as opposed to actual) age. This is one of the reasons why driving cessation as an act (either voluntary or involuntary) has been linked to reduced physical and emotional health and well-being.

Social Identity Change and Driving in Later Life

Driving is a familiar activity of daily living, one in which many individuals worldwide participate, in most cases without thought for when this important activity may have to be suspended, either on a temporary or a permanent basis. Indeed, although in some densely urban metropolitan centers car ownership is rare and thus driving less important, in many societies throughout the world, people are heavily dependent on automobiles as the predominant means of transportation (Buys et al. 2012). Continuing to drive is reported by older adults as important for maintaining independence and quality of life (Adler and Rottunda 2006). However, declines in health and cognition may result in older adults ceasing to drive, either voluntarily or involuntarily (Edwards et al. 2008). In turn, driving cessation may affect health and well-being negatively for a number of reasons.

Since driving is not only a practical and useful skill but is symbolically associated with many desirable qualities such as independence, competence, and freedom of mobility, stopping driving is typically associated with many negative emotions and is associated with a decline in physical and mental well-being and an increase in isolation (Fonda et al. 2001; Mezuk and Rebok 2008; Ragland et al. 2005). Consistent with this, older people who stop driving report a loss of control and self-efficacy (Windsor et al. 2009), decreased quality of life (Oxley et al. 2010), and increased dependence upon others (Yassuda et al. 1997).

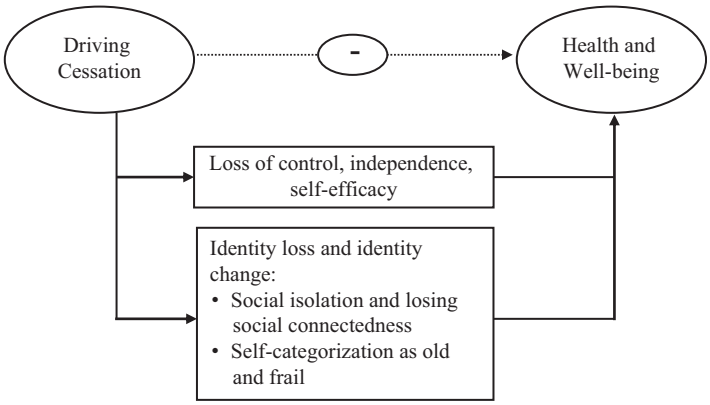
However, the cost of driving cessation goes well beyond the greater dependence caused by the inability to drive from A to B. It often represents an important life change, one that is associated with social identity change and/or loss. One's social identity can be described as the portion of an individual's self-concept that is derived from perceived membership in a social group (Tajfel and Turner 1979). Traditionally, social identity theory has been used as a framework for describing intergroup behaviors and is increasingly seen as a means to not only explaining but also as a means to influencing such behaviors (Tajfel and Turner 1979; Haslam et al. 2010). In recent years, the theory has been applied more broadly, for example, to explain the way changes to social identity affect health and well-being (Jetten et al. 2012). The Social Identity Model of Identity Change (SIMIC; Iyer et al. 2008; Jetten et al. 2009) views identity change quite broadly and includes anticipated life changes such as the transition from work to retirement, as well as more sudden changes to one's identity such as those that

might result from an acute illness, or with having to stop driving. At the core of SIMIC lies the assumption that, because self is in important ways defined by the groups that we belong to (e.g., age groups), changes in group membership or loss of valued group memberships affects a person's sense of self in important ways.

Driving cessation can be viewed as an identity change process not unlike other important life transitions such as retirement or changes in health status, in that it can occur acutely or over time and can be voluntary or involuntary. It thus involves many of the factors associated with SIMIC that make it harder to adjust to such a change. Specifically, driving cessation involves giving up a valued identity as a driver and the taking on of a new identity as a nondriver, which is viewed as unattractive and often stigmatized (Eisenhandler 1990). This new identity is very often permanent, with negative effects on the individuals' broader identity network with respect specifically to maintaining membership in social groups and group activities (Jetten and Pachana 2012).

There are at least two ways in which driving cessation involves identity change and identity loss (see Fig. 1). First, driving cessation implies increased barriers to participation in community life and social connectedness (e.g., Glasgow and Blakely 2000). Driving cessation may result in a change in one's relationship to others, to the extent that one no longer feels they belong to, or identify with, the same social groups as previously. This may be reflected in membership of specific groups oriented around an activity which is no longer able to be pursued due to changed driving status (such as a hobby or volunteer activity), but also membership in a more abstract group (people who are independent). Thus, an individual who stops driving is likely to find it harder to engage in the social networks and social groups to the same extent as they did before ceasing driving. The social isolation that can occur and the potential for loss of group membership as a result of driving cessation are therefore likely to impoverish the individual's social identity and, by extension, his or her personal identity (Jetten et al. 2010), and this will negatively affect health and well-being.

Second, driving cessation is also associated with changes in how a person views himself or herself and their relationships to others. When identity change involves a sense of losing identity (e.g., from being a driver to a nondriver), this not only implies a change from a positively valued identity (e.g., a healthy older adult) to a more negative identity (e.g., a frail older adult, unable to drive), it is also a marker of aging (i.e., self-categorization as "young-old" to "old-old"). In this way, driving cessation may well hinder an older adult from feeling they are younger than their chronological age and thus no longer able to "pass themselves off as something they are not" (Hornsey and Jetten 2003). This can be viewed as a categorization threat, whereby others may place them into a social category to which they would rather not belong (Branscombe et al. 1999). In effect, they have lost one means of staving off old age (Gardezi et al. 2006).



Social Identity Change and Driving in Later Life, Fig. 1 A schematic representation of processes that affect the relationship between driving cessation and health and well-being

There is now a growing body of work showing evidence for these different negative consequences of driving cessation on health and well-being. For instance, there have been several qualitative and, more recently, quantitative studies published that shed light on how older adults think of themselves in relation to stopping driving and the potential impact of driving cessation on social identity in later life. Rudman and colleagues (Rudman et al. 2006) used focus groups of older adults who were either still driving (aged 55+) or had stopped driving (aged 65+) to explore their perspectives on self-regulating their driving behaviors. Continuing to drive was viewed as indicating independence and well-being; those who had not yet ceased to drive in this study almost could not envision themselves in the position of no longer driving: "I can't imagine not driving" (p. 70). Donorfio and colleagues (Donorfio et al. 2009) examined, among other things, what mid-aged adults thought driving meant to them, personally. As reported by the authors, driving to these persons "meant much more than getting from A to B" (p. 223), hinting at meanings to driving beyond mere functionality.

In one of the first papers to address driving cessation and identity, possession of a valid driver's license has been seen as explicitly linked to a positive sense of self, while loss of one's driver's license was associated with taking on an "older" identity (Eisenhandler 1990). In another qualitative survey, this issue of stopping driving being equated with being older was reported by one participant, after listening to a media program on driving and driving cessation: "I saw a documentary and then there was a radio phone-in. It took me a while, then I thought. . . this is actually about me, now. I suddenly realised I was old and needed to be more careful. It was that that started me thinking (female, aged 75)" (Musselwhite and Shergold 2013), pp. 94).

In a recent qualitative study of driving cessation in persons with dementia, the difficulty of bringing up the topic of stopping driving, due to its high emotional impact, was mentioned frequently by caregivers: "It meant transport, it meant independence, but it was also something about the activity itself that was so important to him . . . It was his manly activity" (Liddle et al. 2013, pp. 2038).

In a recent quantitative study on the meaning to self in ceasing driving (Pachana et al. 2015), over 200 older adults who had either ceased driving or were contemplating stopping driving were surveyed. Driving cessation was a significant life event, one associated with subjectively feeling older. Irrespective of current driving status, these older participants identified the state of having ceased driving as associated with feeling older than their real age and the state of not having stopped driving as associated with feeling younger than their real age. Participants' expectations about both the practical hassles involved in stopping driving, as well as identity changes with respect to, for example, social networks, were both significant predictors of the stress associated with driving cessation.

Several authors have also provided evidence that continuing to drive may be an effective way of holding off the *individual* perception of growing older (Gardezi et al. 2006; Rudman et al. 2006; Siren and Hakamies-Blomqvist 2005). Since the changed driving status is associated with so many negative and socially undesirable traits (e.g., dependence), an older adult may have great difficulty making and accepting this social identity transition. In fact, driving cessation for some individuals signals a transition from being young-old to old-old, which is often associated with greater exclusion from mainstream society (Jetten and Pachana 2012). Moreover, this can be viewed as a very public (and likely permanent) transition – an undeniable sign to others that one has become old.

Conclusion

Driving is an important aspect not only of participating in activities and maintaining mobility but also in maintaining a social identity as independent and effective and possibly even as functioning at a level that belies one's chronological age. Driving cessation, on the other hand, is associated not only with decreases in physical and mental well-being but also with a shift in social identity to

one which is less desirable and more stigmatized, namely, a nondriver. This shift in social identity and its aftermath are congruent with the Social Identity Model of Identity Change (SIMIC; Iyer et al. 2008; Jetten et al. 2009).

Cross-References

- ▶ Age Stereotyping and Discrimination
- ▶ Social Connectedness and Health

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Social Media and Aging

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Synonyms

Social networking

Definition

"Social media" collectively refers to a range of applications that allow user-generated content and person-to-person or person-to-network content sharing via the Internet (Kaplan and Haenlein 2010). This includes applications like Wikipedia, Facebook, YouTube, Flickr, and Twitter, to name a few commonly known examples, as well as blogging sites and online communities. All these applications share the capacity to facilitate interaction, discussion, and exchange between individuals and groups of individuals, who might be physically dislocated but can nonetheless be copresent or who can interact in an asynchronous way, in virtual space.

Background

"Social media" rose to prevalence in the early to mid-2000s following a series of technical innovations known as "Web 2.0." Web 2.0 does not refer to any specific advance in technology or programming, but rather is used to refer to the accumulated changes that increased the capacity for user-generated content and made the sharing of this and social interaction via the Internet more possible. Although social media applications share these capacities, individual social media platforms differ on a number of dimensions, including their specific purpose (e.g., social, political, commercial; informational versus entertainment), content and layout (e.g., primarily text or image based), and scope of individual contributions (e.g., being relatively more public versus private, anonymous versus identified, active versus passive in terms of use and engagement). On the boundary of social media are applications that also allow for specific forms of social interaction via the Internet, including email, instant messaging platforms, and Skype, but do not meet the formal definition of "social media" because they do not involve the creation and public sharing of content that exemplifies social media properly. Nonetheless, these applications and technologies also provide opportunities for users to connect with each other and with networks, to share content and interact, and to do so instantly and beyond the constraints of physical and temporal co-location. As such, these forms of online social interaction and networking are often discussed in connection to social media more generally.

Social media are now deeply embedded in the societies of most developed nations and many developing nations also. Social media play a significant role in the everyday personal lives of individuals around the globe and have also been implicated in social and political life via their role in facilitating social movements and collective action (e.g., as exemplified by the "Arab Spring" protest movements in 2010). In the context of aging, interest in social media has been driven by two broad, but related, concerns. First, social media are seen by some to hold considerable promise as tools for supporting the social

participation of older adults who might otherwise be at risk of isolation. Second, as access to information and social services increasingly becomes "digital by default," concerns have been raised about digital literacy among older adults and the extent to which deficits in skills or access to technology could be creating digital divides that further contribute to the marginalization of older adults. These twin concerns speak to the role of social media, and online interaction more broadly, in contributing to social inclusion versus exclusion. Current research that speaks to these issues is summarized below.

Aging, Social Media Use, and Well-Being

Social isolation and loneliness are issues of concern across the life span, and research has established significant links between the quantity and quality of individual social connections, or the subjective representation of these (e.g., in terms of felt loneliness), and individual mental, cognitive, and physical health outcomes. To broadly summarize this body of research, people who have access to more social connections, who are more satisfied with their relationships, and who participate across multiple social groups tend to be more emotionally and physically resilient in the face of stress, tend to experience better mental and cognitive health, and tend to live longer. Although such patterns are evident in younger and older populations alike, the negative health effects of social isolation and associated feelings of loneliness tend to amplify with age (Hawkley et al. 2006; Ong et al. 2012). As such, the negative consequences of social isolation and loneliness are an issue of particular concern among older adults. Moreover, aging itself is associated with a variety of physical, cognitive, and social changes that can contribute to, or exacerbate, social isolation and feelings of loneliness among older adults. For example, physical impairments can restrict mobility and thereby reduce opportunities for ordinary contact with others in the local community; cognitive impairments can create barriers to easy and effective communication; bereavement can restrict one's social network; and moving into long-term care facilities can create distance between one's self and one's family. For all these reasons, finding ways to support positive social relations among vulnerable older adults is an important priority both for research and for aged care and public health policy more generally given the aging global population.

Because of their capacity to bridge physical and temporal divides, to enable alternative forms of communication, and to facilitate social connections (Neves 2013), social media applications have been viewed by some as promising tools to reduce social isolation among older populations. Specifically, social media seems to offer a way to help those who have limited physical mobility, who may be living away from their families, or who may be experiencing difficulties with verbal communication, to maintain their social networks and to engage with these effectively. Beyond these uses, social media can also connect people to other public health developments such as telecare and tele-health, in which interaction with and monitoring by carers and health professionals are conducted remotely, thus having a potentially wider field of application in relation to aging.

There is evidence that older people who are more digitally active tend to experience better well-being. For example, data from large-scale, population-based surveys of older adults in the United Kingdom (English Longitudinal Study of Ageing) and the United States of America (Health and Retirement Longitudinal Study) show significant longitudinal relationships among Internet use and reduced depression (Cotten et al. 2014), improved cognitive capacity (Xavier et al. 2014), and more positive health behavior in areas of physical activity, diet, and smoking (Xavier et al. 2013). These relationships hold when controlling for important demographic indicators (e.g., gender, education, functional impairment, and wealth). Interestingly, the relationship between Internet use and reduced depression was found to be the strongest (and indeed only significant) among older adults who were living alone, or with only one other person, rather than those living in larger households. This particular pattern speaks to the idea that Internet use might provide a useful supplement to social activity

among those who have fewer local opportunities for interaction, thereby attenuating the negative effects of social isolation. However, such links could also be explained by a variety of other processes. For example, relationships between Internet use and improved cognition could be explained both by enhanced social engagement and by increased learning and mental stimulation (Ybarra et al. 2008), and relationships between Internet use, depression, and health behavior could be accounted for by access to health information and other resources, as well as by processes associated with social support, advice, and influence from one's network (Smith and Christakis 2008).

However, correlational links like these, even when longitudinal, could also be explained by other uncontrolled factors associated with Internet use. As such, experimental research is important for understanding the causal links between engagement with specific forms of technology and individual health and well-being outcomes. In contrast to this correlational picture, evidence for the causal role of Internet use in general, and social media specifically, in enabling social connections and contributing positively to cognitive and mental well-being is currently scarce, especially with respect to older adults. Moreover, the studies that have been conducted on this issue have produced mixed findings. Some small-scale earlier studies in this area showed positive effects of Internet provision and supportive training on the well-being of older adults involved (McConatha et al. 1994, 1995). However, more recent larger-scale studies found no or limited evidence of improved outcomes among older adults assigned to receive a computer, Internet connection, and supportive training (Slegers et al. 2008; White et al. 2002; Woodward et al. 2011). Thus, while there is suggestive evidence that points to the potential for social media and other online applications to support the social connections of older adults and through this improve their well-being, at present the evidence for this is inconclusive (Shklovski et al. 2004). To resolve this issue, there is clearly a need for more large-scale well-controlled experimental studies to quantify the causal effects of social media provision and training, and individual engagement with these, on the capacities and well-being of older adults over time.

Perceptions and Use of Social Media and the Internet by Older Adults

Beyond the specific benefits that may or may not flow from social media use, researchers have also examined the perception and use of social media among older adults. It is often assumed (by younger people) that older adults are not interested in computers and social media or that they are not capable of using these fully and effectively. In line with this, surveys show that age is associated with lower levels of computer use and less engagement with social media. However, despite the persistent age gap, computer use is increasing across time for all ages, and recent US data suggest that the use of social media has increased particularly sharply among adults over 50 years (Madden 2010). These trends suggest that older adults are increasingly interested and engaged with computers, technology, and social media applications. Indeed, there are some who suggest that the age-based "digital divide" may be a historical problem – because current generations have been raised with technology and the Internet. Moreover, as social media becomes more pervasive and part of one's ordinary daily life, this digital literacy will remain as people age. Of course, technology itself ages, becomes obsolete, and is replaced by newer developments. As such, there are still reasons to suspect that the gap in digital literacy between younger and older groups might persist (Friemel 2014).

There may also be specific functional and attitudinal aspects of computers and social media use that act as barriers to individual engagement among older adults. Functionally, for example, physical and cognitive changes associated with aging may make computer use progressively harder: impaired vision and hearing makes it harder to engage with content displayed by computers, and reduced dexterity makes it harder to use a keyboard and mouse to navigate these. However, computers themselves are changing by

becoming more portable and more user-friendly. The use of assistive devices (e.g., a stylus in conjunction with a touch screen) and minor modifications can help to overcome some of the physical barriers to computing experienced by older adults. Beyond functional restrictions, attitudinal barriers might exist. For example, self-perceived ability may limit willingness to engage with computers. A lack of comfort with the perceived norms of social media, the potential for exposure to inappropriate content, and especially fears about privacy and the sharing of personal information have also been identified as particular attitudinal barriers to engagement with social media among older adults (Nef et al. 2013; Xie et al. 2012). With respect to these attitudinal barriers, it is also worth noting the important role of encouragement and support from social networks in facilitating older adults' engagement with technology and the Internet (Friemel 2014). In this respect, features of older adult's offline social networks are likely to contribute to whether and how they engage with social networking online.

Another barrier to older adults' engagement with social media may be what they do or do not find when they go onto social networking sites. Social media can be a useful way for supporting social connections only to the extent that they provide access to others with whom one wants to connect. Given that social media use generally reduces with age, older people might find it difficult to locate friends and peers with whom they would want to interact on social networking sites. The perceived absence of friends online may limit individual participation, thereby creating a reinforcing pattern of underrepresentation of older adults in social media fora. Of course, older adults may not want to only interact with people of their own age. Because social networking is so pervasive among younger adults and children, social media might provide opportunities for intergenerational contact that are welcomed by older adults (Nef et al. 2013).

Aside from the types of social contact that are available, older adults might also be confronted by negative stereotypes about their age group via social media. Ageism is a common form of social prejudice and unlike many other prejudices is one that is openly expressed and perceived to be legitimate (North and Fiske 2012). This, in combination with the dominance of younger users, could lead to the expectation that age-based prejudice and negative stereotypes on social networking sites should be fairly frequent. Indeed, a recent study conducted an analysis of 84 open-membership Facebook groups that included terms related to older adults in their descriptions and found that the overwhelming majority of these referenced negative stereotypes (Levy et al. 2014). Although this possibility has not been systematically investigated, it seems plausible that exposure to negative stereotypes and prejudice toward older adults via social media sites might negatively affect individual motivations to engage with these.

To the extent that older adults do engage with social media, studies highlight specific features of these that are valued by this population. Consistent with the perceived potential for social media use to address social isolation, studies suggest that one of the most common uses of computers and Internet technology among older adults is for communication and social support (Wagner et al. 2010). As noted above, providing the opportunity for intergenerational contact has also been suggested as a specific value of social media (Nef et al. 2013). Finally, social media provide the capacity for accessing, sharing, and discussing health information, something that may be of particular interest and relevance to older adults – and that might contribute to better health and well-being to the extent that the information found is reliable and contributes to better decisions. Indeed, seeking health information is a common use of computers among older adults (Wagner et al. 2010). However, trust in the credibility of such information can also be an issue for this population (Zulman et al. 2011).

Summary

Social media represent both the accumulation of technological advances and a shift in the form through which many people now engage with social connections. Reflecting the broader uptake

of social media across society, older adults are increasingly computer literate and increasingly engaged socially online. Because of their unique capacities to transcend time and space, and to offer alternative ways of communicating, sharing, or otherwise being "copresent" with others, it is often suggested that the Internet and social media applications might be useful tools for tackling social isolation among older adults. However, to date, systematic evidence for the effectiveness of Internet connectivity, Internet use, or social media use, more specifically, in supporting the health and well-being of older adults who might be vulnerable to social isolation is limited and, at best, mixed. As such, more research exploring how older adults engage with Internet technology and social media, and the consequences that this might have for their health and well-being, is clearly needed.

Cross-References

- ▶ Age Stereotyping and Discrimination
- ▶ English Longitudinal Study of Aging (ELSA)
- ▶ Health and Retirement Study, A Longitudinal Data Resource for Psychologists
- ▶ Loneliness and Social Embeddedness in Old Age
- ▶ Telemental Health

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Social Policies for Aging Societies

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Definition

In this entry, social policies refer to policies that affect well-being of individuals and families. They are usually referring to income maintenance policy, educational policy, social welfare policy, housing policy, and health policy. Aging society refers to a society that has at least 14% of its population aged 65 years or older.

Background

Population aging affects all aspects of human experience and requires specific social policies that address the needs of older people. Older people face a higher risk of poverty and income insecurity. They have increased needs for health and long-term care. Governments are developing policies to promote successful aging, productive aging, and aging in place. Although population aging affects both developed and developing countries, policy challenges for developed and developing countries are distinct. In this entry, we review four major social policy issues related to aging societies: old-age income support, health care and long-term care, successful and productive aging, and age discrimination and age equity. In doing so, we draw on policy examples from developed countries such as the OECD countries and developing Asian countries to illustrate the diversity of policy responses to population aging.

Old-Age Income Support Policies

Economic activities, and hence income, expenditure, and saving, are not distributed evenly across the life span. Typically, younger adults save for retirement throughout their working years via different public and occupational retirement saving programs and private saving. By the time they become too old to work, they finance their consumption by gradually dissolving their assets and by support from their children. Over the last century, governments have developed policies and programs to protect against the risk of poverty in old age and smooth the transition from one's work life into retirement (Holzmann and Hinz 2005; Holzmann et al. 2008).

The social safety net, public pension, and social insurance are three major policies that aim to protect older people from economic hardship and to smoothen consumption over the life course (Smeeding and Sandstrom 2005). The social safety net is noncontributory social assistance program for lifetime poor, sick, and disabled elders who have no or very limited work history. It is usually funded by the general tax revenues and provides minimum safety net benefits against old-age poverty. It can be universal or means-tested. The public pension is generally universal and contributory, either through defined contribution or defined benefit, providing a cash transfer paid regularly to older people. The cash payment is usually small, funded by salary tax in a pay-as-you-go arrangement. It provides a higher-income replacement rate for low-income earners. Social insurance is contributory, mandatory, and universal. It generally links benefits to earning history and provides effective financial protection against old-age economic hardship by spreading the risk over all insured people, within and across generations. Some social insurance programs, such as

the Social Security program of the USA, also provide spouse and dependent children benefits. These three programs, together, create the first three pillars of the World Bank's pension system framework (Holzmann et al. 2008). The fourth pillar of its framework is a voluntary employment-related retirement saving plan, usually in the form of a fully funded defined-contribution individual retirement account or a defined benefit pension plan. Most governments use a combination of these policies to reduce the risk of old-age poverty and improve the economic status of older people. In the USA, the Social Security program alone reduced the old-age poverty rate from 44.4% to 9.1% and lifted 15.3 million older people out of poverty (Van de Water et al. 2013).

Old-age income support programs are under stress in many countries as the size of the elderly population grows rapidly. Population aging increases the needs of old-age income support and at the same time reduces the contribution to those programs. Governments are exploring different ways to reform their old-age income support programs to make them sustainable. These reform efforts can be grouped into two strategies, namely, eligibility-restricting reforms and generosity-restricting reforms. The eligibility-restricting reform aims to abolish or restrict early retirement schemes, increase the statutory retirement age, and gain greater equality in the age at which men and women retire. In generosity-restricting reforms, governments adopt a lower pension benefit ratio to decrease or stabilize pension expenditure (European Commission 2014). Politically, it is easier to adopt and implement the eligibility-restriction reform than generosity-restriction reform.

Health Care and Long-Term Care Policy

Health care and long-term care are other pressing policy issues in aging societies. It is well documented that the rates of morbidity and mortality increase with age. Population aging also affects disease profile, shifting from infectious and acute diseases that are relatively inexpensive to treat to chronic diseases that are expensive to manage. Therefore, many policy makers assume that population aging is associated with increased utilization of health services and higher health spending. Such perception has also been supported by health-care utilization data. For example, in the USA, elderly people comprised 13% of the total population in 2010, but consumed 34% of the total health-care spending (Centers for Medicare and Medicaid Services 2015). In Europe, older people account for about half of the hospital bed-days (McKee et al. 2002). Governments, therefore, are trying to slow the growth of health spending by finding new ways to finance and organize health care to produce the best health outcomes by the most efficient means (National Research Council 2001). These usually include better coordination of care across health and social services, across different levels of health care, and across private and public health resources; moving treatments and care out of hospital; and enhancing health promotion and disease prevention programs that target amendable risk factors such as obesity, hypertension, mental health, and inactivity (Economist Intelligence Unit 2009; Rechel et al. 2009).

However, recent research findings cast doubt on the population aging-higher health-care spending connection and suggest that other factors, such as the use of advanced medical technology, public health spending, and end-of-life care, may have a larger impact on health-care costs in an aging society (Rechel et al. 2009; Werblow et al. 2007). For example, the USA spent 16.4% of its GDP on health care in 2014, which represents 7.5 percentage points above the OECD average of 9.3%. This is despite the fact that the USA has a much younger population than OECD countries (OECD 2014). Similarly, an analysis of OECD health spending data between 1965 and 1995 also found that age has a negligible effect on an individual's health-care expenditure when proximity to death is controlled for. In fact, most health-care expenditure is driven by medical technology and decision on end-of-life care than by aging population (Werblow et al. 2007).

Long-term care (LTC) is a set of multidimensional services that comprise health care, social care, personal care, and housing and is directed at persons with limited self-care ability due to cognitive decline, functional decline, or chronic illness. It differs from health care as the goal is not to cure or rehabilitate, but to maintain and to reduce the impact of cognitive and functional decline on the quality of life of older people. LTC can be delivered at home (e.g., chore services), in the community (e.g., adult day-care services), or in institutions (e.g., nursing and residential care facilities). Although governments have been increasingly providing long-term care to older people, family members are still the major caregivers of frail elders in all societies, including advanced Western countries such as the USA and UK. Most governments have complicated policies that regulate providers of long-term care services, including manpower, qualifications, safety, hygiene, and physical environment.

LTC is usually financed through taxation, LTC insurance, or through national health-care spending. In some Nordic countries, LTC is tax-funded and is an integral component of their universal health-care system. In the USA, LTC is mainly funded by the Federal Government's Medicaid program and is means-tested. Other governments, in countries such as Japan, Korea, and Germany, use a stand-alone insurance to finance LTC. The LTC insurance is usually contributory and mandatory. A few countries, such as the USA, adopt the medical model of LTC and fund LTC services through the public health system (Francesca et al. 2011).

Many governments are trying to rebalance their LTC services by shifting more resources to home- and community-based care that encourage frail elders to age in place. Some countries are also trialing various forms of participant-directed care, also known as the money-follow-the-older-people programs or personalized social care. The participant-directed program allows frail elders, with support from their family or informal caregivers, to develop individual budgets to support access to more personalized services that meet their individual needs.

Many governments see ensuring and improving the quality of LTC as an important policy priority in aging societies. The most common policy approach in quality control focuses on controlling input, such as staff ratio and infrastructure, by setting minimum acceptable standard and enforcing compliance. Very few countries have a system of systematically monitoring the quality of LTC.

Successful and Productive Aging Policies

Successful and productive aging are two different, but related, concepts. Successful aging is a multidimensional concept covering physical, mental, and social functioning; life satisfaction; and psychological resources (Rowe and Kahn 1997, 1998). To age successfully, older people work to improve their overall health, minimize their functional loss, increase their social participation, and enhance their capabilities (Rowe and Kahn 1998). Similarly, for those more frail, successful aging involves optimizing physical, cognitive, and social functions, but in the context of accommodating for their long-term disabilities. Regardless of ability and age, autonomy and meaningful engagement are essential for successful aging. Social policies, therefore, aim to minimize the negative impact of disability and health deterioration on functioning and social engagement and to maintain high levels of autonomy. Successful aging policies cover various community support programs that provide older people opportunities to optimize their health and functioning, to engage in socially meaningful activities, and to enhance their autonomy and capability. Environment is crucial to successful aging, and governments have increasingly adopted policies that promote age friendliness in local communities. The Age-Friendly City domains from the World Health Organization have been adopted by a number of societies as guiding principles for age friendliness.

Productive aging policy focuses specifically on increasing opportunities for older people to continue their productive engagement in the context

of aging. Productive engagement of this form refers to any activity that is seen to have economic value (Hinterlong et al. 2001). Economic value can be measured in terms of goods or services produced (e.g., full-time or part-time paid employment) or of the economic cost involved in supporting older people not involved in those activities (e.g., caregiving and volunteering). Productive aging policies also incorporate activities that enhance productive activity in older people, such as education and training. Productive aging engagement has positive effects on older people's health and mental health, but, typically, tends to be taken up by more educated and middle-class elders (Hong and Morrow-Howell 2010; Lum and Lightfoot 2005; Musick et al. 2000). For low-income elders who wish to volunteer, financial support from the government helps reduce the economic barrier associated with participation and makes such participation possible. In the USA, the Federal Government funds the Senior Corps that provides service opportunities for Americans aged 55 years and older. The Senior Corps programs offer modest stipends to help offset the costs of volunteering. Similarly, the AARP Experience Corps® (EC) offer high-commitment volunteer opportunities that bring older adults into public elementary schools to improve the academic achievement of students.

Age Discrimination and Age Equity Policy

Some employment policies are not age friendly. Nevertheless, governments have an obligation to protect people from age discrimination in the workplace. Age discrimination typically arises in response to age stereotyping, where characteristics are attributed to people based on their age. It can result in the setting of arbitrary age limits for hiring, promotion, compensation, and other employment decisions, regardless of an individual's actual ability or potential for job performance. Age discrimination arises when employers use such stereotyping to make employment decisions. For example, an employer may assume that older workers are less interested in training and thus make decisions about the training opportunities they offer on the basis of age. They may also assume that younger workers are more productive and make hiring decision based on age. Age discrimination, intentional or unintentional, is not only illegal but also harms business when the workforce is rapidly aging. For example, in the USA, the median age of the working population is already 40 years and older (AARP 2006). In the USA, the Age Discrimination in Employment Act has been in place since 1967 to make it illegal for employers, employment agencies, and the federal government agencies with at least 20 employees to discriminate against employees and job applicants who are 40 years or older. It also prohibits age discrimination by labor organizations, such as unions, that have at least 25 members. The best way to prevent age discrimination is to make age-neutral decisions on hiring, firing, work assignments, and benefits and to base these decisions on how well an individual's abilities and qualifications match the criteria set for the job. Finally, an age-friendly work environment, such a more flexible employment term and retirement age and more support in using assisted devices in workplace, is essential for the future of aging societies. Unless we can attract a very large number of older people to remain in the workforce, many societies will face severe labor shortage.

Conclusion

Population aging creates pressing needs that drive social policies. The diverse responses to address these needs reflect the unique strengths and challenges of different societies. These may include different rates of population aging, levels of economic development and wealth, maturity of health and LTC infrastructure, and availability of human resources and dependency ratio. With reference to these previous responses, a new generation of social policies for population aging can be designed, with innovations that turn challenges into opportunities. The interrelatedness and synergetic effects of the four major social policy issues outlined in this entry is an area to be further explored.

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Social Resources and Centenarians

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Synonyms

Affect; Centenarians; Culture; Emotional regulation; Social support

Definition

Social resources are characterized by structural (social network availability, culture) and functional (instrumental support, emotional support) attributes originating from social interaction and interpersonal engagement. The interplay between structural and functional characteristics in social resources is vital to positive adaptation and

long-term survivorship in human aging. Specifically, social resources contribute to the sustainability of individual health, emotional regulation, positive psychological disposition, and quality-of-life among long-lived adults.

Social Support Ties and Centenarians

Although social resources increase the probability of living long, they often present a quandary for persons living 100 years or longer. Survivorship beyond the expected normative limits of human life expectancy is generally accompanied by co-occurring and simultaneous declines in biological potentials including but not limited to impaired cognitive orientation to time, space, and place; short- and long-term memory deficits; reduced sensory acuity in vision and hearing; poor functional mobility; and diminished performance in everyday decision-making and activities of living (Poon et al. 2010). The acceleration of age-associated losses in human biology experienced by persons living extremely long lives contributes to an increased dependence on sociocultural provisions to manage and sustain individual functioning and well-being (Poon et al. 2010; MacDonald 2007). Paradoxically, researchers commonly assume that most centenarians have outlived the majority if not all of their close immediate familial attachments, as well as other familiar but informal sources of support (e.g., friends, neighbors; Poon et al. 2010; MacDonald 2007). This limited support network of family, friends, neighbors, and others puts centenarians at a unique social disadvantage in terms of both a diminished social functioning and quality of life compared to younger age cohorts (Poon et al. 2010; MacDonald 2007). In some cases, centenarians may have an increased concern about dependency and whether they may have an adequate supply of social provisions to meet their personal needs (Poon et al. 2010). As a result, contemporary centenarian researchers have pursued three primary areas of scientific inquiry pertaining to social resource provisions among persons living 100 or more years: (a) where centenarians live and from whom they receive social support, (b) the associated link between social resources and functional health in extreme longevity, and (c) the interplay between social resources and experiential and evaluative attributes of emotional well-being.

Living Arrangement and Social Resources

Recently, centenarian researchers have begun to consider the structural conditions of social resources and in particular the comparative examination of interpersonal living arrangements among centenarians. A primary focus of this work has involved identification of where and with whom centenarians may reside, as well as what types of resource provisions centenarians receive from their social network affiliations. Results of this focus include the identification of noticeable sociocultural differences where centenarians may live and from whom they may receive sources of care. For example, the care of old and very old adults in the United States conforms to a Western cultural tradition of filial obligation (Blieszner and Hilkevitch-Bedford 2009). This implies a sense of social duty as well as obligatory ethical practices by blood-related offspring or a legally designated third party (e.g., legal guardian, long-term care/medical institution) to manage and provide social resources for society's older members. Relative to the care of long-lived adults, social provisions are exchanged to sustain a shared sense of autonomy and well-being for both care recipient and care provider (Blieszner and Hilkevitch-Bedford 2009). According to the U.S. Census Bureau (2012), this generally translates into a continuum of support relative to where centenarian men and women reside: (a) alone and independently at home without the presence of assistance others within the household (33.3% of centenarian men vs. 34.0% of centenarian women); (b) independently but with family members or others in the household who may provide unpaid or paid 24-h assistance with basic activities of daily living (43.5% of centenarian men vs. 28.5% of centenarian women); (c) under 24-h direct medical supervision within formalized

long-term care setting (18.2% of centenarian men vs. 35.2% of centenarian women). This appears to confirm that centenarian men in the United States tend to live more often with various family members (e.g., son/daughter, grandson/granddaughter, niece/nephew) and therefore receive more family-based support in the maintenance of everyday social functioning (e.g., mobility, cooking, financial management); whereas centenarian women more likely require more formalized and long-term socioenvironmental provisions (e.g., Medicare/Social Security, nursing and medical care).

Investigators from the Georgia Centenarian Study (GCS) studied social resource differences among centenarians residing in private homes, assisted-living facilities, and nursing homes (Randall et al. 2011). Evidence from the GCS suggests that centenarians residing in nursing homes tend to report lower self-reported social provisions overall compared to their counterparts residing in private homes or assisted-living centers (Randall et al. 2011). This finding appears to persist even for those centenarians who have larger social networks. Although quality of life may be enhanced by interacting with social network members, centenarians living in nursing homes may find it intrusive or even tiring when numerous people come to visit and interact (Cho et al. 2012). Nonetheless, social resources remain essential in improving the degree to which centenarians feel prepared to face everyday life challenges (Randall et al. 2011; Cho et al. 2012). In most cases, centenarians who possess high-quality social ties feel more capable of handling life circumstances regardless of current residential status (e.g., at home, in an assisted-living facility, or nursing home).

Among centenarians living in the United States, those originating from other countries are more likely to coreside at home with others. This appears to be very predominant among centenarians representing Asian countries such as China, Taiwan, and Japan (U.S. Census Bureau 2012). For example, an estimated 61.4% of Asian-American centenarians reside with others in the household compared to only 26.4% of White-Caucasian and 47.8% of African-American centenarians. A majority of social provisions reciprocated in the care of a centenarian are generally initiated by an adult child or grandchild (Yang 2013). This appears to reaffirm an Eastern cultural philosophy known as filial piety or the act of good conduct and care toward one's parents, elders, and ancestors (U.S. Census Bureau 2012). This is a cultural tradition across many Asian cultures. Traditionally, it is the duty of a male heir to behave out of respect and love while pursuing acquisition of material means to be used in care and support of one's parents or elders (U.S. Census Bureau 2012). Such conditional lifestyle factors contribute to a greater number of centenarians living at home regardless of whether they may or may not need to use public welfare provisions to support normative activities of daily living (Yang 2013). Most interesting is the fact that centenarians do not view their need for support as a burden that increases with continued survivorship (Yi et al. 2008; Wong et al. 2014). Yet, family care providers of centenarians seem to exhibit similar self-reported feelings of burden, symptoms of depression, health problems, and energy compared to noncentenarian care providers (Yang 2013; Yi et al. 2008; Buetner 2008). In effect, family caregivers of centenarians are not immune to caregiving stressors that may eventually compromise one's own need for social resource functioning (Yang 2013).

Characteristics of filial piety have been reported to persist within the social networks of individuals living 100 years and longer in Japan. Investigators have cited evidence that Japanese centenarians commonly endorse a sense of shared history, death/grief, and life domains such as lifestyle habits and work within collectively tight-knit and age-homogeneous groups (Martin et al. 2013). Centenarians on the island of Okinawa, Japan, are most noted as maintaining membership within small collective social network groups known as "moai." Moai typically consist of a shared social network of centenarians who attend to the social needs of other centenarians (Martin et al. 2013). This reflects a reciprocated social system in which elders support and care for other elders. In many instances, moai include a lifelong group of centenarian friends who often coreside together or within very close proximity

(Martin et al. 2013). Moai serve as a "social safety net" in the exchange of social capital (e.g., guidance, physical care, financial assistance, dietary wellness) within everyday social interactions between companions (Martin et al. 2013). In effect, social resource quality appears to be essential in the continued well-being of Okinawan centenarians.

Social Resource-Health Functioning Link

In addition to investigating social living arrangements and underlying resource needs of centenarians, investigations have attempted to clarify the empirical link between social resources and functional health capacity. A majority of reported findings surrounding association has come from the Georgia Centenarian Study (GCS) in the United States. Of key interest has been the determination of how social resources are associated with the performance of activities of daily living by centenarians. Investigators from the GCS have reported negative changes in the performance of activities of daily living (ADL) and social resource provisions to be significantly greater among centenarians compared to persons in their 60s and 80s (Poon et al. 2010; MacDonald 2007). This contributes to a deficiency of age and functioning well at 100 years of age and older. As centenarians experience noticeable declines in their ability to complete everyday instrumental tasks in living (e.g., using the phone, meal preparation, shopping, handling money), an ever-shrinking social support network erodes opportunity to maintain frequent contact with social resource ties that commonly provide assistance (Poon et al. 2010; MacDonald 2007). Among centenarian participants within the GCS, social resources significantly moderate the performance of instrumental tasks in everyday life. Centenarians may initially possess greater social resources, but they continue to experience steeper declines in their functional capacity to perform instrumental tasks over time compared to younger age cohorts (Poon et al. 2010; Randall et al. 2011; Cho et al. 2012). Unlike younger age-groups, centenarians experience increasing reductions in ADL performance which translates into a simultaneous need for greater social assistance in meeting daily living tasks (Poon et al. 2010; MacDonald 2007). Investigators from the GCS have also extended confirmation of these findings to include the perspective of proxy informants (Buetner 2008). In particular, caregiver reports indicated that centenarians, especially those living independently at home, tend to be in better overall physical health and therefore more likely to effectively perform daily tasks of living on their own (Buetner 2008). Yet, centenarians who receive encouragement from members of a caregiver support system are more likely to attempt performing activities of living, despite experiencing age-associated limitations (Buetner 2008). Thus, the support received from caregivers is an essential social resource and determinant in the functional well-being of centenarians.

Beyond the United States, international-based research efforts have given primacy to understanding the associated link between social resources and physical health functioning among centenarians. There has been some minor global debate whether social resources are essential determinants of health functioning among centenarians. Researchers with the Japanese Centenarian Study conducted a nationwide census-based study ($N = 1{,}907$ centenarians; (Ozaki et al. 2007)). Within this sample, approximately 10.4% of centenarians were regarded as "autonomous centenarians (Ozaki et al. 2007)." Such centenarians maintain a strong cognitive reserve and numerous other alternative psychosocial resources (e.g., cognition, diet, exercise, lifestyle habits) that play an essential role in health functioning. Relative to social resources, Japanese centenarians who remain self-sufficient in the performance of daily activities of living tend to view the status of their family relations more favorably than relationships with friends or other nonrelatives (Ozaki et al. 2007). Furthermore, Japanese centenarians who reside alone at home with family are more likely to maintain better cognitive ability and overall functional capacity than their counterparts who may reside within hospital or institutional care settings (Ozaki et al. 2007). Family relations are believed to bolster autonomy

among centenarians to the point of eliminating dependence on nonfamilial supports for health-related assistance in everyday life activities (Ozaki et al. 2007). It may be that the ability to demonstrate competence in completing everyday activities by one's self and without feeling dependent on others external to one's family is a valuable resource for some centenarians.

The issue of autonomy versus dependency as social determinants of centenarian health functioning has also been further explored by a group of Korean researchers (Kim et al. 2012). In this investigation ($N = 796$ Korean centenarians), social connectedness and activity at 100 years of age and older were identified as essential attributes in reducing the presence of disease and lowering the need for assistance in everyday activities of living (Kim et al. 2012). These findings suggest that social provisions improve health functioning among centenarians. Thus, a case may be made that social resources are valuable to healthy longevity for many centenarians. Still, there are some centenarians whose health seems to fare better without help from others (Poon et al. 2010; MacDonald 2007; Kim et al. 2012). Further clarification of this paradox in the social resource-health functioning of centenarians link is warranted and an opportunity for future investigations.

Socioemotional Resources of Well-Being

A final area of empirical interest in centenarian research involved socioemotional resources of well-being. A majority of this research focused on understanding how social resources operated in tandem with experiential (e.g., positive and negative affect, loneliness, happiness) and evaluative (e.g., life satisfaction, quality of life) attributes of well-being (Poon et al. 2010). For example, Martin et al. (1997) conducted an earlier cross-cultural comparison of loneliness in centenarian samples representing two countries, Sweden and the United States. Contrasting culture differences in social support and loneliness were evident across the two samples. Among centenarians in Sweden, reported feelings of loneliness were increased by the presence of greater social resources. Martin et al. (1997) speculated that this counterintuitive finding was likely due to the provision of social support which heightens individual awareness of social losses, and thereby increases emotional longing for close attachment ties which the centenarian has outlived. However, centenarians in the United States indicated feeling more lonely in the absence of supportive resources (Martin et al. 1997). Among other European centenarian studies, such as those in the Heidelberg Centenarian Study, there is supportive evidence that self-reliant beliefs may regulate the extent to which basic social capital (e.g., social support, job training, and extraversion) increase or decrease socioemotional affective outcomes. According to Jopp and Rott (2006), centenarians generally remain resilient to reduced resources that would otherwise produce negative affective outcomes. This is mostly due to proper self-regulation in adapting to loss (Jopp and Rott 2006). Yet, it is important to remember that poor socioemotional regulation can contribute to underlying symptoms of anxiety and depression, which can potentially hinder positive adaptation and overall quality of life (Poon et al. 2010; Riberiro et al. 2014). Further investigation into the interplay between social resource deficiencies, psychological adaptation, and socioemotional well-being among centenarians is warranted.

Recent evidence from the Georgia Centenarian Study (GCS) has confirmed that greater social interaction enhances perceived quality of available social resources among centenarians in the United States. The more accessible social resources are perceived to be, the more positive the centenarian feels in terms of their own psychological state (Poon et al. 2010; Randall et al. 2011; Cho et al. 2014; Margrett et al. 2011). Additional empirical evidence suggests that this may be particularly true relative to cognitive perceptions of fatigue, feelings of loneliness, and cognitive-affective appraisals in life (Poon et al. 2010; Cho et al. 2014; Margrett et al. 2011). In particular, centenarians who possess greater social resources have significantly reduced cognitive-affective perceptions associated with feeling mentally exhausted, socially

isolated and lonely, and dissatisfied and unhappy with life (Poon et al. 2010; MacDonald 2007; Cho et al. 2014; Margrett et al. 2011). However, such reported associations between social support and psychological well-being outcomes may be partially explained by the extent to which U.S. centenarians feel they are in good physical health, can foster positive social relationships, or have the ability to independently perform activities of daily living needing assistance (Poon et al. 2010; MacDonald 2007; Randall et al. 2011). Researchers with the Iowa Centenarian Study have reported significant mean-level decreases in positive affect but not negative affect (Martin et al. 2012). Most notably, growth-curve changes in positive affect appear to reflect simultaneous decrements in social assistance, physical health status, and self-reported health functioning over time (Martin et al. 2012). In turn, it appears that any shift from positive to negative emotionality among centenarians over time may be due to co-occurring life events linked to changes in one's biological or social resources.

It should be noted that life history is an often forgotten yet equally important social element of underlying emotional well-being reported by centenarians (Poon et al. 2010). da Rosa et al. (2014) conducted a cross-cultural comparison of U.S. and Japanese centenarians (da Rosa et al. 2014). This examination involved a cross-examination of life event data reported from $N = 239$ centenarian participants from the Georgia Centenarian Study and $N = 309$ centenarian participants from the Tokyo Centenarian Study. Results provided valuable insights into overall cultural differences in socioemotional history of centenarians. For example, centenarians in the United States more frequently endorsed positive socioemotional experiences linked to achievement-oriented events commonly interconnected with everyday social living including education/schooling, marriage, and the raising of children (da Rosa et al. 2014). Although Japanese centenarians were somewhat similar in their reporting of these events, da Rosa et al. (2014) reported that positive social experiences seemed to be counterbalanced by socioculturally shared traumas reflecting human suffering and hardship. Specifically, Japanese centenarians endorsed more cohort-linked sociohistorical events surrounding warfare (e.g., World War II) and natural disaster (e.g., Great Kanto Earthquake of 1923). The endorsement of these traumatic sociohistorical events by Japanese centenarians appears to demonstrate a collective or shared cultural response in coping with human loss and mortality (da Rosa et al. 2014). Initial evidence across various centenarian studies suggests that positive and negative historical events impact the degree to which centenarians achieve contentment and finitude in life (Poon et al. 2010). Future investigation is needed to clarify the extent to which the sociohistorical lives of centenarians act as resource by which socioemotional well-being is derived.

A qualitative study of near-centenarians and centenarians in Hong Kong recently revealed four major themes that best summarize the interplay between social resources and living long and well (Wong et al. 2014). First, it is not the quantity of people in one's life that necessarily count, rather it is the quality of persons by whom one is surrounded that matters most to flourishing. Second, interpersonal connections through social engagement are essential to achieving a sense of meaning and passion in life. Third, social domains (e.g., living arrangement, work) represent valuable sources of comparison by which a long life can be appraised, judged, and accepted. Fourth, the conditions of social life operate as a mechanism by which individuals can deepen a sense of faith and hope in living a better future one day at a time. These four themes seem to reiterate the value and impact of social resources for persons living 100 years of age and beyond. Based on the evidence presented in this summary, there are still many unanswered questions regarding how social resources are maintained, managed, and used by centenarians residing across varying residential environments and sociocultural contexts. Nonetheless, there is no denying that social resources

remain an intricate, yet essential, element of individual functioning and well-being at the extreme upper limits of life.

Cross-References

- ▶ Age-Related Positivity Effect and Its Implications for Social and Health Gerontology
- ▶ Aging and Quality of Life
- ▶ Cross-Cultural Aging
- ▶ Grandparenthood and the Changing Nature of Social Relationships
- ▶ Loneliness and Social Embeddedness in Old Age
- ▶ Social Cognition and Aging
- ▶ Strength and Vulnerability Integration

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Social Support and Aging, Theories of

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Definition

As innately social beings, social relationships are integral to survival and well-being. From the cradle to the grave individuals depend on their social ties for resources and support. Social relationships, although often beginning with maternal attachments, encompass a whole range of people across the life span including family, friends, and peripheral ties. This article begins by defining social relationships; then discusses the current theories and the research with regard to life span changes in relationship quality and the implications of relationships for health and well-being. The article ends with a discussion of directions for future research.

Positive and Negative Dimensions of Relationships

Across the life span, individuals engage in a whole variety of social relationships from immediate families, to spouses, friends, coworkers, and neighbors. These social ties vary widely in their positive and negative qualities (Rook 2015). Positive aspects of relationships include the support provided, companionship, affection, and social control. Support include instrumental, information, and emotional support. Instrumental support includes financial and other types of material support as well as errands and sick care. Informational support involves advice. Emotional support involves listening and providing affection. Relationships also provide control or regulation of health behaviors. Negative aspects of social ties include inappropriate support, unsolicited support, criticism, demands, irritations, and conflict. Ambivalent relationships are defined as those that are simultaneously positive and negative.

Theories of Social Support

Convoy Model

According to the convoy model of social relationships, individuals are surrounded by close social ties across the life course and those ties are sources of support as well as strain (Antonucci et al. 2013). Social ties vary in their quality (e.g., positive and negative), function (e.g., types of support exchanged), and structure (number of network members, contact frequency, geographical proximity). The social ties that surround the individual vary by both personal (e.g., gender, age) and situational factors (e.g., social roles) and those factors as well as the characteristics of close social ties are closely linked with health and well-being. According to the convoy model, the support provided as well as the negative aspects of those ties are more closely linked with well-being than the structure of those ties. Over the life span the convoy is continuous in some ways but changes in others. Young adults have larger networks that tend to be more diverse, that is, with more family and friends, than older adults who tend to have a greater number of family members in their networks. However, older adults with diverse social networks generally report higher well-being; those with restricted or socially isolated networks are associated with the lowest well-being. Social networks also vary by gender. Women generally have larger social networks but also feel more burdened by those network members than men.

Socioemotional Selectivity Theory

According to socioemotional selectivity theory (SST; Carstensen et al. 1999), individuals change across the life span in terms of their goals and those goals directly influence their relationships. When individuals are young and perceive time as more limitless, they have more information-focused goals in which they are willing to engage

with a variety of social partners in order to achieve careers and meet romantic partners. As people age and perceive time as more limited, they become motivated by emotion-focused goals and become narrower in the selection of social ties in which to engage. Having emotionally meaningful and poignant connections with people becomes paramount. Studies testing this theory document that the number of close social ties is similar for different age groups, but numbers of casual acquaintances are smaller among older adults. This preference is theorized to be less driven by age and more by temporal perspective; for example, a study examining middle-aged adults with a life-threatening disease found that people with shorter life expectancies had similar social partner preferences to older adults (Charles and Carstensen 2007). Research also reveals that as people age they reduce their interactions with people with whom they feel less emotionally close. Older individuals are also less likely to attend to and remember negative information than are younger individuals, a phenomenon referred to as the positivity effect (Carstensen and Mikels 2005; Mather and Carstensen 2005).

The Strength and Vulnerability Integration Model

The strength and vulnerability integration (SAVI) model emerged from SST. According to the model, as people age they experience increased ability to avoid negative experiences due to improvements in emotion regulation skills (e.g., attention, appraisals, behavior). In turn, avoidance of negative experiences is associated with improvements in well-being. As a result of the ability to avoid negative experiences, older adults report more positive and fewer negative interpersonal experiences. Older adults will look similar to or worse than younger people, however, when they are not able to avoid negative experiences. For example, under circumstances in which older adults experience increased and sustained negative emotion (e.g., when under chronic stress), they have less physiological flexibility to recover and thus experience decreased well-being (Charles 2010).

Functional Specificity Theory

According to the functional specificity theory of relationships (Weiss 1969), relationships are specialized in terms of the functions they serve. There are six different emotional support provisions of relationships, which together help to maintain individuals' well-being. These provisions are: (1) attachment, or an emotional bonding that provides security; (2) reassurance of the individual's worth or value; (3) guidance when it is needed; (4) reliable help and assistance in times of need; (5) a sense of shared values, interests, and companionship; and (6) being needed by another for love and care. This theoretical approach implies that having people in one's social network who together can provide all of these provisions is ultimately more beneficial for one's health and well-being than having a restricted network where only a few of these provisions are represented.

Relationship Quality Across the Life Span

Overall, research suggests that relationships improve in quality as individuals grow older. In general, older people report less negativity in their relationships and they are more likely to use avoidance in response to interpersonal conflict than are younger people. This has been found across relationships with the exception of the spousal tie. For example, in a 12-year longitudinal study, Birditt et al. (2009) found that the parent–child tie and the friend tie decreased in negative relationship quality over time whereas the spousal tie actually increased in negativity when people remained married to the same person. Studies also show that the parent–child relationship often increases in quality after adolescence.

New research is emerging indicating that examining average trajectories does not provide a complete picture of how relationships change over time; for example, spousal ties vary in terms of whether they remain consistently happy or decrease in happiness over time. Couples may experience early marital stressors and these

stressors may lessen only during late middle-age in marriage when the challenges couples face – such as establishing careers and raising a family – have decreased. This suggests that relationship satisfaction increases as children leave home or retirement is reached. For example, studies show that for many women, their relationship satisfaction with their spouse increased as adult children left home, as opposed to the commonly-held belief that many middle-aged parents are faced with an "empty nest" (Gorchoff et al. 2008). The departure of children and imminent retirement may provide opportunities for couples to share leisure time, as well as encourage greater relationship satisfaction.

Relationship Quality and Gender

Men and women often show different approaches, expectations, and social network quality in all types of relationships, whether with a spouse, friend, or family member. Compared to men, women typically have larger social networks, are thought to have more complex and intimate relationships, and are relied on more often as providers of support. Women tend to be more upset by interpersonal arguments and demands from others whereas men become more upset by work and financial problems (Almeida and Kessler 1998), reflecting societal gender norms of nurturance and intimacy for women, and agency and instrumentality for men (Eagly et al. 2000). In general, men also tend to continue occupying positions of power in societies while women continue to be more responsible for the care of others. These factors lead to differential socialization in the expression of emotions, especially negative ones; for example, among men it is more acceptable to express anger, whereas among women it is more acceptable to express sadness. However, the body of literature concerning gender differences in all types of social relationships presents a complicated picture: although women are more prone to reinforce affiliative social norms in general and to have more positive and emotionally close relations than men, they may also be relatively more demanding, feel more burdened by others' problems, and report more negativity in their relationships (Birditt and Antonucci 2007). A brief summary of some of the literature concerning gender differences in spousal, friend, and family relationships is provided below.

Arguably, the close relationship that has been most researched in terms of gender differences is the spousal relationship. Extant theory and research suggest that this relationship is an especially close, intimate, and unique source of support, and that – particularly, perhaps, in older age – positive and negative aspects of spousal relationships relate to well-being for both men and women in similar ways (Antonucci et al. 2001). However, the mechanisms required to maintain spousal relationships may differ by gender and change over time. Often, for example, wives are perceived as better providers of support than husbands. In examining this phenomenon in younger couples early in their marriages, Neff and Karney (2005) found that although husbands and wives did not differ in the amount of support they provided each other, they differed in when they provided support: Wives tended to provide better support on days that their husbands experienced greater stress, but when wives experienced greater stress, husbands displayed both support and negativity. However, in older couples (in their 70s, on average), researchers have found fewer gender differences in either negative or positive quality in relationships with spouses (Antonucci et al. 2002).

How husbands and wives react to stress, either within the context of negative marital quality or in general, can also differ. Husbands may be more likely to react physiologically than emotionally, given their propensity to internalize their emotions in the marital context. In contrast, wives may be more visibly reactive to marital stress than husbands, due to their greater relational orientation and investment. For instance, wives tend to use more destructive conflict and demand strategies whereas husbands are more likely to report constructive and withdrawal strategies. This demand/withdraw pattern of marital conflict states that the demander is usually the woman, who pressures the other through emotional requests, criticism, and complaints, and the withdrawer, usually the man, retreats through defensiveness and passive inaction. Some research has found

that, although women are no more demanding, men are more likely to withdraw, such that the wife-demand/husband-withdraw interaction is more likely than husband-demand/wife-withdraw interaction, especially when discussing a change the wife wanted (Christensen and Heavey 1990). Adding complexity to gender differences in negative spousal relationships is the idea that, at least in midlife, this relationship can be a particularly important source of support among people without best friends, who are more likely to be men (Birditt and Antonucci 2007). In addition, women are more likely to report low quality relationships, or express disappointments in relationships.

Friends are an important source of social support, often sharing an accumulation of experiences and often originating from the same historical cohort. Women typically have larger social networks than men, and they tend to seek supportive interactions with other social network members when key sources of support, such as a spouse, fail to provide it. For example, women may be more likely to express their feelings of being let down and how their husbands get on their nerves to close friends. In research on married adults aged 60–91 who also had a best friend, women with friends in whom they could confide were more satisfied with life compared with women without a confidant, whereas men who confided in a friend were less satisfied with life than men who did not (Antonucci et al. 2001). In contrast, women with a best friend who got on their nerves also exhibited higher life satisfaction, whereas men in the same situation exhibited lower life satisfaction, indicating that women and men view friendships in very different ways.

Indeed, the extent to which men and women self-disclose in friendships also differs: Married women often tend to disclose as much to close friends as they do to a spouse, whereas married men do not. Gender differences in relationships with friends seem to be stable across the adult life span, although friends may become an even greater source of social support for women who tend to outlive their spouses. In research examining older adults (mean age = 73), women frequently had higher expectations of friends than men, and placed a greater emphasis on intimacy, whereas men's friendships often focused more on shared activities (Felmlee and Muraco 2009).

Consistent with gender norms of nurturance, women are more involved in adult child–parent relationships (Lye 1996). Adult child-mother relationships are closer than adult child-father relationships, particularly for daughters, although older mothers also confide in their daughters more than their sons. Additionally, older mothers may also prefer to rely on their daughters for both instrumental and emotional support. Again, however, this relationship is a complicated one: Although women report feeling closer to their children, they also report feeling both more positive and more negative about them (Antonucci et al. 2011).

Relationships and Health/Well-Being

Overall, a great deal of research has shown that relationships are important for psychological well-being, health, and a longer life span (Thoits 2011; Uchino 2004). In general, negative aspects of relationships are more highly associated with well-being and health than are the positive aspects of relationships. Relationships also buffer the effects of stress on health and well-being.

The literature with response to the two closest relationships people often report having, the spousal tie and the parent–child tie is reviewed below. Married people report better physical health, live longer, and are less distressed than unmarried individuals. Better quality marriages are associated with fewer psychological and physical health problems and greater life satisfaction and, in general, married individuals in middle age and older adulthood report better overall health than those who are unmarried. Destructive conflict behaviors (e.g., yelling, insults) in response to marital conflict are associated with increased blood pressure and endocrine changes. Greater physiological reactivity in the laboratory predicts divorce and lower marital satisfaction 10 years later. Daily diary research has revealed links between couples' interactions (e.g., intimacy, affection, communication) and self-reported well-being, cortisol, and DHEA-S levels. Marital quality is also associated with cardiovascular health. In a meta-analysis assessing the relationship between

marital quality and health, Robles, Slatcher, Trombello, and McGinn (Robles et al. 2014) found that marital dissatisfaction was consistently related to structural indicators of cardiovascular disease as well as functional indicators, including blood pressure.

Researchers still debate whether there are gender differences in the link between relationship quality and health, often finding that men are more physiologically reactive than women to marital conflict. However, more recent research indicates that there are few gender differences in the link between marital relationship quality and physical health (Robles et al. 2014). In a recent study, Birditt and colleagues conducted an examination of marital couples (Birditt et al. 2015) and found that there were interesting dyadic effects of negative marital quality and stress such that husbands had higher blood pressure when wives were more stressed, although the reverse was not evident. These associations were greater when husbands reported more negative feelings about the relationship. Thus, when examining married couples there may be more evidence of gender differences because the gender differences are within rather than between couples.

The parent–child tie has significant effects on well-being and health. Parents report greater well-being when their children provide them with emotional support or affection and when they report greater positive quality relationships with children. Parents also reported fewer depressive symptoms when children relied on them for tangible support. Thus it appears that parents benefit from both receiving and giving support to their children. Additionally, parents' well-being appears to be affected by their perceptions of how well their children are doing in their lives: parents whose adult children have more problems report lower well-being whereas parents who report that their children are well-adjusted (e.g., happier, satisfied with their lives) have greater levels of well-being.

Studies have also assessed associations between parental ambivalence and parental well-being. Parents who report greater ambivalence (i.e., high positive and negative relationship quality) report greater depression. Lowenstein (Lowenstein 2007) examined mothers and fathers aged 75 and older in England, Norway, Germany, Spain, and Israel to determine whether their feelings of ambivalence, solidarity, and conflict predicted quality of life. In all countries, ambivalence predicted lower quality of life, whereas solidarity predicted greater quality of life. Additionally, solidarity had a greater impact on quality of life than ambivalence.

Parent–child relationship quality also influences adult children's well-being. Adult children who reported lower parental support as children also reported greater depressive symptoms and chronic illnesses in adulthood. Less support from mothers and greater strain with mothers and fathers were associated with greater psychological distress among adult children. It is important to note, of course, that these studies are cross-sectional. Children who report lower well-being may be more likely to view their parents in a negative light and remember their childhood experiences as having been more negative.

Other studies have examined the associations between parent–child relationship quality and well-being for both generations simultaneously. Fingerman et al. (2008) assessed the associations between ambivalence and well-being among parents and offspring and found that ambivalence predicted lower psychological well-being among mothers, fathers, and offspring. Overall, it appears that relationships have important influences on physical and psychological well-being. More research is needed, however, on the longitudinal effects of the relationship on well-being.

Future Research Directions

There are several directions that future research should pursue in the field of social relationships, aging, and health. For example, studies need to examine more deeply how relationships change over time as people grow older; current longitudinal studies of social relationships do not have several waves and are not lifelong in nature. The present literature also often includes one individual's perception of relationships, and it is clear from the marital and parent–child literature that

it is important to include multiple perspectives because individuals in the same relationship may not agree or have distinct perspectives on the same tie. Widening the focus on gender differences in the perception of relationship quality would be useful. For example, examining how men and women approach long-term friend or family relationships over time, particularly in nongender-matched relationships, such as male–female friendships. Additionally, more research needs to examine multiple social ties in the same study because social ties may interact in unique ways to influence well-being. Further, although there have been advances in the examination of biological systems that account for links between social ties and health, they have primarily been used in the study of the marital relationships. Further studies need to examine the influence of multiple social ties on biological indicators of health in order to understand how relationships, and perhaps particularly relationship qualities, "get under the skin" to influence health and well-being.

Conclusion

In sum, social relationships vary widely in their supportive as well as positive and negative qualities. The negative and positive dimensions of relationships have important implications for health and well-being across the life span. Theories of social support suggest that although relationships change across the life span they become increasingly salient for well-being as individuals grow older.

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Socioemotional Selectivity Theory

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Definition

Socioemotional selectivity theory is a life-span theory of motivation that posits age differences in goals result from shrinking time horizons. When time is perceived as expansive, individuals will prioritize information-focused goals. When time is perceived as limited, individuals will prioritize emotion-related goals.

Overview

Socioemotional selectivity theory (SST) is a life-span theory of motivation grounded in the uniquely human ability to monitor time. In particular, the theory posits that age differences in goals result from shrinking time horizons. Goals influence social preferences and the composition of social networks. Because goals also direct cognitive processing, SST postulates that attention, memory, decision-making, and emotional experience are influenced fundamentally by the perception of time. Unlike most developmental theories of adulthood, which place primary emphasis on past experience, SST considers ways in which perceptions of the future change motivation. Indeed, in some ways, SST is not a developmental theory at all but rather a social psychological theory about perceived time and goals. SST maintains, for example, that younger people who face endings through terminal illness, wars, or other more benign endings, such as geographical relocation, display similar changes in motivation.

According to the theory, temporal horizons direct two overarching sets of goals that govern much of human social behavior. One set of goals concerns the acquisition of knowledge; another concerns the regulation of emotional states. Both sets of goals activate behavior across the life-span, but the relative importance and priority placed on them varies as a function of time horizons. The emphasis on a mechanism of perceived time, which can be cleanly separated from age as well as subjected to experimental manipulation, affords SST an unusual strength among developmental theories. SST is falsifiable. That is, the postulates of this theory can be tested and evidence can be gathered that either supports or fails to support its predictions.

SST is based on the idea that goals are set in temporal contexts, such that individuals focus their energy on goals that are feasible to pursue given the time they have available. When time is perceived as expansive, SST posits that individuals will prioritize information-focused goals. Under these conditions, people allocate their resources in a way that will help them prepare for the nebulous far-off future. Time is spent exploring the environment and gathering all manner of information in case it may be useful down the road. Individuals who perceive the future as long will invest in emotionally taxing activities if

the experience may allow for new learning or future opportunities. When the future is constrained and time is perceived as limited, emotion-related goals grow in importance. Under such temporal conditions, individuals prioritize emotional satisfaction over exploration and gathering information. People are motivated to invest in emotionally meaningful experiences that will provide more immediate payoffs. They spend time engaging in activities that make them feel good and savoring the positive aspects of life.

History

The first publication describing SST appeared in 1991 in the *Annual Review of Gerontology and Geriatrics* (Carstensen 1991) and was later elaborated in the 1993 volume of the *Nebraska Symposium on Motivation* (Carstensen 1993). In 1999, the *American Psychologist* published an overview of the theory in an article titled, "Taking Time Seriously in Life-span Development" (Carstensen et al. 1999). An essay describing the theory was published in *Science* in 2006 (Carstensen 2006).

In its original formulation, the theory was offered to provide an account of the purported "paradox of aging," a term coined to refer to high levels of emotional satisfaction despite age-related losses. In this formulation, the theory focused on goals as instantiated in social preferences. As evidence accrued and new hypotheses were put to test, SST was applied to emotional experience and later to cognitive processing.

Social Preferences and Relationships

According to socioemotional selectivity theory, as temporal horizons shrink, people live in the present. They shift attention away from the long-term future and prioritize the most important aspects of life. For most people, this prioritizes close relationships and emotionally meaningful interactions. As a result, the composition of social networks changes, as do social interactions, such that individuals choose to spend more of their time with close others as time horizons diminish. Initially, the fact that social networks get smaller as people age led to concern about older adults being lonely and depressed. Subsequent research, however, revealed that this change in social networks reflects a proactive pruning process whereby older adults increasingly invest their limited time in relationships with close others (Lang and Carstensen 2002). That is, older adults maintain their most meaningful, core relationships and let go of less satisfying, peripheral social partners. Similarly, when asked to imagine they have a half hour of free time, older adults prefer to spend time with a close social partner rather than a novel one, whereas younger adults do not show this preference. Moreover, relationship quality improves over time with children, spouses, and other meaningful partners, presumably a reflection of both experience and motivation.

Reasoning from SST, these age differences in social interaction are due to changes in time horizons. Older adults have relatively shorter time horizons (because they have less time left in life), so they prefer spending time with close others who provide a sense of emotional meaning. If time is limited for younger adults, they too would be expected to show a preference for emotionally meaningful partners, theoretically because they would then prioritize emotional goals over information-focused goals. Similarly, if time is expanded for older adults, they would be expected to prefer novel social interactions that have the potential to provide new information or future opportunities.

Several studies have manipulated time perspective to determine whether it changes social preferences, as postulated by SST. One of the first studies to do so found that when younger adults were asked to imagine moving alone across the country, their preferences aligned with those of older adults (Fredrickson and Carstensen 1990). When primed to think about this social ending, younger adults preferred to spend time with family rather than a novel social partner (an acquaintance or author). Artificially expanding time horizons in older adults also eliminates age differences in social partner preferences. When asked to imagine a medical breakthrough that

would allow older people to live an additional 20 years in relatively good health, older adults no longer prefer to spend time with family; in this case, social preferences are indistinguishable from those of younger adults.

Naturally occurring events also shift time horizons, preferences, and goal pursuit. After the terrorist attacks on the USA on September 11th, young adults reported preferring to spend time with family rather than novel social partners, presumably because the fragility of life had been highlighted by these events (Fung and Carstensen 2006). A similar pattern of findings emerged among young adults in Hong Kong in the months before the handover of Hong Kong to the People's Republic of China, when the future of the country was uncertain and the end of an era loomed large. Consistent with SST, a year after the handover, young adults in Hong Kong preferred novel social partners, as they had the year before the handover (Fung et al. 1999). Young adults who have shortened time perspective due to terminal illness also display social preferences similar to older adults. Before there was an effective treatment for HIV, young HIV-positive men who were experiencing symptoms of AIDS were found to conceptualize social partners similar to the elderly (Carstensen and Fredrickson 1998). HIV-positive men who were not yet experiencing symptoms of AIDS appeared similar to middle-age adults, and healthy gay men conceptualized the social world as an age-matched representative sample did.

Time horizons can be constrained by the experience of social endings or endings that represent the culmination of important chapters in one's life (e.g., graduations, births, weddings, moving). According to SST, changes in time perspective have important implications for how individuals choose to spend their time and with whom they will surround themselves. When constraints are placed on time, people focus on emotional goals and enjoying meaningful interactions with close others.

Emotional Experience and Regulation

SST postulates that focusing on the present and prioritizing emotionally meaningful experiences will benefit emotional well-being. By the late 1990s, scores of cross-sectional studies had documented superior emotional functioning in older as compared to younger adults. Although one notable exception, Charles et al. (2001), observed improvement in emotional well-being in multiple cohorts over time, there remained concern that cohort differences rather than age accounted for the findings. Carstensen's group undertook an innovative longitudinal study utilizing experience sampling in the late 1990s in order to examine intraindividual change in emotional experience in everyday life (Carstensen et al. 2011). They found an increase in emotional well-being, as well as emotional stability, across a 10-year period. Emotional experience became increasingly positive as individuals grew older. When older people experienced negative emotions, they reported intensities comparable to younger people. The frequency of experiencing negative emotion, however, was significantly lower for older adults.

Emotional life does not simply become more positive with age, but rather it becomes richer and more complex. Older adults are more likely to experience positive and negative emotions at the same time. According to SST, this poignancy arises as a result of the bittersweet moments that occur when time horizons are constrained. Indeed, even young adults experience poignancy in situations where endings are salient. When asked to imagine being in a personally meaningful location for the last time, individuals report mixed emotions (i.e., feeling both happiness and sadness) regardless of their age (Ersner-Hershfield et al. 2008). Similarly, on graduation day, college seniors experience more poignancy when reminded it is the last day they will be a student at that university (i.e., college is ending for them). When time perspective is constrained, individuals focus on emotional meaning, resulting in a more satisfying and rich emotional experience.

The Positivity Effect and Cognitive Processing

The *positivity effect* was identified in experimental tests of SST. The effect refers to an age-related

preference in attention and memory for positive relative to negative information (Mather and Carstensen 2005). Older adults' tendency to focus more on positive information is thought to reflect cognition operating in the service of emotion-related goals. That is, because goals direct cognitive resources, SST predicts there are age differences in processing emotional information.

Initial work on SST and cognitive processing focused on age differences in preferences for emotional information in general. For instance, it was revealed that older adults are more likely to prefer and remember advertisements framed in terms of emotional meaning (e.g., "capture those special moments") rather than information gain (e.g., "capture the unexplored world"). When asked to imagine a medical advance that would allow them to live an extra 20 years in reasonably good health, however, older and younger adults were comparably likely to prefer the information-focused ads as the emotion-focused ads (Fung and Carstensen 2003). These findings suggest that emotional information is more salient for older adults because they typically have more limited time horizons than do their counterparts.

In subsequent work, researchers began to test the idea that certain types of emotional information may be particularly salient for older adults. Older adults' prioritization of emotional goals may direct their attention to positive information more than negative information. Now referred to as the *positivity effect*, the phenomenon has been documented across a wide range of emotional stimuli, including faces, pictures, words, and music, and in various types of experimental paradigms (Reed et al. 2014). For instance, when presented with pairs of faces, older adults orient more towards happy faces than neutral faces and orient away from sad faces compared to neutral faces. They are also more likely to remember happy faces than sad faces. Younger adults do not show this attentional bias or differential memory for happy versus sad faces. Age differences in processing of emotional information have also been observed at the neural level, whereby older (but not younger) adults show less amygdala activation to negative pictures than positive pictures (Mather et al. 2004). In an important test of SST, Mather and colleagues examined the role of executive functioning in the positivity effect. If positivity is driven by age-related differences in goals, then positivity should be reduced when older adults have insufficient cognitive resources to direct towards their emotional goals. Indeed, older adults no longer show a disproportionate preference for positive information when cognitive resources are constrained in a dual attention task. There is also less positivity in memory among older adults who perform poorly on cognitive control tasks (Mather and Knight 2005). These findings suggest that the positivity effect reflects a top-down controlled process whereby individuals attend to goal relevant information.

The most recent work on the positivity effect has focused on the impact it may have on health-related behaviors and decision-making. For example, older adults' preference for positive information has been documented in the context of framing health behavior messages (Notthoff and Carstensen 2014). In one study, young and older adults were given pedometers and provided information about walking. Older adults who had been told about the benefits of walking (positive framing) walked more over the ensuing week than did those who had been told about the risks of not walking (negative framing). In contrast, younger adults walked the same amount regardless of the type of information they were provided. In a follow-up study, older adults who were told about the benefits of walking showed an increase of about 1,000 steps per day across 4 weeks, while older adults who were warned about the risks of not walking did not show a significant change in their walking. These findings suggest that promoting health changes in older adults will be better served by highlighting the benefits of engaging in health behaviors rather than focusing on the risks of failing to engage in such behaviors.

Consistent with SST, age-related positivity is not found when older adults are focused on information-related goals, either because it is demanded by experimental tasks or because they are naturally motivated to gather more information in that context. In one study, younger and older adults were asked to imagine they had to choose a new physician and health plan (Löckenhoff and

Carstensen 2007). They were presented with a grid of information that described four different physicians (or health plans) on a number of dimensions. Compared to younger adults, older adults were more likely to focus on positive characteristics when reviewing information and when later recalling features of the different physicians and health plans. These age differences in information processing were eliminated when individuals were told to "focus on the specific facts and details" when reviewing the different options. In this information-focused condition where goals were equated across age groups, younger and older adults showed a similar even-handed review (and recall) of the information they had been presented. A recent study found that positivity is also reduced in contexts where older adults are naturally motivated to focus on information gathering (English and Carstensen 2015). In particular, relatively unhealthy older adults were less likely to show positivity in their review of information when making health-related decisions than were healthier older adults. Importantly, being in poor health was only associated with lower positivity for health-related decisions. When making decisions that were not related to health (e.g., choosing a new car), older adults showed similar levels of positivity regardless of their health status. These findings suggest that personal relevance or importance of the decision can shift goals, and thus, processing of information.

Older adults naturally tend to prioritize emotion-related goals, and therefore, they focus more on positive features in the environment that can enhance their emotional well-being. There are times, however, when older adults instead prioritize knowledge-acquisition. In these situations, SST would predict a redirection of cognitive resources, such that older adults no longer favor positive over negative. The age-related positivity effect only emerges when goals are unconstrained by the context and individuals have the cognitive resources required to pursue their goals.

Conclusion

For many years, social scientists presumed that old age was a time of loneliness and despair. As evidence accrued, it became clear that not only are older people less lonely than young people, they suffer lower rates of virtually all mental disorders than their younger counterparts and report greater happiness and satisfaction with their relationships. According to SST, older adults show these improvements in social functioning and psychological well-being because their limited time horizons lead them to prioritize emotional goals. Age is typically a good proxy for time left in life, and it is the perception of time, rather than age per se, that influences goal priorities and, therefore, the allocation of cognitive resources and the behavioral patterns individuals display.

Cross-References

- ▶ Age and Time in Geropsychology
- ▶ Aging and Psychological Well-Being
- ▶ Aging and Quality of Life
- ▶ Emotional Development in Old Age
- ▶ Life Span Developmental Psychology
- ▶ Motivational Theory of Lifespan Development
- ▶ Positive Emotion Processing, Theoretical Perspectives
- ▶ Age-Related Positivity Effect and Its Implications for Social and Health Gerontology
- ▶ Second Generation Socioemotional Selectivity Theories
- ▶ Strength and Vulnerability Integration
- ▶ Time Perception and Aging

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SONIC Study, A Longitudinal Cohort Study of the Older People as Part of a Centenarian Study

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Synonyms

Epidemiological survey; Longitudinal study; Cohort study; Narrow age range design

Definition

SONIC study is a longitudinal epidemiological survey. The purpose of this study is clarifying age similarity and difference in factors associated to healthy longevity and maintaining higher well-being among different age groups from 70 to 90 years.

Limitation in Centenarian Studies

The main methodological limitation of centenarian studies is derived from the specificity of their focused age group: "centenarian." More specifically, even though that collecting data from centenarians are time consuming and highly loaded

work, it is difficult to find clear evidences for longevity factors or psychological and social characteristic of centenarian without setting up control group(s). Comparisons with reference data (population norm or control group(s)) make it possible to highlight specific characteristic of the group of centenarians. However, even in centenarian studies that do use control data, it can be difficult to clarify the characteristics of centenarians by simple comparison, because the true control for centenarian would be individuals of the same cohort who did not survived to 100 years of age. Specifically, cross-sectional comparisons between centenarians and younger controls cannot distinguish aging-related changes or the influence of studied factors on longevity. Overall, these problems make the findings of centenarian studies difficult to generalize.

There are centenarian studies that collect data only from centenarians (Jopp et al. 2016; Gondo et al. 2006; Stathakos et al. 2005; Samuelsson et al. 1997; Motta et al. 2005). In many of these cases, researchers were attempting to describe the characteristics of centenarians in the target population. However, focusing solely on centenarians – in other words, not using younger control data or comparable population norms – precludes understanding centenarians' relative functional status or specific characteristics. This is a fatal disadvantage of centenarian studies, particularly if the researchers are interested in human aging process or factors related to longevity. The average life expectancy and age-specific mortality rates differ substantially across different countries and populations. Therefore, control data from the same population would be needed for each centenarian study to ensure sufficient generalizability of results. Furthermore, this framework is essential if researchers are aiming to compare findings with other centenarian studies.

Despite these limitations, researchers can still perform useful correlational analyses to clarify the relationships among the variables and construct models to predict subjects' physical, emotional, and cognitive functions using only centenarian data (e.g., Jopp et al. 2016). Such studies have a variety of applications, such as identifying the necessary support needs for centenarians. However, it is still difficult to conclude whether the findings obtained from such studies are unique to the centenarians or are common phenomena among other age groups. We would be unable to make any definitive conclusions regarding these effects without running the same analysis on the control group(s).

It is quite possible that differences in medical, physical, social, and cognitive function will have different influences on psychological state in different age group(s). Recent studies on emotion have indicated the importance of cognitive resources for maintaining well-being in elderly people (Mather 2012; Scheibe and Carstensen 2010); in contrast, oldest old people maintain a higher level of well-being regardless of cognitive decline (Gondo et al. 2013). This phenomenon is also shown in the final part of this entry. To develop theories that resolve such paradoxical phenomena, concurrently collected control data are important. So far, only a few centenarian studies have established control group(s) to overcome the abovementioned problems. For example, Georgia centenarian study has 80 Octogenarians (80–89) and 100 young controls (20–59) as references (Poon et al. 2007).

A second important methodological issue is that even centenarian studies that utilize younger control group(s) or that compare their data with existing norm(s) will be unable to provide a clear picture of centenarians' characteristics if they rely on cross-sectional comparisons. The exceptions to this limitation are certain variables that are static over time, such as birth order or genotype. In such cases, we could interpret the observed finding as a characteristic of longevity even when a comparison is made with an exciting epidemiological data set. For example, centenarians have been repeatedly found to have a higher frequency of the E2 genotype of apolipoprotein E (APOE), which is currently believed to be the strongest genetic factor for longevity in comparison to younger age individuals (Blanché et al. 2001). However, see the argument of accepting this method by Lewis and Brunner (2004).

In contrast to these static variables, psychosocial variables (e.g., well-being or family

membership) and other biological features (e.g., blood albumin or number of teeth) are not stable characteristics; rather, they change with age especially in the oldest old. Accordingly, it would not be possible to determine from the results of direct comparison of these characteristics between controls (e.g., octogenarians) and centenarians whether the observed differences are reflection of the innate characteristics of long-lived individuals or merely indicating the result of aging-related changes.

Centenarian studies seeking to understand longevity-associated personality traits face this problem. Researchers often contrive new ways to obtain precise results, by using a new analysis framework (Martin et al. 2006; Masui et al. 2006) or by developing new designs such as focusing offspring of centenarians (Givens et al. 2009). As an example of the former, Masui et al. calculated expected scores for personality traits at the age of 100 years using accessible data from individuals aged 50–79 years old (Masui et al. 2006). They calculate formulae of aging-related change of personality traits based on the abovementioned middle- to old-aged individual data then estimated personality scores of 100 years old for deceased individuals. Finally, they compared these scores with scores of living centenarians to highlight personality traits associated with longevity. Although this approach is currently considered the best possible way of utilizing cross-sectional data, it still does not avoid the risk of type I error because cross-sectional data tend to overestimate age-related changes. As far as they adopt any cross-sectional design, centenarian studies cannot escape from this limitation.

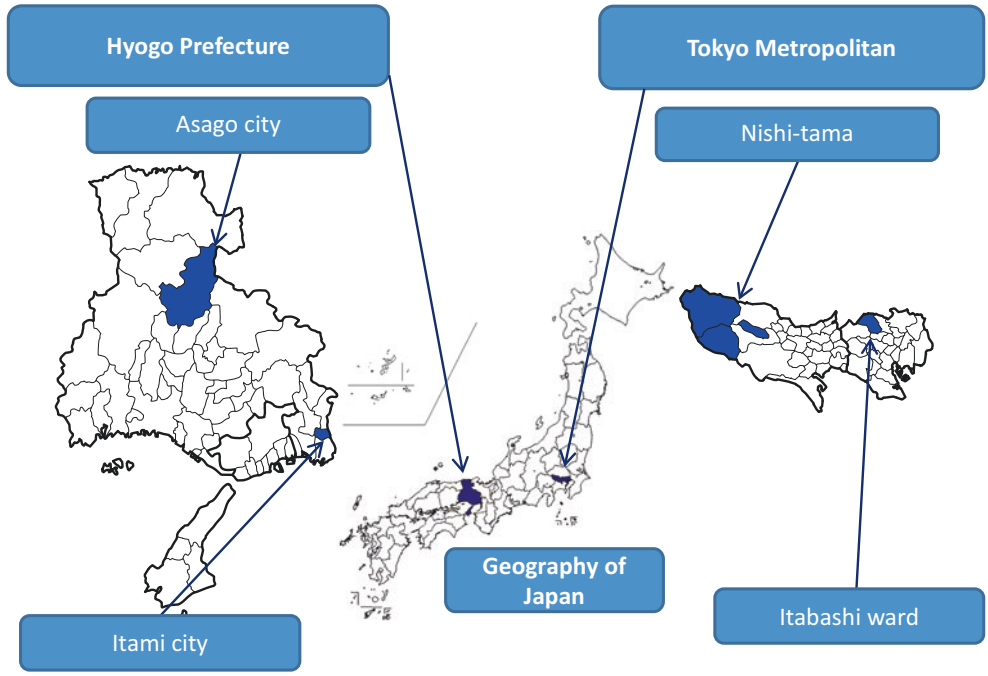
As an example for the latter, the New England Centenarian Study compared personality traits between offspring of centenarian parents and offspring of non-centenarian parents. They suppose that centenarian offspring share 50% of genetic characteristics with centenarian. This pseudo-case-control design has the advantage of saving time and the findings can be verified by employing the longitudinal follow-ups. Here, the "case" refers to the centenarian candidate (offspring of centenarian) and the control refers to an individual in the same cohort who did not survive to 100 years old (e.g., spouses of centenarian offspring). Ideally, cases and controls should be extracted from existing large-scale longitudinal epidemiological studies that have been accumulating data for a long time. A case-control longitudinal study would also enable researchers to make a more accurate estimation of average aging-related changes in variables for both survivors and non-survivors. This idea was used as reference in designing the SONIC study and will be described in more detail later on.

Concept of SONIC Study

As mentioned above, a major limitation of centenarian studies is a lack of appropriate control group(s). To overcome this limitation, we conceived SONIC as a longitudinal case-control study as this was considered the best solution for clarifying the characteristics of centenarians, by including a large group of individuals who might survive until 100 years old. The most preferable research design is to follow up the same birth cohort over a long period. This procedure is similar to a sequence of projects using Danish individuals from 1895, 1905, and 1915 birth cohorts (Christensen et al. 2013; Engberg et al. 2008). The authors of those projects asked cohort members to participate in a study at the ages of 90 and 100. Adapting this concept, the SONIC study adopted three methodological considerations.

First, the SONIC study utilizes three control groups of different ages (70s, 80s, and 90s) for a centenarian cohort, which we are planning to run in the future. At the same time, these control groups can serve as controls for other centenarian studies, such as the Tokyo Centenarian Study (Gondo et al. 2006). The first-wave data is available for identifying the genetic characteristics in comparison with centenarian studies and can be used to explore age-group differences/similarities in the factors influencing well-being and other psychological variables.

Second, we are planning to follow up the three control cohorts over a long period and expect that a certain number will become centenarians. This longitudinal portion of the study enables us to run



SONIC Study, A Longitudinal Cohort Study of the Older People as Part of a Centenarian Study, Fig. 1 Location of four survey regions in Japan

case-control comparisons between centenarians and non-survivors and thereby explore factors influencing longevity. Additionally, longitudinal data would enable precise estimates of aging-related changes in targeted variables for each age group in both deceased and survived individuals.

Third, we used a narrow age-range cohort design (Hofer and Sliwinski 2001). Each cohort includes individuals whose ages fall within a range of 3-years (e.g., 69–71 for a 70-year-old cohort). The main reason for setting up narrow age-range cohorts was to focus more on individual differences in the aging process and health outcomes. When considering individuals of a wide range of ages while focusing on individual differences, we can use chronological age as a covariate to control age differences in variables not at the focus of the analysis. Recent studies however indicated that this method of statistical control might not be appropriate for variables in the medical or biological dimensions. Indeed, inter-individual and intra-individual variability of biomarkers are much greater in higher chronological age groups, and correlations between chronological and biological age are much smaller than expected (Mather et al. 2011; Sprott 2010). Therefore, in the SONIC study, we utilized the 3-year narrow age range, which is ignorable age difference in each age group.

In addition to these methodological qualities, the diversity of environmental conditions such as main industries (e.g., agriculture in the rural, light and heavy manufacturing in cities), social resources, and infrastructure in survey regions are a notable characteristic of the SONIC study. We selected two subregions (an urban area and a rural area) from major geographic regions (the Tokyo metropolitan area, in eastern Japan, and Hyogo prefecture, in western Japan). In total, we collected data from four separate regions with different social and economic environments (Fig. 1). The Table 1 indicates the names of the city/village and their total populations.

Along with offering control data for other centenarian studies, the SONIC study has two main purposes as an independent study. The first is to

SONIC Study, A Longitudinal Cohort Study of the Older People as Part of a Centenarian Study, Table 1 Total population, sampled invitee, and participant of SONIC study in each four region

				70s cohort			80s cohort			90s cohort		
Regions	City/ Rural	Total Population	Aging ratio (%)	Sampled	Participated	Participation ratio	Sampled	Participant	Participation ratio	Sampled	Participant	Participation ratio
Itami	City	196,127	20	1,000(471)	250(124)	25.0(26.3)	1,566(653)	317(157)	20.2(24.0)	530(133)	72(29)	13.6(21.8)
Asago	Rural	32,814	30	1,155(547)	243(114)	21.0(20.8)	1,249(524)	195(92)	15.6(17.6)	315(84)	36(22)	11.4(26.2)
Itabashi	City	535,824	21	1,075(510)	239(94)	22.2(18.4)	1,295(507)	269(118)	20.8(23.3)	921(277)	130(54)	14.1(19.5)
Nishi-tama	Rural	164,592	25	1,077(543)	268(147)	24.9(27.1)	1,281(560)	192(90)	15.0(16.1)	208(67)	34(18)	16.3(26.9)
Total		929,357		4,307(2,071)	1,000(479)	23.2(23.1)	5,391(2,244)	973(457)	18.0(20.4)	1,974(561)	272(123)	13.8(21.9)

Note: number shown in parentheses indicate men

clarify aging-related changes in multiple domains of human functioning and the dynamics of interaction among these domains throughout the extreme old age period (from 70 to ≥100 years). Most previous studies have reported declines in functions with age, but there is no guarantee that aging-related decline is linear. For example, the incidence of diagnosis of arteriosclerosis or dementia incidence appears to increase until at around age 90 years, after which it plateaus (Homma et al. 2001; Miech et al. 2002). However, Corrada et al. (2010) presented contrary evidence for dementia incidence. This phenomenon can be understood in terms of survival effect, namely, that individuals who exhibit progression of arteriosclerosis do not survive to an age of 90 years. However, we do not have enough data to examine such phenomena. In case of arteriosclerosis, we could not conclude whether arteriosclerosis progression in nonagenarians becomes slower and maybe stops at this age or whether individuals with mild atherosclerosis are able to survive their 90th birthday and longer. The longitudinal follow-up of the three narrow age-range cohorts will doubtlessly be able to help answer this type of question.

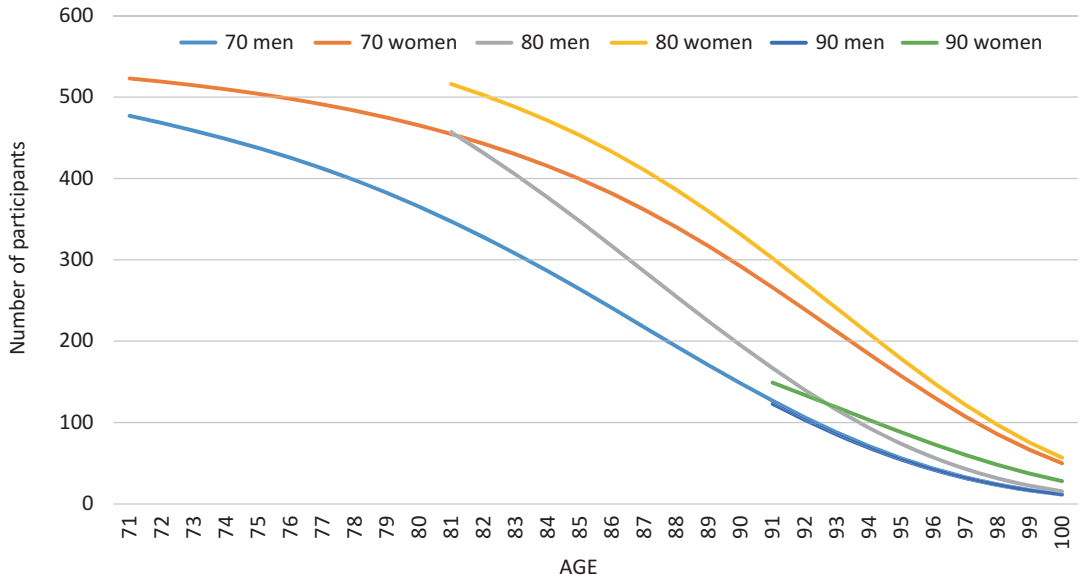
The second purpose is to identify the factors influencing healthy longevity, including psychological well-being. The target variables were chosen not only from centenarian studies but also from studies of younger elderly participants. Therefore, the SONIC study can examine whether findings from centenarian studies can be replicated in younger elderly individuals and at the same time examine whether younger elderly participants show results that are consistent with those of centenarian studies. Below, we will describe the detailed methodology of the SONIC study.

Overall Design of SONIC

In addition to assessing the three main cohorts, namely, septuagenarian (70s), octogenarian (80s), nonagenarian (90s; details see below), we are planning to collect data from a parallel cohort of centenarians in 2022 with similar methodology as the three main age cohorts. In that year (i.e., in 2022), the first 90s cohort participants assessed in 2012 will reach 100 years of age. So far, however, we have been conducting only a small centenarian survey in various regions of Japan with different research design and the procedure to improve methods to collect data from centenarians. Therefore, centenarian portion of the SONIC study will not be mentioned in this entry, and we will call the 70s, 80s, and 90s cohorts the SONIC main cohort in the following.

Sample Size Estimation

Because of the multiple study purposes (description of the aging process and identification of factors influencing healthy longevity) and multidiscipline nature of the variables collected in the SONIC study, it was not possible to calculate which might be an appropriate sample size. Hence, we prioritized maximizing the number of participants expected to survive to 100 years old. At the planning phase, we aimed at have 100 centenarians in each age cohort as endpoint. We calculated the estimated sample size of first-wave participants based on the survival ratio for each age and sex derived from a complete life table of Japan. The results indicated that about 1,600, 1,300, and 700 participants were necessary to obtain 100 centenarians from the 70s, 80s, and 90s cohorts, respectively. However, it was not feasible to collect such a large number of participants with a limited budget. Therefore, we decreased the targeted number of first-wave participants to 1,000 for 70s and 80s cohorts. Consequently, the expected number of centenarians would be between 60 and 70 for these two cohorts. Because we estimated the participation ratio for 70s and 80s cohorts as 25% and 20%, we oversampled the 80s cohort in comparison to the 70s cohort. For the 90s cohort, considering the high ratio of certification for long-term care (in the 90–94 age range, 66.2% had this certification in 2013 in Japan), we invited all individuals among the targeted age range in the four surveyed regions.



SONIC Study, A Longitudinal Cohort Study of the Older People as Part of a Centenarian Study, Fig. 2 Estimated number of survivors of SONIC participants in the longitudinal phase

We intended to include the same number of participants among regions irrespective of the total populations of each region. Therefore, we restricted the geographical region within which we sent out invitation letters to potential participants living in urban areas. The total population, aging ratio, and the invited and participating individuals in each region are shown in the Table 1. Regardless of the smaller total populations in rural areas, difference in number of older populations between urban and rural areas were quite small, especially in the 90s cohort. The participation rate for men was higher than for women in the 80s and 90s cohorts, but not in the 70s cohort.

The expected survival curves for the first wave of the SONIC study, separated by age group and sex, are shown in Fig. 2. The expected numbers of participants to reach 100 years old for the 70s, 80s, and 90s cohorts are 62, 69, and 39, respectively. Because there were fewer participants in the 90s cohort, we plan to recruit a new cohort of individuals in their 90s when we run the second wave survey for the 90s cohort.

Procedure

Recruitment of Participants

The data collection for each age cohort was performed in different years because of the large number of participants recruited. The first-wave survey began in 2010 for the 70s cohort, 2011 for the 80s cohort, and 2012 for the 90s cohort. Second-wave surveys began in 2013 in the same order. We are planning to conduct a follow-up assessment on each cohort every 3 years. As such, third-wave surveys are expected to start in 2016 with the 70s cohort.

All individuals invited to participate in the survey were recruited from residential registries. We obtained names, genders, birth dates, and addresses for individuals in the specific range of birth dates from the local government office. The range of birth dates was slightly different among the four study regions because of the differences in the schedule of creation of the registry database by the local government, allocation of the time slot which we can use to transcribe data at the local government office, and difference in the starting date of recruiting participants in each region.

The SONIC study was designed as an invitation-type survey. We asked invitees to visit survey venues located near their residences. Most of these survey venues were local community centers owned by the local government. The invitation letters sent out to invitees described the purposes of the SONIC study and its methodological details. We asked them to send back an agreement letter, wherein invitees indicated the appropriate date and time of participation if they were interested. About 2 weeks before data collection, we sent reminders to invitees of the place, date, and time of their survey. We also sent a questionnaire booklet comprising items on socioeconomic status, psychosocial variables, medical conditions of self and family, dental conditions, and food intake, which invitees were asked to complete in advance at home and bring to their appointment. In case participants could not fill booklet by themselves or with the help of family member, we asked all questionnaire items at the survey venue.

At the survey venue, participants were given an overview of the SONIC study and signed a consent form before taking part in the performance tests. At this point, participants were asked about their current physical condition, if they had a history of cardiovascular disease, and whether they had undergone hospitalization in the last 6 months. To ensure their safety, we then examined their body temperatures and body oxygen levels. For participants who showed high risks according to these measures, we began the investigation with a medical history (taken by medical staff), which resulted in exclusions for the performance tests. Most individuals with a history of cardiovascular diseases or who complained about pain did not participate in the physical examination.

Investigated Variables

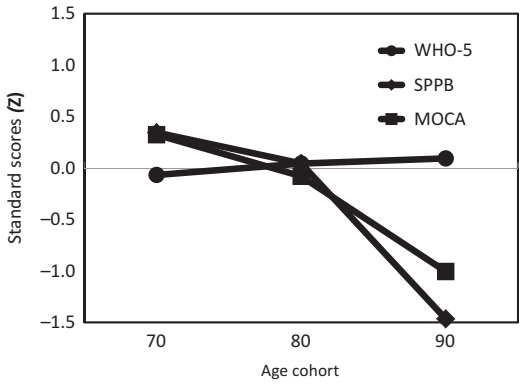
Participants underwent the following examinations in a random order at the survey venue: a check of the prefilled questionnaire booklet and answering additional questions on psychosocial variables in face-to-face interviews; cognitive tests; interviews regarding work or household work to create a work complexity rating; current leisure activity; short physical function tests; medical tests including blood samples, blood pressure, breathing capacities, carotid ultrasonography, and dental checkups including numbers of natural teeth, occlusal force, taste sensitivity, and masticatory performance. The main psychological variables collected in SONIC study are listed in Table 2. In total, examinations took about two and half hours to complete. If participants were unable to finish the tests within this time frame, we asked them to visit the survey venue again or asked if we could visit their homes to complete the questionnaire.

SONIC Study, A Longitudinal Cohort Study of the Older People as Part of a Centenarian Study, Table 2 Main psycho social variables collected in SONIC study

Psychological variables
Mental health (WHO-5)
Personality (NEO-FFI)
Emotional well-being
Life satisfaction
Valuation of life
Selection, optimization, compensation
Gerotranscendence
Social variables
Social network (direct)
Social network (indirect)
Social support
Other variables
Main occupation and work complexity
Household work complexity
Leisure activities (current)
Leisure activities (within this week)

Preliminary Analysis of SONIC First Wave Data

Although the advantage of SONIC study is the longitudinal part of the data, we can report only on cross-sectional comparisons at present. Here we demonstrate age cohort differences in main variables of physical, cognitive function and well-being. Physical function were accessed by Short Physical Performance Battery (SPPB; Guralnik et al. 1994), cognitive function was accessed by Montreal Cognitive Assessment (MOCA; Nasreddine et al. 2005), and mental health was assessed by WHO-5 well-being index (Awata et al. 2007). Standardized scores for these variables among the three age cohorts are



SONIC Study, A Longitudinal Cohort Study of the Older People as Part of a Centenarian Study, Fig. 3 Comparison of standardized scores among three age cohorts

presented in Fig. 3. As shown in the figure, physical and cognitive function are lower in the 90s cohort. In contrast to these functional limitation, well-being of 90s cohort was at the same levels as in younger cohorts. As we mentioned in this entry, we cannot conclude that higher well-being in 90s cohort are characteristic of long-lived survivors or reflecting age-related change. This important question will be answered by completion of longitudinal follow-up phase of SONIC study. We believe that clarifying aging-related background factors that cause this type of dissociation must be possible by our case-control longitudinal study. The SONIC study will also allow to test many other important gerontological research questions not mentioned here. Future research progress in a variety of research disciplines is expected.

Cross-References

- Aging and Mental Health in a Longitudinal Study of Elderly Costa Ricans
- Australian Longitudinal Study of Aging (ALSA)
- Australian Longitudinal Study of Women's Health (ALSWH)
- Berlin Aging Studies (BASE and BASE-II)
- Canadian Longitudinal Study on Aging, A Platform for Psychogeriatric Research
- China Health and Retirement Longitudinal Study (CHARLS)
- Chinese Longitudinal Healthy Longevity Study
- English Longitudinal Study of Aging (ELSA)
- Health and Retirement Study, A Longitudinal Data Resource for Psychologists
- Health, Work, and Retirement Longitudinal Study
- Interdisciplinary Longitudinal Study on Adult Development and Aging (ILSE)
- Irish Longitudinal Study on Ageing (TILDA)
- Korean Longitudinal Study of Ageing (KLoSA): Overview of research design and contents
- Longitudinal Aging Study Amsterdam
- Melbourne Longitudinal Studies on Health Ageing (MELSHA)
- Swiss Interdisciplinary Longitudinal Study on the Oldest Old (SWILSOO)

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Spatial Cognition and Wayfinding

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Synonyms

Navigation; Spatial orientation; Spatial visualization; Visual imagery

Definition

Spatial cognition is a term often used to refer to varied aspects of cognitive processing. It refers to spatial perception, spatial visualization, visual mental imagery, spatial memory, and spatial navigation. Most psychometric measures of spatial cognition emphasize the mental manipulation of geometric figures or forms. Spatial cognition in the context of wayfinding refers to the ability to

understand your position in the world and to use this knowledge to navigate to desired locations and destinations.

Introduction

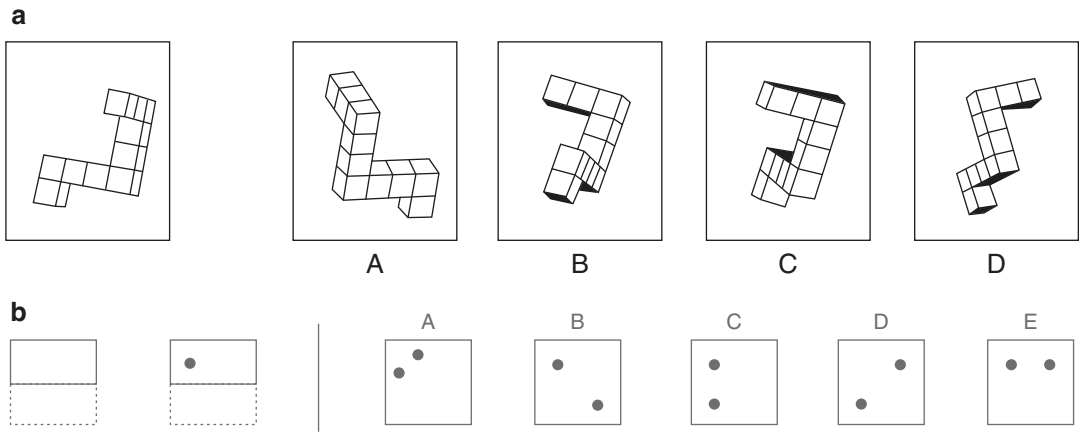
Although, much less studied that some aspects of cognition (e.g., memory) spatial processing has important implications for the lives of older people. For example, Lord and Webster (1990) reported that elderly persons who had fallen in the previous year performed more poorly on a measure of spatial perception, compared to age-matched controls who had not fallen. In addition, we routinely tax our spatial computational skills in daily life when we attempt to find our car in a busy parking lot, travel to an unfamiliar location in a new city, or try to reverse directions to find our way back home. Older adults have self-perceived deficits in navigation and develop behavioral patterns to avoid unfamiliar routes and places (Burns 1999). Assessments of navigational/route-finding skills in older adults provide evidence of age-related differences in these skills. Moreover, impairments in navigational skills (e.g., "wandering") are often apparent in the early stages of Alzheimer's disease. The systematic study of spatial cognition has both important theoretical and practical importance in geropsychology.

What Is Spatial Cognition and How Is It Measured?

Spatial cognition is a relatively generic term that refers to a wide variety of cognitive measures sharing as a common feature the reliance on visual as opposed to verbal cognitive processing. Within this general cognitive domain, two traditions of study have emerged. In what I broadly identify as the psychometric approach, spatial cognition is typically measured using laboratory-administered tests involving the manipulation of either physical or imagined objects as stimuli. In a complementary approach, spatial cognition is studied from the ecological perspective of wayfinding or navigation. The wayfinding and psychometric traditions tend to emphasize different aspects of spatial processing. Psychometric measures tend to be object oriented and static (do not require movement of the observer or the scene) and emphasize spatial manipulations of relatively small objects presented on the printed page (or computer screen). The wayfinding perspective emphasizes a more dynamic processing that takes place over a larger-scale space and tends to emphasize the movement of the whole body through the three-dimensional world (either real or simulated). Another unique aspect of the navigation/wayfinding perspective is that during navigation the whole spatial scene is typically not visible all at once and is encountered piecemeal, which requires integration of spatial scenes and views over time. This feature places demands on spatial working memory and episodic memory for items, landmarks, and cues encountered on a route. In both traditions, there has been robust consideration of individual differences, in particular in relation to sex and age of participants. Interestingly, scientific studies of these domains of spatial processing have tended to occur mostly in parallel with the wayfinding/navigation perspective often being more influenced by models of episodic memory encoding and retrieval than by the literature on object visualization. There is some justification for this parallelism, given that the psychometric and navigation tasks seem intuitively different, are only modestly correlated, and share somewhat different brain mechanisms. For these reasons, this paper will consider each of these aspects of spatial cognition in their own sections.

Aging and Psychometric Measures of Spatial Cognition

Spatial abilities are typically measured by tests that require the imaginary transformation, rotation, or visualization of everyday objects (e.g., hands, animals) or abstract shapes. Factor analytic studies of psychometric spatial measures have identified multiple spatial dimensions (Ekstrom et al. 1976), including, but not necessarily limited



Spatial Cognition and Wayfinding, Fig. 1 (**a**) In the mental rotations test (Vandenberg and Kuse 1978), participants choose the two figures from the four on the *right* that represent rotated versions of the target figure on the *left*. In the paper folding test, a series of drawings depicts a square piece of paper being folded before a hole (*small circle*) is punched through all folds (**b**, *left* of *vertical line*). The participant must determine the resulting arrangement of holes when the paper is completely unfolded and select this from among the five alternatives (*right* of *vertical line*)

to, the spatial orientation factor best exemplified by mental rotation tests, (See Fig. 1a) and the spatial visualization factor exemplified by, for example, the paper folding test (see Fig. 1b).

There have been several meta-analyses of spatial cognitive performance across the life span and these have shown robust age-related differences in psychometric measures of spatial cognition. Most recently, Techentin et al. (2014) performed a comprehensive meta-analysis of the literature of age-related differences in psychometric measures of spatial cognition. These authors examined 138 effect sizes from 78 published studies. Importantly, they quantified separate estimates of age effects for both spatial orientation and spatial visualization factors and also examined the effects of possible moderator variables. Among the moderators considered were whether the age effects differed as a function of accuracy versus reaction time scoring criteria, sex distribution of the samples, education history, and year of publication (to examine change in effect size over time for secular/cohort effects). This meta-analysis revealed a substantial effect of age on spatial cognitive measures and identified the importance (or lack thereof) of possible moderator variables. Overall, younger adults outperformed older adults by approximately 1.0 standard deviation (SD), with moderately larger effects when reaction time was used as a dependent measure (1.30 SD) than when accuracy was used as dependent measures (0.95 SD). The large effect size when accuracy was used as an outcome measure argues against a strictly processing speed account of spatial age differences. However, it should be noted that even when accuracy is measured in a study, the test is most often still timed (with a maximum time limit) and older adults may respond differently to speed-accuracy demands than younger adults. In addition, Techentin et al. (2014) found a small positive effect of higher education but no effect of spatial domain (orientation vs. visualization). Moreover, there was no evidence of change in effect size as a function of the publication years considered in the study (1958–2011). This latter finding suggests that the effect size has been robust through several decades of research.

A feature of the age differences observed across studies that must be emphasized here is that the effects are large by conventional effect-size criteria and are also among the largest effect sizes observed in the cognitive aging literature. For example, according to Verhaeghen (2003), the age-related effect sizes for short-term memory is 0.36 SD, 0.52 SD for more complex working

memory, and 0.67 SD for recall of story details. The age difference in spatial cognition is of similar magnitude to that of verbal list learning ($d = 1.0$) and seems to be exceeded only by the larger effects on perceptual speed ($d = 1.21$). It seems noteworthy that the magnitude of the age difference in psychometric measures of spatial cognition is among the largest of the age effects in cognitive aging, although the factors explaining this are poorly understood.

Of course, a meta-analysis can lose certain nuances of differences between studies by emphasizing commonalities rather than unique aspects of research designs. One of the most consistent and interesting findings in the domain of spatial cognition is the linear relationship between the degree of mental rotation and the time required to solve a mental rotation problem. That is, as the degree of misalignment between stimulus and target increases (say between 45 and 135°), the longer it takes a participant to arrive at a "same/different" judgment (Shepard and Metzler 1971). Indeed, this finding is often considered the quintessential evidence that a task requires mental rotation versus some other spatial or nonspatial solution strategy. Moreover, individual differences in the slope of this "mental rotation function" are also said to reflect individual differences in speed or efficiency of rotation. Several studies have investigated the nature and meaning of age differences in mental rotation reaction time slopes and a few are considered here to illustrate the main findings and to highlight some differences in perspective.

Several studies have found that mental rotation intercepts and slopes are greater in older than in younger adults (e.g., Jacewicz and Hartley 1987). Furthermore, steeper slopes in mental rotation tasks are often interpreted as evidence for slowing or reduced efficiency in the rate of mental rotation. That is, an individual with a shallow slope is relatively unaffected by the magnitude of the required rotation and is hence more efficient or faster at rotating. However, mental rotation tasks, like all complex cognitive tasks, are composed of separable components. Although full consideration to the literature on visual imagery is beyond our scope here, Dror and Kosslyn (1994) identify image generation (generating a stored image from memory), image maintenance (maintaining the image in visuo-spatial working memory), image inspection (analysis of the image in working memory), and image transformation (e.g., mentally rotating the image) as essential components. In addition, post-rotation decision-making processes also play a role.

Hertzog and Rypma (1991) reasoned that age differences in mental rotation rates may not reflect mental rotation speed per se and designed a study to investigate age effects on encoding, rotation, and decision-making during a mental rotation task. Hertzog and Rypma (1991) presented a stimulus and target serially rather than simultaneously, as in most MR tasks in order to isolate the processes of interest. Replicating other studies, the authors found poorer performance by older adults at all three stages but only a weak rotation slope difference between age groups. The authors concluded that age-related differences in mental rotation rates may reflect decay of the stimulus from working memory and post-rotation decision-making processes. This study highlights the utility of considering even seemingly "pure" measures of spatial cognition (e.g., mental rotation) as complex cognitive tasks, the age effects for which may depend on specific and subtle subcomponents.

Age Differences in Navigation and Wayfinding

As seen above, there is a rich literature concerning the study of age-related differences in psychometric measures of spatial cognition. As noted in the introduction, these measures tend to be object centered and focused on a relatively small spatial scale.

These are important cognitive tasks that assess critical human faculties; however, the psychometric approach may overlook the dynamic nature of spatial cognition as it is utilized on a daily basis by most people. Arguably, the most important manner in which our spatial cognitive systems are challenged is during navigation where we must learn a route to a new goal or locate an object or person in our environment. The most obvious

difference between psychometric and wayfinding approaches is that navigation/wayfinding requires physical movement through space (and concomitant dynamic visual processing) and explicit memory for previously viewed scenes/routes, whereas paper and pencil tests require no movement through space.

There has been a tradition of wayfinding and orienteering studies in humans but these have mostly neglected possible age-related differences. This is partly due to the difficulty of studying human navigation because it takes place over a relatively large-scale space which exceeds what can be accomplished in the laboratory. As well, in the real world, it is difficult to gain experimental control over the features of the environment; there are inevitably between-subject differences in familiarity of the local environment and limitations of older people's physical function may compromise mobility. While some studies have examined older adults' capacities for navigating a large-scale space, this field of inquiry is experiencing something of a resurgence of interest due to the development of a virtual environment technology which has brought the systematic study of large-scale navigation into the laboratory and into the MRI scanner.

Age-Related Differences in Navigation and Orienting in the Real World

There is considerable evidence now for age-related differences in navigational/route-finding skills. One approach to the study of spatial navigation in older people has been to measure navigation in "real-world" settings such as supermarkets, hospitals, or university campuses. Kirasic (1991) assessed the navigational skills of younger and older women in supermarkets and found that younger women acquired the spatial information in the environment faster than did their older counterparts. Wilkniss and colleagues required participants to navigate through the hallways of a hospital after being presented with a map of the environment and route that they were required to follow. They found that older adults took longer to navigate through the hospital than younger adults and that the older adults made more frequent turning errors. Interestingly, older adults recalled objects which were encountered along the route just as well as younger subjects, but compared to their younger counterparts, they were deficient at placing those objects in their proper temporal sequence (Wilkniss et al. 1997).

An often used measure of place learning in nonhuman species is the Morris water task. Briefly, this task requires an animal to locate a platform which is hidden beneath the surface of an opaque pool of water. Surrounding the pool are visual cues which aid the animal in pinpointing the location of the platform. Over successive trials the animal comes to learn the location of the platform as revealed by faster escape latencies and shorter path lengths to the target. One study has replicated the Morris water task on a human scale by requiring older and younger adults to remove then repeatedly replace a pole in a circular enclosure which was surrounded by visual cues. Across a series of learning trials, older adults showed greater displacement error in replacing the pole compared to younger adults suggesting age-related deficits in place learning in older humans (Newman and Kaszniak 2000). This type of measure is usually described as "place learning" and might be considered similar to locating your car in a parking lot by judging its distance and bearing from environmental cues.

Assessing Age-Related Differences in Virtual Navigation

Navigation in the real world is the most ecologically valid approach to studying navigation. However, as noted above there are difficulties associated with doing so and this has led to many studies now employing virtual environment technology to study age differences in navigation. As in most domains of cognitive aging, the methods are variable but these studies generally consist of computer-presented (or rarely head-mounted) displays depicting a first-person perspective and equipped with an interface device such as a joystick, mouse, and arrow keys to allow movement through the simulated world.

As one could imagine, this itself entails potential pitfalls in the assessment of older adults because they may have limited experience using computers and visual disturbances or may differentially suffer from the elimination of vestibular and proprioceptive feedback that accompanies real-world navigation. Nevertheless, with careful training and appropriate use of visuomotor controls, older people can interact quite effectively with the computer environment (Moffat 2009).

Moffat and Resnick (2002) developed a virtual MWT (vMWT) similar to the one described above. As with the real-world task, the results of the study confirmed substantial age effects on virtual environment place learning. These basic age differences in a virtual MWT have subsequently been replicated and extended by other authors (Driscoll et al. 2005).

In a task more similar to the hospital or supermarket studies listed above, Moffat and colleagues challenged older and younger adults to solve a computer-based route-learning task in which several intersecting corridors ultimately led to a goal point (Moffat et al. 2001). Participants were instructed to find a goal point and remember the route. An important distinction in scoring was made between "information errors" (the first visit to an error location in which the subject had no previous knowledge that a corridor did not lead to the goal) and spatial memory errors (repeat visits to error locations that they should have remembered did not lead to the goal). It was found that older participants made more spatial memory errors but did not make more information errors than their younger counterparts indicating that elderly individuals differed only in their tendency to revisit error locations and not in their initial exploration of the environment.

As noted above, one of the limitations of using VE presentations of navigation tasks is that it deprives the participant of vestibular and proprioceptive feedback that is normally available in real-world navigation tasks. Lovden et al. (2005) investigated the effect of age on spatial navigation through a VE using an interface which required participants to walk on a treadmill to initiate simulated movement through the environment, thus providing proprioceptive feedback. These authors found that providing walking support on the treadmill attenuated (but did not eliminate) the age differences in navigation accuracy (Lovden et al. 2005).

Another approach to the examination of age differences in navigation has been to quantify the ability of younger and older individuals to spontaneously develop or use a map of the environment. A second component of the study by Moffat et al. (2002) described above required participants to draw a freehand map of the vMWT environment and to designate the platform location on the map. Older individuals showed evidence of impairment in cognitive mapping as revealed by their poorer map constructions of the environment and their impaired ability to locate the platform on the experimenter-provided maps of the environment. Interestingly, there was no age effect on the recall of the object cues present in the environment. Consistent with the results of Wilkniss et al. (1997), older individuals appeared to have comparatively spared object/item memory (at least if the number of objects to be remembered is low) but are deficient at using those objects to assist in navigational behavior.

Sjolinder et al. (2005) provided younger and older participants with an overhead map of an environment to investigate the effects of navigational aids on the age differences. Sjolinder found that although the older participants subjectively felt more secure with the map, it did not improve efficiency in navigating the environment (Sjolinder et al. 2005). Similar results were obtained in another VE study of cognitive mapping which showed that older participants required more time to form a cognitive map of an environment than young individuals and required more time and made more errors when subsequently using the map for orientation (Iaria et al. 2009).

Brain Mechanisms of Age Differences in Navigation

Behavioral age differences in spatial navigation have been consistent across studies. One major advantage of VE testing is that it makes

navigation tasks adaptable to the MRI scanner environment. Indeed, neuroimaging studies in younger participants have identified a network of structures that are involved in spatial navigation. These structures include the hippocampus, parahippocampal gyrus, parietal cortex, and retrosplenial cortex (Burgess 2008).

The role of the hippocampus and associated medial temporal lobe structures in human navigation have been of considerable interest, in part because of the very precise animal models of spatial navigation that localize "place" and "grid" cells to the hippocampus and entorhinal cortex, respectively (Moser et al. 2008). Likewise, in human aging there has been great interest in the role of the medial temporal structures in mediating age-related navigation impairments.

Three studies have now reported quite consistent results demonstrating reduced or absent hippocampal/parahippocampal activation in older as compared to younger adults during virtual navigation. Meulenbroek et al. (2004) had younger and older participants learn the layout of a virtual house by viewing and remembering a sequence of turns through the house. Compared to older adults, younger subjects showed stronger activations in the supramarginal gyrus and posterior parahippocampal gyrus.

Moffat et al. (2006) investigated the neural mechanisms of age differences in spatial navigation in an fMRI study. Fifty-one healthy individuals (30 young, 21 old) were scanned while performing a VE navigation task. The task differed from the Muelenbroek study in that participants actively navigated through the environment using a joystick, while the participants in the Muelenbroek study passively viewed the navigation task. The results showed that compared to their younger counterparts, older adults showed reduced activation in the posterior hippocampus, parahippocampal gyrus, and retrosplenial cortex. This study also demonstrated that increased activation in the hippocampus/parahippocampal gyrus was associated with more accurate navigation.

Antonova et al. (2009) provide further converging evidence that changes in the parahippocamal cortex may be a major component of the age differences in navigation performance. As with virtually all navigation studies, these authors report a widespread neural network being activated in young and older adults. In addition, they report that only young adults significantly activated the bilateral hippocampus and left parahippocampal gyrus during encoding.

Of particular importance in these functional imaging studies of navigation and aging is the consistent observation of reduced activation in older adults in the hippocampal/parahippocampal complex and in the retrosplenial cortex of the posterior cingulate gyrus, despite quite different task demands across studies. These areas play a critical role in spatial navigation in both human and nonhuman species (Burgess 2008). In particular the hippocampal/parahippocampal area has been hypothesized to act as a cognitive map receiving egocentric and motion-derived information from other cortical regions and converting this input into an allocentric representation of the environment. This suggests a clear divergence in the neural systems devoted to spatial navigation in younger and older participants. It will be important for future studies to try to understand both the mechanisms and implications of the reduced medial temporal contribution to elderly navigation.

Do Spatial Strategies Change with Age?

Another dimension on which people differ in solving navigation tasks is in their strategic preferences. Although researchers have described navigation strategies using variable nomenclature, the most common terms are egocentric and allocentric. An egocentric strategy is one in which an individual uses a frame of reference centered on the self, for example, remembering left and right turns relative to your own body. An allocentric strategy is one in which the individual adopts an external frame of reference, for example, by developing a mental map of the environment in which the individual is one object with coordinate relations with other objects in the environment.

One approach to this question of deducing possible strategy differences between older and younger adults was to simply ask participants

how they solved a navigation task. Doing this, Driscoll et al. 2005 recorded spontaneous descriptions of people's own navigation strategies and subsequently coded them as either egocentric or allocentric and found that self-reported allocentric strategy decreased with age.

A more direct way to assess this issue is to perform specific environmental manipulations that may reveal more objectively strategic preferences. In an animal navigation study, rats were trained to locate a goal for a reward in a two-choice T-maze. There were multiple ways in which the rat could learn the location of the reward. One possibility was an egocentric strategy in which the rat always turned left while another possibility was an allocentric strategy in which the rat moved to the same absolute location designated by external room cues. Barnes and colleagues tested this by rotating the maze following training and starting the rats in a different arm. Barnes et al. (1980) showed that older rats were more likely to use an egocentric strategy to solve the maze while younger rats were more likely to use an allocentric strategy.

Rodgers and colleagues performed a very similar manipulation using a virtual two-choice Y-Maze in humans and found an overwhelming preference for the use of an egocentric strategy in older adults (83%) compared to a slight preference for allocentric strategy use in younger adults (54%). Harris and Wolbers (2014) extended these results by noting that in a given navigation task, it is often optimal to switch between strategies flexibly as the task demands change or as you gain more familiarity with an environment. These authors showed that older adults were impaired compared to younger adults specifically in switching from an egocentric to an allocentric strategy, suggesting that aging may also affect the dynamic strategic processing required for successful navigation.

Although no studies have specifically tested brain activation during egocentric versus allocentric processing in older adults, Iaria et al. (2003) showed in a sample of younger participants that while adopting an allocentric strategy, the hippocampus was activated and when adopting an egocentric strategy, activation was primarily in the caudate nucleus. This suggests that the overwhelming preference for egocentric strategy in older adults may underlie and possibly explain their under-recruitment of the hippocampus and parahippocampal gyrus that has been observed in functional MRI studies.

Conclusion

Spatial cognition is an important and somewhat understudied aspect of cognitive aging. Nevertheless, important and consistent results have been observed across different labs employing varied study procedures. Psychometric measures of spatial cognition show robust age-related differences with effect sizes among the largest in the cognitive aging literature. There is currently a dearth of studies in this area investigating the possible brain mechanisms of the age differences in mental rotation or spatial visualization.

The study of spatial navigation is having something of a resurgence in cognitive aging as more researchers investigate both the behavioral and brain mechanisms of age differences. Under-recruitment of the hippocampus and related medial temporal lobe structures may underlie the navigation impairment in older individuals. This under-recruitment may be caused by or even interact with age-related changes in navigation strategy preferences. Among the advantages of spatial navigation assessment are its dynamic processing and ecological validity. By its very nature, navigation is an inherently complex cognitive task that depends on widespread brain networks and many component cognitive processes.

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Spirituality and Religious Participation in Later Life

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Synonyms

Faith; Belief; Creed; Religiousness; Practice of faith, belief, or ritual; Sacred matters; Mystical experience; Immaterial; Holism

Definitions

As older adults live to increasing ages, spirituality and religious participation form an important

source of meaning and purpose and relate to the ways older people choose to interact with what they deem as sacred. For many older adults, spiritual and religious participation include involvement in traditional world faith communities.

Spirituality

Spiritual awareness develops through relationships with one's inner self, others, nature, the universe, and ultimate reality, whatever a person understands this to be. Spirituality is the manifestation of the search for significance and purpose in life. Spirituality is an integrative, holistic component of life that can touch on physical, cognitive, emotional, and relational aspects. In the human services, spirituality is generally viewed as a larger domain that may or may not encompass religion.

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Religion

Religion is an organized system of beliefs, behaviors, rituals, and ethical principles or values shared by a community and transmitted over time. Religion is expressed through cultural lenses and traditions.

Spirituality and Religious Affiliation

Spirituality and most especially religion are of deep value to most older adults. While questions about the importance of religion have appeared in many national surveys, questions about the importance of spirituality are rare. In fact, the term spirituality is often less well understood by older people who as a group endorse religion over spirituality. For them, the meaning of these two concepts may be conflated, with spirituality viewed as a component of religion, if seen separately at all. Sixty-nine percent of adults in the USA aged 65 years and older report that religion is very important to them; that differs from the 45.7% of those between 18 and 24 years who name religion as very important (Pew Forum on Religion in the Public Life 2008). However, the high rating of importance of religion has trended down by seven percentage points over the decade from 1998 to 2008. Further, 90% of older adults express belief in God (Pew Center: Growing Old in America: Expectations Versus Reality 2009). The fourth most common daily activity performed by older adults (behind talking with friends and family, reading, taking medication, and watching TV) was praying (Pew Forum on Religion in the Public Life 2008). Older adults not only report that religion is important to them but also they integrate public or private religious behavior into their lives. Increasing age has been related to higher levels of religious belief but not to attendance when health is controlled (Wang et al. 2014). Overall, like the rest of the population, older adults, too, report being religious only, spiritual and religious, spiritual only, or neither religious or spiritual. In the literature, these domains are referred to as R/S or S/R. In keeping with this tradition, this entry will use R/S to honor the more frequent use of the term *religious* compared to *spiritual* given by older adults.

Across all age groups, older adults (over 65 years) are the most religiously affiliated group. According to the US Religious Landscape Survey (Pew Forum on Religion in the Public Life 2007), about 84% of those ages 60–69 have stated that they hold membership in Christian religions; an additional 5% have membership in other world religions such as Islam, Hinduism, and Buddhism, bringing the full percentage to about 89 (Pew Forum on Religion in the Public Life 2008). There is a slight increase in these percentages for those over age 70. To a greater extent than the USA, the UK has long hosted a diverse population. This is demonstrated by greater numbers of older adults affiliating with world religions (72% report being Christian) and 15% of the population reporting to be atheist or agnostic (Association for Religion Data Archives: Religious

Adherents 2011). Globally, those who self-identify as part of a religious faith include the following: Christians (31.5%), Muslims (23.2%,), unaffiliated (16.3), Hindus (15.0%), Buddhists (7.1%), folk religionists (5.9%), other religions (0.8%), and Jews (0.2%) (Pew Research Center 2012). *Folk religionists* comprise African traditional religions, Chinese folk religion, American Indian religions, and Australian aboriginal religions. The category of *other religions* comprises Baha'is, Jains, Sikhs, Shintoists, Taoists, and many other smaller faith groups (Pew Research Center 2012).

Descriptions

Spirituality. Psychology, social work, counseling, and other helping professions generally distinguish between spirituality and religion as being associated but conceptually distinct. Spirituality is often used as a broader more inclusive term that refers to the search for meaning and purpose. For many people, it is a process of dynamic discovery that unfolds over time with aspects that sometimes advance and other times regress as individuals face or choose not to face their own blockages and fears. Pargament, drawing on the work of Tillich and other theologians, refers to this as "a search for significance, in terms related to the sacred" (p. 32) (Pargament et al. 2013). Although he calls this a definition of religion, it more closely resonates with a spiritual understanding. The consensus conference to develop standards of spiritual care for palliative care suggested, "Spirituality is that aspect of humanity that refers to the way individuals seek and express meaning and purpose, and the way they experience connectedness to the moment, to self, to others, to nature, and to the significant or sacred"(p. 887) (Puchalski et al. 2009).

One of the views carried by a number of people who self-identify as spiritual, including indigenous groups, is that spirituality pervades everything, including inanimate objects such as rocks and stones. Thus everyone has an innate spiritual self whether this is acknowledged or not. Conceptually, the idea of the spiritual may be viewed in several forms: (1) as one aspect of the biopsychosocial spiritual self, (2) as an inner center or core of the person, or (3) as something beyond everything that has a material/physical essence and transcendent to the self. These are not mutually exclusive ideas. Dependent on culture and worldview, the meaning of spirituality can expand to include presence of deceased loved ones, angels, guides, energies, and other forces (Nelson-Becker and Canda 2008). Connecting to nature for many older people remains a key expression of the spiritual. One older woman living independently reported that what she saw outside her window each morning was "a view of eternity"(Nelson-Becker 2003). The actual vista included a tiny corner of Lake Michigan which she later explained was her connection to spirituality. However, it is also important to note that the term spiritual applied to inner experience is not typically used by many older people (especially those residing in the Western world) who prefer the word religion as the umbrella term for all aspects. This seems to mark a generational difference in discourse between older adults and those born in the 1950s or later (Coleman 2011).

Religion. Religion is a marker for the Judeo-Christian social context in which many older people in Western culture were raised, although that is changing. With immigration and globalization, the number of older people expressing affiliation with world religions mentioned above, though small, is increasing. Religion refers to the organization, beliefs, ethical values, rituals, and behavior that are transmitted over time and shared by a community. Often, though not always, this includes belief in a divine power, transcendent being, or sacred source of meaning. Ancient sacred texts and modern devotional literature including stories about origins form part of most religions, although some have developed through oral traditions. Responsiveness to social injustice and moving synchronously with the rhythms of holidays and festivals are other aspects in the lives of older people of faith.

Religion as resource. Religion has been an important resource for social connection and for comprehending what is beyond ordinary understanding throughout history. For example, some

older Holocaust survivors wonder why God would allow the devastation of the Jewish people during World War II. Religion is embedded in nearly every culture, although with its own unique representations and manifestations. For older people who are beginning to lose social friendships through widowhood and death, the church, synagogue, mosque, or sangha offers an important source of connection and reconnection, especially with younger persons with whom they might not otherwise engage. *Faith* and *belief* are other terms commonly used by older persons in reference to the doctrine or teachings of a religion or their own thinking that is not based in substantive proof. Faith and belief are valuable because they express ideas about how the world/universe is and one's relation to it, assumptions based on deepest roots or foundations of being. Thus, religious tenets can offer reassurance to older persons. Most religious traditions offer a positive view of the cosmos and the place that humans have within it. Life especially is valued; it holds meaning and purpose. Further, religion can facilitate the expression of powerful emotions that lie beyond thought and include gratitude, peace, joy, and hope. Religion can provide comfort, the sense that one can turn to God or a sacred source when life becomes difficult or depressing. Religious rituals and ceremonies can offer renewal or recognition of transitions and life endings. Prayer in groups or alone (private prayer) and meditation facilitate a sense of nearness to the transcendent power as well as a sense of responsibility to a community and care for the earth, a sacred home for all beings. Religions offer general guidance for the best course of action taking into account needs of self and others, and most religious faiths have role models one can look to and reflect on for inspiration.

Spiritual well-being or spiritual strengths. The National Interfaith Coalition on Aging, with representatives from several religious faiths, described spiritual well-being in 1975 as an affirmation of living in relationship with self, community, environment, and God that cultivates wholeness (National Interfaith Coalition on Aging 1980). Spiritual strengths refer to specific aspects of religious faith and spiritual beliefs that serve as resources and anchors during times of health crisis or transition. Many older persons report reliance on prayer as a tool to counter physical and emotional pain. Comments by older adults include statements such as "God made this world so beautiful. We've got to be thankful. Maybe I might not be thankful this morning [because of my pain], but I've got to get to it this afternoon." Religion alludes to basic principles that "develop heart, mind, soul, and body." "You treat people better. You have peace within yourself and peace and harmony among people"(Nelson-Becker 2003). Reading sacred texts also provides comfort and insight. Religion is viewed as an opportunity for tolerance and greater understanding of others. It is more often pondered in a positive light by older adults as something that offers benefit, though not always. Joy, hope, forgiveness, and acceptance are a few of the outcomes of spiritual strengths.

Spiritual suffering and spiritual struggle. Spiritual suffering concerns all the existential, religious, and spiritual conflicts people encounter during the life course that cause emotional pain or anguish. Spiritual struggles are active endeavors to either maintain or change spiritual views that are threatened. Spiritual suffering can ensue from discouragement, despair, abandonment, emptiness, detachment from self and others, fear, demoralization, and ambivalence or doubt about former beliefs. Spiritual pain also may emerge from a sense of separation from God, precipitated by illness or other loss. While older age may be a time for reconstituting the self and deepening, it may also be a time of sorrow over sensed failures, disappointment, and grief related to the meaning one assigns to one's experience of life.

Spiritual care. Even though somewhat less likely to use formal therapy than younger groups, older individuals do seek out and use formal psychotherapy supports. Spiritual care is the official province of pastoral care professionals, chaplains, and other spiritual leaders such as rabbis, priests, ministers, clerics, monks, nuns, imams, and shamans. Some of these leaders may have specialized study while others do not; some are ordained and some are lay (not ordained but possibly certified) ministers. Certainly, they should be

used as referral sources when feasible as well as sources of specific denominational or spiritual group knowledge resources. Generally there are fewer clergy than therapists, so frequently therapists are the ones available when psychospiritual crises or problems emerge. Also, fewer clergy have received the mental health education and training that licensed professionals have. Spiritual triage (beginning assessment of concerns) may be required from any first-line professional staff, especially those working on interprofessional teams. Mental health professionals should all have some training in assessing and addressing R/S needs of clients, with those who have particular affinity and comfort in this area encouraged to seek ongoing professional development.

Ethical Practice and Boundaries

Some mental health professionals feel uneasy about addressing religion and spirituality with older clients or choose to avoid it entirely because at times, well-intentioned professionals have attempted to privilege a spiritual or religious point of view. This section will identify those general concerns, discuss the reasons that assessing religious and spiritual needs is essential (especially those that are unmet), and provide guidance on working with spiritual issues and use of prayer with clients.

Concerns about proselytizing. One of the concerns mental health practitioners often have about discussing spiritual and religions issues with older clients is that they may be perceived as proselytizing or seeking to convert clients to a particular system of belief. In the past, people of goodwill, who thought they held the best answers, have stepped across boundaries. A risk for clients is that they are vulnerable and lack power in the relationship, so any assent would be manipulation and not freely given as an act of faith. Even though religious belief and practice have resulted in positive outcomes for many older people, that is not universally the case (Puchalski and Ferell 2010). The level of intimacy is such that religion cannot be prescribed the way one might suggest exercise, certain reading material, or other "homework."

Importance of assessing religious and spiritual needs. It is important to ask broad questions in assessment about whether these areas are important to the client and whether he/she would like them to form part of therapeutic work. If unasked, older clients particularly will often not mention what could be a significant source of comfort or distress. Taking cues from the practitioner about what is perceived as a level of discomfort, they may hesitate to reveal their spiritual or religious beliefs that are fundamental and integral to their constructed self. The unethical practice would be to avoid the area entirely. If it emerges that R/S is an area of interest or concern for the client, then the task for the practitioner becomes one of listening fully and holding in check one's own assumptions and stereotypes. Although psychologists tend to rate religion as beneficial, when client beliefs shift farther from mainline beliefs and norms, these professionals demonstrate greater tendency to rate them as pathological (Post and Wade 2009). Even when affiliated with a particular religious faith, many older individuals may have developed their own unique understandings and expressions within that faith.

Professional work with older clients around spiritual issues. At moments when spiritual and religious issues emerge as a main concern, older clients can be referred to board-certified chaplains (available from many faith traditions) or leaders in their own faith community. However, there are occasions when the need is so immediate and the pain so profound that psychologists, counselors, and social workers should listen intently, no matter their own background or personal faith or non-faith preference. Some practitioners may feel unprepared and assume that it is best for clients to work with someone from their own religious or spiritual group. However, practitioners do not need to match clients on their spiritual genetics. In fact, at times a person from a secular or humanistic background may serve as the best resource because he/she can approach the problem with a fresh mind free of assumptions. The key requirement is that the professional be prepared to use all of his/her training and skill to listen deeply to what the client may find

extremely difficult to discuss or be conflicted about revealing.

Praying for or with clients. Holistic work with clients include integrating attention to many parts of the self. Although chaplains have had training in leading prayers after genuine invitation by clients, other mental health professionals have not. Unless there are exceptional reasons such as the client and therapist are members of the same faith tradition, there is a risk of abuse in participation in prayer. On some occasions, an older client may ask a professional to pray with them. Depending on the background of the professional, he/she might consider standing/sitting in respectful silence while the client prays. Because of risk of coercion, it is best when these requests are initiated by the client. Following the client's initiative, without engaging in behavior that would seem to cause harm to the professional's own belief system, seems like the optimal approach.

Spiritual Assessment with Older Adults

Assessment of spiritual and religious needs remains inconsistent in many agencies that work with older people. The Joint Commission as a health-care oversight agency requires some form of spiritual assessment in hospitals and other health-care organizations, but it offers little guidance in how these assessments should be structured. Classic measures of religiousness were whether an individual was affiliated with a religious faith and whether they prayed. More recently, a common question is how important religion and, separately, spirituality are in an individual's life or whether their spiritual needs are met. While the area may be checked off, there is little here to encourage a longer encounter. Better constructed assessment tools for therapeutic work cultivate a conversation about needs and desires by providing a framework that can point to later intervention. Quantitative tools explore specific areas such as coping, beliefs, values, and daily spiritual experiences (Fetzer Institute 1999). The health literature also has a number of qualitative assessment tools such as FICA (faith and belief, importance, community, address in care or action). Before taking a full spiritual history or comprehensive assessment, it is helpful to ask a preliminary question about what gives an older person meaning and purpose (Nelson-Becker et al. 2006). If religion and spirituality surface here, these can be further explored, if the client wishes. If the individual indicates they have no interest, then that can be information noted and no further questions need be asked. Assessment of R/S should be directed by client needs and interests but can provide a prolog into intervention.

Spiritual Interventions

Spiritual interventions should be utilized cautiously with respect for all spiritual and religious positions but can be an empowering tool for older adults who may use R/S coping discussed below. Many older adults have spiritual portfolios or repertoires, strategies that have proved useful to them in the past for coping with stress. A mental health professional might assist someone in expanding their portfolio by helping them consider ways to deepen their spiritual practices or to try new ones. While these may include individual spiritual practices, learning to engage with spiritual communities in new ways may be another possible area for exploration. Making innovative use of pastoral care opportunities or small group meetings and support are other ways. Faith communities are growing older and they are beginning to explore ways to connect older and younger members as well as teach practices such as the recognition and inclusion of older people with mental health needs. There are some useful guidelines to consider in this area. Spiritual intervention should be preceded by client request. Practitioners should develop clinical expertise and cultural competency through education and training, respecting religious and spiritual diversity and any prohibitions within specific religious traditions. Finally, where available, this work should be research informed.

Spiritual resilience is a quality that enables people to mediate difficult circumstances and still flourish (Nelson-Becker 2013). It is present when an older person manages ambiguity

successfully by full immersion in and enjoyment of the moment. Similarly, benefit-finding is the ability to engender a positive outcome in the midst of severe health or other threats. Loss and grief are visible in personal histories that include stories of pain, but out of those stories, a reintegration and recovery of a new self can occur.

Spiritual reminiscence is a process that considers individuals' life stories and how meaning can continue to be understood or reframed from significant life events (MacKinlay and Trevitt 2010). Although useful with almost any older client, if they have some cognitive impairment, they can be paired with another person or their significant other to develop a dyadic story. This describes an in-the-moment process of meaning reconstruction and providing provisional purpose while addressing issues of vulnerability, reason to hope, and despair. Persons with dementia, like everyone, have stories to tell, but they will require assistance in structuring them in a way that returns meaning both to themselves and others. Spiritual stories are a validation of life lived experimentally without knowing the ending in advance and give witness to the woundedness and resilience of the storyteller. Storymining is the act of the professional who asks questions that can help highlight the meaning of a life, the wrong turns that were the right ones, for example.

Incorporating compassion, courage, fluidity, hope, trust, joy, and equanimity. Human values define the experience of being human, yet developing greater compassion, courage, fluidity, hope, trust, joy, and equanimity is seldom identified as a goal. Much therapeutic work takes a problem-focused approach instead of a spiritual development approach. Contemplation of the risks and benefits to full authenticity is another under addressed topic. Shame, guilt, greed, and other unsavory maladies also may remain unrecognized in a mental health lexicon that privileges standard complaints common in aging such as depression and anxiety. Forgiveness, too, is an important area of therapeutic work that can take greater significance in aging when a lifetime affords more opportunities for forgiving and being forgiven. Contemplating some of the ancient vices and virtues anew may yield new places for enhancing the quality of life for older people.

Spiritual and Religious Coping in Older Adults

R/S occupies a unique space in the lives of people for whom it matters. The level of profundity and the core issues related to spirituality such as the quest for meaning and purpose, experiencing deep joy in recognizing the beauty of life and all beings, or dealing with doubt or sense of abandonment/anger toward an ultimate being/transcendent power/God touch on foundational beliefs central to a sense of personhood. Although religious beliefs and related ideals may falter in stressful circumstances of aging when older adults encounter chronic and acute illnesses, increasing frailty, and adapt to unwanted changes, religious coping has been found to offer benefit beyond social and psychological resources (Pargament et al. 2013). In a study of 79 older adults asked to identify their three most difficult life challenges and subsequent coping styles, the most common coping styles included tapping social resources (talking with friends or soliciting instrumental help), religious coping (attending church, praying, reading the Bible/Talmud/Koran, using resources provided by God/faith), personal coping (depending on oneself, accepting the situation, using humor), or idiosyncratic or avoidant coping styles (placing trust in physicians, crying, not coping) (Nelson-Becker 2004). The primary coping style was more salient than the type of problem, and older people used their preferred coping method on most identified problems. Religious coping was the dominant coping pattern for African-American respondents. Traditional religious practices of prayer, meditation, reading religious texts, and using religious teachings as a moral compass or guide and helping to banish loneliness through altruistic behavior of helping others are important aspects of religious coping. One older African-American woman spoke of placing her trust in God, "I'm helpless without God, that is where my help comes from." Another African-American woman who was a storefront minister exhibited a

strong belief in the benefits of using religious practices:

> As I said earlier with prayer, Bible scriptures, meditation, seeking the answer from within, so I can do the will. I don't move too fast-I make the attempt to get an answer about what to do about a situation. I don't worry myself. It's like a touch on the shoulder. 'You're my child. You don't have to worry. It's going to be alright.' Then I adjust my mind to accept whichever way it turns out. In the end I find it to be the best.

A Caucasian woman detailed the manner in which she integrated her faith with her daily life. These rituals helped her achieve some important routines in her day and enhance life meaning since it was difficult for her to leave her home due to some physical limitations. Her preferred activity would have been to attend church frequently:

> I have my daily practice of meditation, Bible reading and prayer. That's daily. I don't miss. My Bible reading has to be every day. In the morning I'll get up at 6:00 or maybe earlier and have my meditation and prayer, then reading. I have daily readings–three of them. I go back to bed and maybe sleep until 9:30. I have to listen to Joyce Meyer (a Christian speaker) on TV at 12:00.

Although spirituality was less often cited as a specific resource in this older age group, it was mentioned as something inside the self that provides courage and inspiration. An older Jewish American woman commented, "When you really feel very sad, you want to turn to something. This is when you use spirituality." Another older adult man spoke about the difficulties in managing interpersonal relationships, "You meet people who don't act right. My spirituality helps me leave them alone. I'm able not to get angry." A third individual spoke of spirituality as something mysterious that was difficult to fully articulate, "You use spirituality in the sense of you don't see but you know it's there. Just like the solution [to a problem]. All of a sudden it's there – aiding you and letting you know how to go about it." R/S are significant tools for many older people in managing increasing frailty, mental health issues such as depression, or simply maintaining a satisfactory quality of life.

Dementia and caregiving. Religious coping has been viewed as valuable to clients diagnosed with early-stage dementia. When disconnection from others due to communication problems and loneliness disrupted their sense of identity and self-esteem, relationships with God were deemed important, regardless of varying attributes/descriptors assigned to conceptions of God (Beuscher and Beck 2008). Hope was expressed in living fully through daily experience rather than impractical hope for cure. Spirituality in later-stage dementias is evident in the power of ritual for communication when speech is no longer available. The body remembers when the mind cannot, and people with dementia are able to sing religious hymns or participate in religious chants and prayers that have been embedded in their being from young ages. Religious coping has also proved a valuable benefit to caregivers of older people and individuals with disabilities who experience great stress in provision of high levels of direct physical and emotional care. Caregivers under benefit in the reciprocity transactional measure when they give more than they receive. They often relinquish earlier dreams of what they wanted to accomplish or how they wanted to spend their time, sacrificing (making holy) a new project to devote themselves to the welfare of another person, often one who is deeply loved.

Religion, Health, Mental Health, and Aging

Considerable research over the past 20 years has examined overall physical and psychological well-being, a variety of specific health outcomes, mortality, health behaviors, and the role of faith communities in the prevention and impact on older adult health (George et al. 2013; Koenig et al. 2012). Research strongly suggests that R/S beliefs, behaviors, and religious participation influence older adults primarily in five specific ways: (1) development and maintenance of a meaning-making system, (2) social support and pro-social engagement with others, (3) social control of certain behaviors that affect health, (4) consolation, and (5) decision-making guidance around medical treatment and end-of-life

decision-making. The interaction of religion on health and mental health, however, is complex and not always explicit nor positive.

Specifically, mental health is maintained or enhanced by providing a sense of purpose and meaning in life. R/S beliefs have the potential to validate emotional suffering and provide an emotional "holding environment" for coping with life's stressors and unanswerable questions. R/S communities foster a sense of belonging and opportunities for social relationships. They reduce social isolation. R/S beliefs encourage positive attitudes and emotions, such as hope, joy, and forgiveness that enhance well-being as well as neutralize negative emotions such as anxiety or depression. R/S beliefs and behaviors influence lifestyle choices that impact health, such as excessive alcohol use, sexual promiscuity, gambling, and drug abuse. Some R/S beliefs and practices affect one's ability to cope with medical illness, loss, life stressors, and crises. The use of prayer, sacred texts, ritual, and congregational support can aid coping. R/S beliefs and the influence of faith communities guide medical decision-making, including whether or not to receive care. This can influence discussion and decisions regarding the development of an advance directive for medical care and decisions to begin, continue, or end medical treatment and provide definition to what constitutes "futile care" and assist with end-of-life decisions.

Not all R/S beliefs and practices are beneficial to health and well-being. Negative religious coping has been consistently linked with poor health outcomes. Those who believe their god has abandoned or is punishing them exhibit increased distress. Additionally, internal or external motivation for R/S beliefs, practices, and participation can strengthen or weaken the health effect. Older adults whose religious involvement is intrinsically motivated experience satisfaction from their beliefs and practices. Those who are externally motivated engage in beliefs and practices to receive something in return such as praise, respect, or social status. Internal motivation is linked with positive health outcomes, while external motivation is linked with negative health outcomes.

Religious Diversity and Struggle: An Example of LGBT Older Adults' Relationship to Faith

Lesbian, gay, bisexual, and transgender (LGBT) elders have coped not only with the stigma and disregard of general society but also with spiritual violence meted out by authorities of various religious denominations. Religious leaders claimed the voice of sacred texts, the position of theological truth, and doctrinal mandate in relation to sexual orientation. Sacred religious texts have been used as weapons to legitimize harm and ostracism and make claims about one's lack of worthiness to engage the divine and supportive religious community.

Spiritual identity occupies different levels of importance and contributes to self-understanding in varying degrees. For some, spiritual identity is core to who one is; it is a foundational aspect of self, central to how one views and approaches the world. To others, it is a part of the self that is accessed in times of distress or extreme gratitude, and yet to still others, spiritual identity is consciously not important at all. The process of integrating spiritual identity and sexual identity is complex and fraught with emotion. It is frequently a time of spiritual struggle. The outcome of this spiritual struggle can be positive, negative, or a combination. The historical time in which these elders came of age and the diversity of religious views regarding homosexuality can complicate this struggle. Some LGBT elders have developed a personal spirituality that supports a whole sense of self and provides strength and inspiration apart from their religious tradition (Witten and Eyler 2012). Those who have maintained a relationship with their religious tradition frequently have adapted their internal belief system to relieve the conflict between their sexual and religious identity.

An experience of deep grief is a common reaction for those whose spiritual identity is threatened. Anxiety can ensue as one tries to find one's bearings and redevelop self-understanding. Individuals may feel that they no longer have access to God, their religious community, or spiritual home. A sense of what was known as true, good,

enduring, and nourishing might be shattered, at least for a time. Thus, there is loss of self-understanding and diminished access to the strength and coping assistance that was historically available and engaged. Out of this devastation, many LGBT elders have developed strong spiritual identities in the face of societal and religious discrimination. Many have emerged with a life-affirming spirituality that is a source of strength, comfort, and energy as well as the source of personal resilience.

The relationship between organized religion and LGBT elders is complicated at best. While dialog is currently taking place with religious authorities and lay people regarding religious participation, theological validation, and embrace of LGBT individuals within various faith communities, this is a newer development. Historically, LGBT elders have come to expect rejection from places of worship and religious institutions. Given this history and social context, many LGBT elders faced conflict as to how to reconcile these seemingly incompatible parts of themselves, a nonheteronormative sexual identity and a spiritual identity. Some choose to deny religious identity or deny sexual identity, compartmentalize their identity, or integrate their identity.

Many LGBT elders have experienced great pain and rejection from their faith communities. As LGBT adults age, feelings of vulnerability may emerge. Reliance upon existing spiritual resources and religious communities is common during times of stress and can aid in coping with these complex feelings. A large number of LGBT elders are committed to their religious and spiritual identities and have exhibited great resilience, strength, and growth in the face of homophobia, stigma, and rejection. Engaging their spirituality and accessing social support, including religious institutions, will help LGBT elders flourish through their later years. However, it is also important to understand that this vulnerability may impact LGBT elders in a detrimental way. Fears and concerns about being discriminated against when unable to care for oneself may become overwhelming. Some elders have expressed concern that they may be forced to move from an open, integrated sexual and spiritual identity into a compartmentalized identity. They are concerned about being in a position of trying to "pass" as heterosexual for their own safety and ability to receive services. In essence, go back into "the closet." This is a looming spiritual crisis for LGBT elders.

Conclusion

Religion and spirituality have formed part of the cultural landscape for older adults in communities across the world. They touch on many aspects of life which are nourishing: opportunities for social support and shared understanding, deeply held foundational beliefs, emotional richness, and strategies to bring personal peace or harmony in the face of intrapersonal and interpersonal conflicts. However, as societies change, older adults change with them. As their religious and spiritual sensibilities grow, diminish, or remain stable throughout longer life trajectories, there will be many possibilities for practitioners to enhance their understanding of a widening emergent field and of ancient resources for human flourishing. As research methods both expand and retain rigor, practitioners will be better able to recognize the complex associations of religion and increasingly with advancing generations of spirituality.

Cross-References

- ▶ Aging and Psychological Well-being
- ▶ End of Life Care
- ▶ Mindfulness Approaches
- ▶ Palliative Care
- ▶ Psychology of Wisdom
- ▶ Resilience and Aging

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Stage Theories of Personality

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Definition

A stage theory of personality proposes a series of fixed developmental levels that are associated with different elements of personality, progress in the complexity of the expression of personality, and are experienced in the same way by everyone in a society and across different cultures.

History

The earliest stage theories of personality arose from the psychoanalytic writings of Sigmund Freud, and many of those who later went on to develop their own stage theories continued to do so in the psychoanalytic tradition. For the most part, these early theories were primarily concerned with developmental stages in children and considered the personality of adults in much

less depth, with even less consideration given to the personality of older adults. For a very influential example, Freud's theoretical stages of psychosexual development (Freud 1965) applied only to childhood and adolescence and were regarded as stable throughout the adult years. These developmental stages formed the core of the influences that formed the adult personality and its fundamental adjustment to life and its challenges. Another tradition in which stages are prominent is the developmental stage theory of Piaget (1954), who focused upon the cognitive development and resulting differences in observed abilities of children as they progressed in age. Adulthood in the psychoanalytic tradition was presumed to be stable and relatively unchanging except in response to strong environmental pressures. Later theories that built upon the psychoanalytic model retained the focus on childhood development, but some later theories focused more on personality differences among adults during the midlife and later-life periods and elaborated upon aspects of personality during adulthood.

Early Theories

After Jung finally split with Freud in 1913, his writings focused more on the influence of culture on the development of personality features in individuals and expanded on psychosocial developments in the second half of life without adopting a set of fixed developmental stages. Among his other contributions, Jung is credited with the idea of important developments in adult personality around the age of 40 that later evolved to become the concept of the midlife transition or midlife crisis (Jung 1971). It must be remembered that in general most stage theories of personality are based upon data collected from, and the resulting theories derived from, comparatively well-educated individuals from North American and European societies. Thus, Jung described a process of individuation during the adult years in which individuals became more clearly defined and differentiated from one another as individuals adopted different responses to the demands of adult life. Whether the implicit assumption in this that all cultures and societies involve increasing differentiation among adults can be supported outside of well-educated Westerners is rarely addressed among early stage theorists. One of the distinct elements of Jung's work is his sensitivity to the issue of culture and its influence on developmental processes.

The appeal of stage theories is partially based upon the introduction of such additional secondary concepts as the midlife crisis. These ideas are often intuitively appealing but are also more difficult to support empirically. There is also the conceptual problem for a stage theory if empirical results do not support the secondary concept in question. This is the case of the midlife crisis, in which later research has shown not to be universal in all who reach midlife, not to appear at the same age in midlife, and not to necessarily involve significant emotional upset (Rosenberg et al. 1999). Despite such a lack of empirical support, concepts such as the midlife crisis remain popular in modern cultures and have seemed to acquire a life of their own independent of empirical evidence and the implications of disconfirmation for the parent theory. Indeed, little research on stage theories is being done currently. A PsycINFO literature search was done for this topic, using the terms "stage theory" and "personality" and "older adults." A total of only 52 hits were returned, many of them not relevant. In addition, many texts for adult development and aging courses give comparatively little space to stage theories in comparison to newer trait theories.

Lifespan Theories

The first comprehensive stage theory of adult personality change and development that covered the lifespan was that of Erik Erikson (1950, 1964) and Erikson et al. (1986). Erikson's theory emphasizes the interplay between the individual and society in developmental processes and can be seen as an extension of Jung's work. The eight stages proposed by Erikson are clearly articulated and intuitively appealing, including both significant relationships with other people in one's life and intrapersonal processes.

Widely influential, Erikson's stage theory was based on the idea that psychological development required the successful resolution of psychosocial crises. With a rich and clearly described base, the theory influenced many other writers and researchers in the area of personality development. At the same time, Erikson's theory primarily focused on childhood and adolescence, with five of the eight stages covering the first 20 years of life: basic trust versus mistrust, autonomy versus shame/doubt, initiative versus guilt, industry versus inferiority, and identity achievement versus identity diffusion. Issues arising during childhood and adolescence can recur under crises in later life, so the developmental sequence is not entirely fixed and rigid. Erikson devoted three stages for the remaining years of life that covered a substantially longer period of time. Of the three stages of adulthood, the first stage of young adulthood involved the psychosocial crisis of "intimacy versus isolation" and occurs during the 20s and 30s, while the second adult stage is based on the resolution of the crisis of "generativity versus self-absorption" that occurs during the period of the following 25 years from 40 to 65 (Whitbourne et al. 1992). This stage has perhaps attracted more research than any other in the accumulated studies involving the theory. The stage of generativity is predominant in midlife according to most research on the topic as many adults reach this stage of development (Sneed et al. 2006). Some studies have shown that generativity appears to be lower in both younger and older adults than those in their late 30s and early 40s, as predicted by the theory. The final stage that occurs during old age involved the crisis of "integrity versus despair," which covers the period of time from late adulthood to death (Erikson et al. 1986). This period of life can easily cover an additional 15–30 years of life for individuals whose health remains sufficiently robust to place them among those surviving beyond the average life expectancy. It seems to be a feature of most stage theories whose developers are in midlife in that later life is seen to be a relatively stagnant and unchanging stage of existence that begins with retirement and continues placidly until death.

Modern Theories

Despite its intuitive appeal and resulting broad influence, recent years have seen a relative decline in research on Erikson's theory in parallel with the increasing influence of trait models of personality and personality development. It is none the less evident that Erikson's stage theory has had a broad influence on others who have developed more focused theoretical and empirical accounts of the development of personality characteristics in adult life that do extend into later life. These include the theoretical developments of Levinson (1978, 1996) and Vaillant (1977). In common with Erikson's theory, such more recent theories are built upon the broad sequence of developmental events that are almost universally observed in modern Western societies, while retaining links of psychoanalytic theories. Early childhood, preschool days, the years or decades of formal education, employment and marriage, parenthood, and retirement are events and activities that are virtually universal in modern Western societies and are becoming more dominant in the societies of developing countries as Western influences continue to spread. Formal transition ceremonies, such as initiation rites, are far from universal in Western cultures and their survival is variable in developing countries. Individuals may exhibit substantial variation in how they progress in life across the cultural range of stages without considering the relatively consistent variation between cultures that can be exceeded by variation within a culture or society.

Much of the existing research on stages of personality development that does not deal explicitly with childhood and adolescence focuses on the middle period of life, the decades of adulthood. Several other investigators have focused their work on refining and elaborating upon Erikson's stage of identity and have expanded upon the original ideas of this level of development. Levinson's theory (1978, 1996) focuses on early to middle age (age 20 to age mid-40s) and incorporates six stages: leaving the family, entering the adult world, settling down, becoming one's own man, midlife transition, and restabilization and beginning middle adulthood.

Like many stage theorists, Levinson bases his theory upon situations and events that generally occur during relatively specific and consistent periods in a person's life. The theory was originally developed on the life situations of four occupational groups of men and thus lacked a certain amount of generalizability.

Modern Theories

As a psychiatrist, Vaillant (1977) had a rather different perspective on stages of personality development than most personality theorists, in that he was most concerned with the success adults had with the major issues of adulthood: forming an intimate relationship, establishing a career, and transmitting knowledge to the next generation. Vaillant was working in the predominant psychoanalytic tradition that has influenced much of the theoretical developments on the topic of personality structure. Unlike more rigid theorists about personality, and like Loevinger (1976), he does not assume that everyone progresses at the same rate or necessarily reaches the most advanced or highest level or stage. He is particularly interested in the manner in which adults adapt to life and in particular the role of defense mechanisms, a psychoanalytic concept for processes used unconsciously to deal with anxiety. He proposed six levels of defense mechanism, with the highest adaptive level being altruism; the highest adaptive level involves participation in society and care for others. It is in the maturity of the ego defenses that Vaillant's work can be seen as a stage theory. Successively less mature defenses include repression, omnipotence, denial, autistic fantasy, and help-rejecting complaining. The least mature level deals with stress by requesting help and then rejecting offers of assistance. Autistic fantasy involves image distortion, typified by daydreaming instead of taking action. Denial involves the disavowal or refusal to act or to acknowledge personal hurt. The omnipotence level involves minor image distortion by emphasizing one's special attributes. Repression reflects mental inhibition and dealing with stress by expelling thoughts and desires from conscious awareness. From data collected through a series of longitudinal studies that are still ongoing, he was able to demonstrate the stability of individual personality characteristics over a 45-year period of time. Examples include the prediction of income during work life by extraversion scores obtained 45 years earlier.

A somewhat different stage model was developed by Harry Stack Sullivan (1953) who proposed seven developmental epochs, six of which occurred prior to adulthood. Sullivan proposed stage transitions in terms of psychological development rather than of the biological factors favored by most stage theorists working from a psychoanalytic perspective. Unlike many stage theorists, Sullivan felt that the majority of adults did not achieve the most advanced stage of development. Like that of Erikson, Sullivan's model has never been formally discredited by convincing empirical evidence but has fallen from prominence in recent years as other models have increased in popularity. Sullivan's focus on interpersonal relationships has, however, retained its utility into the present (Noller et al. 2001).

Ego and Moral Developmental Theories

Also classed as a stage theory, the work of Loevinger (1976) on ego development also is based upon psychoanalytic thinking. From this perspective with the dominance of the ego in adult life, viewing ego development as part of an individual's personality is relatively straightforward. Extending Erikson's model, Loevinger proposed eight stages of ego development with the last six stages occurring during adult life. At each stage, four areas are essential for the development of personality: character development, interpersonal style, conscious preoccupations, and cognitive style. The six stages of adult development proposed by Loevinger comprise conformist, conscientious-conformist, conscientious, individualistic, autonomous, and integrated. Most American adults operate at the second of these stages, conscientious-conformist. Relatively few adults achieve the level of the integrated stage, fewer

than 1% by one estimate (Cook-Greuter 1994) and between 2% and 3% by another report (Heaton 2011). Unlike the majority of stage personality theorists, Loevinger's theory relies upon evidence derived from an empirical source, the Washington University Sentence Completion Test, to evaluate the level of ego development, which provides stronger support for this approach than perhaps for older models of personality development that rely upon stages.

A related theory to those in the domain of personality is the stage theory of moral development proposed by Kohlberg (1981). For some, moral development is outside the domain of personality, while for others with a broader perspective, moral development is closely related to ego development and can be included among stage theories of personality. A feature of this theory is that a distinction is made between the form of thinking (the topic of thought) and the content of thinking (why one thinks that way). The reasoning behind the behavior is the important element. Moral development is typically assessed by a procedure in which the participant responds to a series of hypothetical moral dilemmas. In each one, different principles are in conflict. Based on responses to such dilemmas, three basic levels of moral development were developed, each of which can be divided into two further stages, resulting in six levels or stages in all. These stages are preconventional (punishment and obedience orientation and naïve hedonism), conventional morality (good-person orientation, social order maintenance orientation), and postconventional morality (social contracts and individual principles of conscience orientation). Kohlberg speculated about a seventh stage, unity orientation (confrontation with death), that developed in the second half of life (Kohlberg et al. 1983). The model has been a popular topic of research, and much of the research supports the general progression that is a fundamental aspect of the theory. In addition, the theoretical stages appear to occur in the proposed fixed order and in the proposed sequence, and that sequence appears to be widespread across different groups and cultures, something not always evident (Gardner and Macky 2012; Heaton 2011).

Summary

Stage theories of personality have an intuitive appeal. They simplify complex phenomena into discrete categories that are substantially easier to understand than the complexities of continuous development. At the same time, it must be recognized that human development does not involve the dramatic stages of development that are seen in nature. No human experiences the changes equivalent to those seen from caterpillar to pupa to butterfly that undoubtedly are clear and distinct stages of development. Human development is basically continuous with occasional major events, such as the sudden death of a loved one, that force changes. It would appear that in most cases stage theories arise from the imposition of artificial transitions upon a continuous process. Most stage theories are silent upon the issue of the necessary processes (see Connors and Richards 2002 for an example of a model of stage transitions). Conditions for transition from one stage to another and whether the same processes operate across all transitions or if different ones are involved at different stages are rarely, if ever, specified.

As with several other theories of personality development, the reliance upon psychoanalytic thinking about personality and its development by many theorists discussed here poses some difficulties with the decline in credibility and acceptance of much psychoanalytic thought. It cannot be denied that biological and social influences impose constraints upon possible developmental sequences and enforce others. Whether the human imposition of a limited number of categorical labels on a fundamentally continuous process advances scientific progress is arguable.

Narrow theories, such as Kohlberg's on moral development, are more likely to have stronger empirical support than very broad conceptualizations of human development in general. While Erikson's theory has broad appeal and substantial empirical support, it is relatively silent upon what is necessary for the progression from one stage to another and whether such processes remain constant across all stages.

While research on stage theories continues, it is clear that trait theories have become more popular over time while the popularity of research on stage theories has become notably less prominent. In part this may be due to most such stage theories ultimately being based upon psychoanalytic theory, and their decline in popularity may arise from their association with psychoanalysis rather than any inherent flaw of their own.

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Stereotype Threat and Aging in the Workplace

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Synonyms

Aging workforce; Employee retention; Job attitudes; Mature age workers; Social identity threat; Stereotyping

Definition

Stereotype threat is the concern that others are evaluating you through the lens of negative group-based stereotypes (Steele 1997). Over the past two decades, hundreds of laboratory studies

have demonstrated that stereotype threat disrupts performance when people attempt difficult tasks in domains in which they are negatively stereotyped, such as women in math and African Americans in academics (Nguyen and Ryan 2008). It has been over a decade since this research was extended to older adults. Here too the accumulated research evidence demonstrates that older adults are susceptible to the performance-impairing effects of stereotype threat (Abrams et al. 2006). Although the majority of stereotype threat research has examined performance decrements, a smaller body of research demonstrates stereotype threat can lead people to disengage from domains in which they feel stereotyped. Although every job involves being judged by other people, employees from negatively stereotyped groups such as older workers have the added concern of being judged on the basis of stereotypes about their group. Importantly, it is not necessary for people to believe the stereotype is true of their group to experience stereotype threat, nor is it necessary that they believe that the stereotype describes themselves. Stereotype threat effects emerge when people worry that others *might* evaluate them on the basis of the stereotype. This entry discusses the concept of stereotype threat and its relevance for older employees and the organizations who employ them.

Stereotyping and the Aging Workforce

Over the next few decades, the aging demographic will pose major challenges in the workforce in most industrialized nations. These developments have led policy makers and organizations to try to retain older employees for as long as possible. For example, in Australia the predicted labor shortage and pension burden have prompted the government to introduce financial incentives to delay retirement, with the pension age increasing to 70 years by 2035. While government inducements are undoubtedly important in helping to retain older employees, it is equally important to examine the psychological factors that may affect well-being in the workplace and, ultimately, retirement decisions.

There are numerous stereotypes about older employees, and thus stereotype threat is a psychological factor that seems likely to be of particular importance. While some of these stereotypes are positive perceptions that reflect perceived gains in "wisdom," more common are negative perceptions that emphasize reductions in "wit." Older adults are often stereotyped as inflexible, frail, incompetent, out of touch, and slow, and consequently it comes as no surprise that older employees are susceptible to stereotype threat.

In the first demonstration of stereotype threat in late adulthood, older adults who were told that age leads to poorer memory performance did worse on a memory test than those who were told that older adults often perform just as well as younger adults (Hess et al. 2003). One reason stereotype threat disrupts older adults' performance is that it consumes their working memory resources (Mazerolle et al. 2012). Interestingly, performance deficits under conditions of stereotype threat are more pronounced among the young-old (i.e., 60–70 years) than the old-old (71–82 years) and among those with higher levels of education (Hess et al. 2009). There is now more than a decade of accumulated research on aging and stereotype threat, and a recent meta-analysis revealed that these performance decrements emerged across a range of cognitive domains (e.g., memory and arithmetic) as well as physical tasks (e.g., flexibility and driving performance) (Abrams et al. 2006).

Stereotype Threat and Mature-Age Workers

Age-related stereotypes also exist about older workers: Although research has consistently demonstrated that workers' age is generally unrelated to job performance (Ng and Feldman 2008), many people continue to hold negative opinions about older workers. Research has demonstrated that younger workers rate older workers as having lower job qualifications and less potential for

development. Older workers are also viewed as less productive, less flexible, and less willing to learn than their younger counterparts (Posthuma and Campion 2009). In short, stereotypes relating to older employees are consistently negative and generalize across most occupational settings. Although industries such as law and academia tend to value older employees for their experience and connections, in most vocational settings older employees report feeling that they have been put out to pasture and believe that their younger counterparts are given more training opportunities and are more likely to be assigned to high visibility projects. For all of these reasons, older workers are likely to experience stereotype threat, as they have good reason to worry that their colleagues are evaluating them on the basis of the "older worker" stereotype.

Beyond Performance Decrements

In the original theoretical description of stereotype threat, Steele (1997) described two types of consequences. First, he proposed that acute experiences of stereotype threat would lead to performance deficits, and this consequence is now well documented in laboratory studies (although this line of research has not been extended into the workplace yet). In contrast, the other consequence proposed by Steele has received much less attention. Specifically, Steele also suggested that chronic experiences of stereotype threat should lead people to disengage from the stereotyped domain over time. This possibility is of great potential importance for both organizations and older employees, as disengagement from work and the organization is associated with a variety of negative job attitudes (e.g., lowered job satisfaction) and greater to intentions to quit.

To examine the relationship between stereotype threat and disengagement, job attitudes and turnover intentions were assessed among employees aged 50 or older in Australia and the USA (von Hippel et al. 2013). Across three diverse samples (i.e., traditional office environment, law enforcement, and a general internet survey), older employees who experienced stereotype threat at work were less satisfied with their jobs, were less committed to their employer, and reported more work-related mental health problems. Negative job attitudes are important variables in their own right, but reduced job satisfaction and commitment are also associated with increased intentions to resign and retire. And thus it is not surprising that negative job attitudes were related to an increased interest in resigning and retiring among older employees. Interestingly, older employees who occupied higher status positions within their organizational hierarchy experienced less stereotype threat than their lower status counterparts, suggesting that not all older employees are equally susceptible to stereotype threat.

Negative workplace attitudes have been shown to impact performance, leading people to be less productive. If older employees who experience stereotype threat also show performance decrements (as seems likely given the robust effects of stereotype threat on cognitive performance in controlled lab-based studies), it could lead their colleagues to believe that stereotypes about older employees are true. Poignantly, the end result is a self-fulfilling prophecy and a self-perpetuating cycle of stereotype threat which has negative consequences both for the older worker and the organizations who employ them.

The Ubiquity and Subtlety of Stereotype Threat in Everyday Life

Stereotype threat is something that nearly everyone will experience at one time or another. For example, when a female driver makes a mistake and another driver beeps his horn, she may have a niggling feeling that the male driver attributed her driving mistake to the fact that she is a woman. These same feelings can arise for older employees in the workplace. For example, if older employees' recommendations are passed over in favor of suggestions put forward by younger colleagues, they may worry that age was a factor in this decision. It is these types of subtle experiences in the workplace that can make people wonder whether they *might* be being evaluated

on the basis of stereotypes about their group. Consider these comments made by older employees who reported sometimes feeling stereotyped at work based on their age:

> Because I am now older than many of our clients, I get the impression it is felt that I no longer am 'in touch' with the clients, despite the fact my specialist knowledge means I have a good understanding of my area. Because my organisation is 'innovative', 'cutting edge' and encouraging of new ideas, it is sometimes assumed anyone over 40 won't have any ideas worth listening to. Or am I just old and paranoid and idealess?
>
> I sometimes feel that I am invisible because of my age (at work). I have difficulty at times with getting people to include me and listen to me.
>
> I believe that perceptions around my age tend to exclude me from the mentoring program and leadership development. Due to now being an 'empty nester' I have more than ample time to commit to my work – but I think that because of my age, I am not utilised enough.
>
> I feel very comfortable in my position but I think that people sometimes view my age as a burden, especially young people that think you are too old to be working and that they should have all the opportunities over older workers.

In none of these examples is it clear that the subjective experiences these employees described reflect actual stereotyping on the part of their colleagues. Rather, it is their concern of being stereotyped that constitutes stereotype threat. These examples illustrate that overt discrimination is not necessary for older employees to feel stereotype threat. Rather, subtle events can occur in the workplace that make people wonder whether they *might* be being evaluated on the basis of stereotypes about their group. For example, a technologically capable older employee may worry that his preference for a paper diary will confirm the stereotype that older employees are less willing to learn new technologies, and that he will be judged as less technically skilled or valuable as a result. It is also important to note that the accuracy of the stereotype (about oneself or the target group in general) is irrelevant to whether people experience stereotype threat. Indeed laboratory research often reveals that it is the exceptionally talented members of the stereotyped group (e.g., female math majors at top ranked universities) who are most susceptible to stereotype threat.

Many workplaces are replete with reminders that certain groups are devalued, such as a small proportion of minorities or women in the upper echelons of the organization. For older employees, these reminders may even be well intentioned. For example, offers of help by younger employees to their older counterparts (e.g., to carry a heavy or unwieldy object or to help unjam the photocopier) may be interpreted as a sign of being stereotyped. Other cues may not be as well intentioned, such as patronizing tones or social exclusion – cues that appear in the earlier quotes from older employees who experienced stereotype threat. Regardless of the specific reminders, workplaces that contain many such cues are likely to lead to chronic feelings of stereotype threat for older employees. Under situations such as these, employees may experience stereotype threat from the moment they walk in the office door each morning until they leave at the end of the day. The end result would be the stringing together of a series of acute events into a chronically aversive state. It is easy to imagine how a situation such as this could lead to work-related mental health problems and ultimately premature retirement.

What Can Be Done?

The experience of stereotype threat at work may counteract efforts to retain older employees in the workforce. As a consequence, it is important to take action to neutralize stereotype threat in the workplace to avoid the unnecessary loss of older workers as well as to increase workers' satisfaction and well-being. Unfortunately, despite hundreds of studies documenting the negative effects of stereotype threat, there is far less known about the best ways to counteract the negative consequences and minimize experiences of stereotype threat. Although research will be necessary to determine the best approach, suggestions are provided based on previous research.

Organizations may be well served by making a concerted effort to promote *positive stereotypes of older employees*, which may help to counteract the existing negative stereotypes. Positive stereotypes of older employees focus on their

experience, wisdom, dependability, and conscientiousness and have had demonstrable positive effects on older adults' performance in previous research (Levy and Leifheit-Limson 2009). It may also be possible to address stereotype threat by *increasing positive intergenerational contact.* Laboratory research demonstrates that declines in cognitive performance after stereotype threat disappear when older adults experience positive intergenerational contact (e.g., quality of contact with people 35 years or younger during the week before the testing session) (Abrams et al. 2006). O*ffering training and development* to older adults can make them feel more valued and less like they are being left behind by the organization. Older workers often feel they are missing out on training that younger workers receive, which is particularly problematic when the training is viewed as important to job performance. Finally, research suggests that *self-affirmation* may help diminish the negative consequences of stereotype threat (Cohen et al. 2006). Self-affirmation involves reflecting on one's important achievements, values, or traits. This kind of intervention would be easy to implement on both a personal and an organizational level and would not be resource intensive.

Conclusions

Most jobs involve being judged by peers, supervisors, or customers, yet older employees have the added concern of being judged on the basis of their age. It is the awareness that others may evaluate you through the lens of negative stereotypes that triggers stereotype threat, regardless of whether people believe the stereotype to be true of themselves. Given the prevalence of age-based stereotypes, it is likely that many older employees experience stereotype threat at least occasionally. Thus, although it is commonplace to experience evaluation apprehension when being judged, stereotype threat can result in additional concerns for older employees. It is therefore important for stereotype threat research to be extended into organizational settings more broadly, as the existing data suggest that stereotype threat is a concern for organizations who desire to retain their older talent and help them reach their potential.

Cross-References

- ▶ Age Discrimination
- ▶ Age Diversity at Work
- ▶ Age Stereotypes in the Workplace
- ▶ Job Attitudes and Age
- ▶ Stress and Well-Being: Its Relationship to Work and Retirement for Older Workers

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Strength and Vulnerability Integration

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Synonyms

Aging and Psychological Well-Being; Mental Health and Aging; Emotional Development in Old Age

Definition

Strength and vulnerability integration (SAVI) is a theoretical model that describes how emotional experience varies across the adult life-span. According to SAVI, older age is related to greater use of emotion regulation strategies and a stronger focus on emotional well-being. As a result, older adults often report even higher levels of well-being than do younger adults. At the same time, however, age-related increases in physical vulnerabilities pose greater problems for older adults when regulating high levels of emotional arousal. Thus, when people can employ emotion regulation strategies to avoid negative experiences, they are more successful than younger adults. When they are unsuccessful at avoiding highly negative experiences that elicit high levels of arousal, however, SAVI predicts that older adults will have more difficulties modulating this experience (Charles 2010). SAVI was formed to explain the patterns of emotional well-being observed in the literature and builds on the work described in other models and theories in psychology and aging (Carstensen et al. 1999).

An Overview of the Three Main Tenets of SAVI

SAVI focuses on three overarching factors that determine age differences in emotional experience: (1) strengths of aging, (2) vulnerabilities or aging, and (3) current circumstances. The first component includes the thoughts and behaviors that influence how people experience and regulate their emotions. As people age, they increasingly engage in thoughts and behaviors that lead to more positive and fewer negative emotional experiences (Carstensen and Mikels 2005). Older age is related to greater frequency and ability to engage in these processes, so these processes are labeled in SAVI as strengths of aging. Despite these strengths, physiological changes occur with age that may challenge a person's ability to regulate high levels of emotional arousal. Throughout childhood, across adolescence and into adulthood, physiological systems develop that are critical for responding effectively to situations of high-emotional intensity. Across middle age and into late life, however, these physiological systems often experience decline. Physiological changes, then, serve as vulnerability factors for many older adults when regulating emotions that elicit high levels of arousal. The third component encompasses current life circumstances. This context determines the extent to which people can and do employ cognitive and behavioral emotion regulation skills effectively and the extent to which age-related vulnerabilities influence emotional experience. By assessing the demands of the situation, researchers can integrate information about the use of strengths and the impact of vulnerabilities to understand patterns of age differences in emotional experience. Below we discuss each of these components in detail, and how their interplay allows us to predict how emotional experience may vary across adulthood.

Strengths of Aging

Researchers have long documented the powerful role that thoughts and behaviors have on our emotional experiences. People experience less

negative affect (or emotional feelings) and more positive ones when they select environments that are more positive and less negative, focus their attention on more positive and less negative aspects of the environment they are in, appraise situations more positively and less negatively, and engage in actions that remove themselves from negative situations (Gross 1998). In multiple studies, researchers find that older adults engage in these processes more often than younger adults (Charles and Carstensen 2014). When exposed to negative, neutral, and positive emotional faces, older adults are more likely to focus on the picture showing more positive and least negative expression. When asked to interpret situations in their lives or when interpreting stimuli in the laboratory, older adults often appraise them more positively and less negatively than do younger adults. Finally, when asked to recall what they have seen in the laboratory or events from their lives, older adults often recall more positive and fewer negative aspects than do younger adults.

SAVI further includes the proposition that these strengths of aging are the result of how people perceive time, both time left in their own lives and the time that they have already experienced. This time perspective results in older adults having greater motivation to regulate their emotions (as described by socioemotional selectivity theory). Time lived also provides them with greater expertise to achieve their motivational goals. The importance of time left in life is taken directly from socioemotional selectivity theory, a theory that describes the importance of time perspective on emotional experience and its influence across people of all ages across the life-span (see entry for ▶ Socioemotional Selectivity Theory). This theory posits that as time left in life grows shorter, people increasingly prioritize emotion-regulated goals. Older adults, then, prioritize emotion-related goals more so than younger adults (Carstensen et al. 1999).

People are motivated to regulate their emotions given the time left in life, but researchers have also discussed the importance of time lived to explain why older adults often report similar, if not higher, levels of well-being than do younger adults (Blanchard-Fields 2007). Researchers have posited that throughout years of practice and recognizing the situations that cause them the most distress, people have gained information that allows them to identify and avoid certain negative situations. For example, studies examining social expertise often find that older adults are better at knowing when to disengage from a contentious argument (Blanchard-Fields et al. 2007). Older adults prefer to back away from potentially negative situations, recommend these strategies to others, and report that doing so leads to better outcomes in their own lives. Together, the awareness that time left to live is growing shorter increases people's motivations to maintain enhanced well-being, and the past experiences from time lived provides them with information and knowledge to engage in thoughts and behaviors that enable them to achieve their goals.

Vulnerabilities of Aging

Across middle age and into late life, people often experience declines in biological and physiological processes. These declines can occur as a consequence of primary aging (genetically programmed biological declines) or from secondary aging (decline resulting from accumulated assaults from exposure or behavior). Secondary aging processes, although related to age, are not caused by biological aging, per se. For example, age is related to decreases in physical activity, and lack of exercise has been correlated with physical decline. Regardless of the source of decline, however, these age-related changes often result in a physiological system that is less flexible. SAVI posits that declines in flexibility will make both rapid responding to and recovering from high-intensity emotional situations more difficult with age.

High-intensity emotional experiences produce a cascade of physiological processes that influence both central and peripheral activity. Researchers have started examining age differences in the association between emotions and biomarkers, defined as physiological indices that often correlate with or predict worse health outcomes. For example, a review of studies has

examined cardiovascular reactivity to stressful experiences that occurred both in daily life and in the laboratory (Uchino et al. 2010). This review found that although older adults show less pronounced increases in heart rate – most likely the result of slower vagal withdrawal in response to the situation – their blood pressure was more reactive to emotional stressors than that of the younger adults.

In studies examining cortisol levels, the hormone biomarker related to stress, people with chronically high levels of negative affect have higher levels of cortisol compared to those with lower levels of negative affect. One study found, however, that the association between chronically high levels of negative affect and high levels of cortisol is greater among older adults than younger adults (Piazza et al. 2013). Specifically, the association between negative affect and cortisol levels was not significant among younger adults; only among people who were in their mid-fifties and older did overall higher levels of negative affect correlate with higher levels of cortisol. A similar age-related pattern is observed when examining the association between trait-like anger expression and metabolic syndrome (Boylan and Ryff 2015). The metabolic syndrome is a medical condition comprised of high levels of triglycerides, cholesterol, blood pressure, and glucose that predispose people to type II diabetes and other problematic health conditions. High levels of anger expression were related to metabolic syndrome among the oldest adults in the sample; levels or greater anger did not predict worse health among the younger adults who were in their mid-30s, 40s, and early 50s.

Integrating Current Circumstances

SAVI posits that by integrating knowledge about the strengths and the vulnerabilities of aging into the context of current circumstances, researchers can predict when older adults will exhibit higher levels of emotional well-being than younger adults, and when older age does not confer an advantage for emotion regulation or well-being. Specifically, in situations where people have the time and opportunity to engage in strategies that allow them to avoid or mitigate exposure to negative experiences, older adults generally report higher levels of well-being than younger adults. This higher level of well-being reflects not only their actions but also circumstances that allow them to avoid negative situations more often than their younger counterparts. For example, when examining people in relatively good physical health whose financial situation supports their needs, older age is related to exposure to fewer daily stressors. Researchers posit that this reduction in daily stress is partly due to the benefits of retirement and no longer having children living in the house. In addition, however, this reduction is hypothesized to stem from older adults navigating their social environment to avoid potentially unpleasant experiences. When people are exposed to negative social situations, older adults more frequently opt to disengage from these situations by walking away or choosing not to continue the debate, whereas younger adults report continuing with the argument (Luong et al. 2010). These strategies are posited to explain why, when asked to think about life in general or the emotions that they have experienced in the past month, older adults are more likely to report more positive and less negative emotions. Older adults often report high levels of positive emotions in their daily lives, but studies suggest that their memories are even more biased toward positive emotions than their actual experiences and more positive and less negative than the memories of younger adults, as described by socioemotional selectivity theory (Reed and Carstensen 2012). Thus, in circumstances where people are given the time to either avoid negative situations or disengage from them quickly or when given the time to think back on their life and make general appraisals about their situations, older adults often report more positive and less negative emotional experiences that those of younger adults.

The avoidance of distressing situations, however, is not always possible. When confronted with an unavoidable negative situation, people experience high levels of distress and high levels of physiological arousal. At these times, SAVI predicts that older age will no longer confer

benefits to emotional well-being. When people cannot engage in thoughts and behaviors that allow them to avoid negative, highly arousing situations, they cannot benefit from these age-related strengths. At the same time, age-related changes in physiological processes are posited to make downregulating physiological arousal more difficult. Thus, when exposed to an inescapable, unavoidable distressing event where they are unable to use emotion regulation skills, older adults are not posited to show improved reactivity and recovery compared to younger adults. Studies have found, for example, that when faced with multiple stressors from different life domains, older adults report greater cardiovascular and self-reported emotional reactivity than do younger adults (Wrzus et al. 2013). In other studies, researchers have found that when adults report having avoided an otherwise negative social interaction, older adults report less reactivity to this mildly distressing event than do younger adults. When they actually engage in these events, however, older adults report similar if not higher reactivity than younger adults (Birditt 2014).

Stressful situations are unavoidable at all ages, but some types of stressful situations that are inescapable and prolonged increase in prevalence with age. These include living with a chronic condition with unremitting and unpredictable symptoms; caregiving for a spouse with a dementia where the course is sometimes unpredictable and the prognosis is bleak; losing people in your close social circle that provide a sense of belonging and security; having a disease that causes cognitive impairment so that engaging in thoughts and behaviors for emotion regulation purposes becomes more difficult; or facing a terminal illness and the decline in functioning that is often-experienced. These are negative events that can happen throughout the life-span, but often increase in prevalence with age. For people experiencing these unavoidable situations that are associated with high levels of distress and emotional arousal, SAVI predicts that age advantages are attenuated, if not completely absent. For people who are placed in chronically stressful circumstances, emotional well-being will decrease over time.

Conclusion

SAVI is a theoretical model positing that across adulthood, an increasing awareness that time is growing shorter and a lifetime of experience provides people with the information and the motivation to engage in thoughts and behaviors that benefit emotional experience. This has been used to explain why many older adults report higher levels of happiness and lower levels of negative distress than their younger counterparts. When faced with unavoidable situations that elicit prolonged physiological arousal, however, older adults will have a harder time modulating their response. The importance of current circumstances is vital, then, to predict emotional well-being and particularly age differences in well-being across adulthood.

Cross-References

- ▶ Positive Emotion Processing, Theoretical Perspectives
- ▶ Second Generation Socioemotional Selectivity Theories
- ▶ Socioemotional Selectivity Theory

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Stress and Coping in Caregivers, Theories of

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Synonyms

Diathesis; Life events; Sociocultural stress and coping; Stress process; Vulnerability

Definition

Providing care to someone in need is usually a lasting situation associated with multiple demands, responsibilities, tasks, and events that have an impact on caregivers' life. All these conditions are considered stressors, as they have the potential to challenge the homeostasis of the caregivers. The degree to which the stressors impact on caregivers' life depends, among other variables, on the way caregivers respond, manage, or act to resolve the challenges associated with caregiving, that is, it depends on the caregivers' coping strategies. The complexities associated with caregiving have led to the development of theoretical models aimed to understand the processes that generate stress on caregivers, in which caregivers' coping strategies play a major role.

Introduction

Caregiving for an older adult dependent relative, especially those with dementia, is a highly demanding task. Caregivers often devote many years and many hours per day to looking after dependent family members, trying to cope with a wide variety of demands (supervision; behavioral and psychological symptoms in the care recipient; adjustments to one's personal, family, work, and financial circumstances; and so on). The often lengthy period over which caregivers are required to carry out the associated tasks makes it easy to understand why caregiving is considered a prototypical example of chronic stress (Vitaliano et al. 2004) and a natural experiment of extreme stress (Robinson-Whelen et al. 2001). Given the relationship between stress and health, it is not surprising that the majority of research carried out with caregiver populations relate caring for dependent persons with psychological and physical health problems in the caregiver (Pinquart and Sörensen 2003).

As early as the late 1980s it was suggested that the chronic stress to which family caregivers of persons with dementia are subjected had negative effects on the psychological and immunological adaptation of the caregivers (Kiecolt-Glaser

et al. 1987), a finding that would appear to be confirmed by longitudinal studies (Mausbach et al. 2008). Such circumstances may contribute to explaining the results obtained by Schulz and Beach (1999), who found that caregivers subjected to stress are at 63% more risk of death than noncaregivers and caregivers not experiencing strain. Nevertheless, despite the fact that many people experience negative consequences associated with caregiving, these vary from caregiver to caregiver, and some even report positive consequences. Thus, for example, Brown et al. (2009) reported that devoting at least 14 h per week to care was associated with reduced risk of death, suggesting the importance of considering the different psychosocial processes (e.g., coping) that characterize the task of providing care.

The recurrent observation that caregiving does not always affect people subject to similar demands in the same way has led to the development of theoretical models for explaining stress and coping in caregivers, models that try to account for the variability in the consequences of this process in this population. The variety of the models themselves reveals that caregiver stress is a complex and multi-causal phenomenon. Below are presented the principal theoretical models on stress among caregivers. The resulting classification of these models is intended to serve as a heuristic that facilitates a global understanding of the different factors that might be involved in the development and maintenance of caregiver stress. This classification does not pretend to be exhaustive, as there may be other conceptualizations of stress apart from those included here; nor should it be considered exclusive, since the models presented are compatible, and largely complementary.

Models with Major Emphasis on Research

Stress and Coping Models

Stress and coping models propose that the effect of stressors on outcomes (e.g., physical or mental health) varies between caregivers depending on variables such as coping or social support. Perhaps the most widely accepted and influential theoretical models in the field of stress among caregivers of dependent older adults are Lazarus and Folkman's (1984) Transactional Model of Stress and Coping, adapted to caregiving (Haley et al. 1987), and the Stress Process Model (Pearlin et al. 1990). The two models are essentially similar and highlight the crucial role of people in the stress process, describing factors that mediate between stressors due to caregiving and the consequences of the caregiving for the care providers. Although there are arguments suggesting that looking after dependent persons means that difficult or stressful situations are maintained or accumulate, or even increase in their intensity and frequency over the course of the caring process (wear and tear model (Townsend et al. 1989)), the reality is that there also occur phenomena of adaptation to caregiving, and even improvements in distress levels associated with the effects of variables such as personal mastery (Mausbach et al. 2007a). Adaptation to the caregiver role can occur through the combined effect of the set of factors or dimensions involved in the process.

Stress and coping models identify first of all background and contextual variables such as caregivers' age, sex, kinship (to the care-recipient), or socioeconomic status. Caregiving processes and consequences have been found to vary depending on the sex or kinship of the caregiver (Romero-Moreno et al. 2014a). Second, these models recognize the importance of the stressors themselves, and most of the models differentiate between objective and subjective stress. Although there is no definitive way of distinguishing clearly between objective and subjective stressors, there does appear to be some degree of consensus that among the principal stressors facing caregivers are the behavioral and psychological symptoms associated with dementia (e.g., agitation or repetitive verbalizations). Behavioral and psychological symptoms of dementia or cognitive and functional status of the care-recipient are usually considered objective stressors. These symptoms are a main source of distress for caregivers and contribute significantly to the decision to institutionalize the care-recipient in a nursing home. But not all the behavioral and psychological

symptoms of dementia generate the same levels of distress. In fact, research findings suggest that the most common symptoms (e.g., memory problems) are not those associated with higher distress levels; on the contrary, disruptive behaviors (e.g., verbal aggression), the least frequent, actually cause the greatest distress (Fauth and Gibbons 2014). The scientific literature suggests the use of interventions such as behavior management as evidence-based therapies for reducing behavioral problems in care-recipients and that a reduction in stressful events is, in turn, associated with reductions in caregiver distress (Logsdon et al. 2007).

Pearlin et al. (1990) make a distinction between primary and secondary stressors. Primary stressors have to do with the needs and demands of the care-recipient (e.g., behavioral and psychological symptoms of dementia) and how these are satisfied by the caregiver. The effects of primary stressors on other areas, such as family or economy, are considered secondary stressors. Caregivers' appraisals of the stressors may generate the experience of burden or other feelings indicative of subjective stress, but they may also generate positive feelings such as finding meaning, fulfillment, or love.

The main contribution of the stress and coping models is the recognition that several variables may mediate between, on the one hand, caregivers' stressors and appraisals and, on the other, their psychological or physical health consequences. Social support, coping, and self-efficacy are some of the most widely studied mediators. These variables buffer the effects of the stressors on caregivers' distress and, as such, represent areas that are potential targets of interventions aimed at increasing caregivers' perceptions of mastery or self-efficacy for coping with care.

The last dimension identified by the stress and coping models is that referring to outcomes or consequences. Usually, these are classified in terms of psychological or physical consequences of caregiving, but others including time until institutionalization or family conflicts arising during the caregiving could be considered to fall into this dimension. Research findings are consistent in showing that caregivers, especially if the care-recipient has dementia, present more negative mental and physical consequences, including those related to physiological health (Pinquart and Sörensen 2003). Although findings from longitudinal analysis, mostly analyzing depressive symptomatology, suggest no reduction in caregiving consequences over time, other studies have found an increase in risk factors for health problems (e.g., cardiovascular health) in caregivers (Shaw et al. 1999). In addition, caregivers' mood state seems to modulate physiological responses (Leggett et al. 2015), increasing the risk for developing physical health problems (Mausbach et al. 2007b).

Even though, as has been mentioned, several dimensions are included in the stress and coping models, feedback loops may be found between these dimensions or variables. For example, the use of maladaptive coping strategies for dealing with caregiving may increase the sources of stress or their intensity; a decline in physical or mental health may increase the appraisal of behavioral and psychological symptoms of dementia as stressful. Intervention studies have shown positive effects of interventions on variables such as caregivers' depression and delaying nursing home placement (Pinquart and Sörensen 2006). It is important to note that there is a general trend to identify caregiving with negative consequences (e.g., depression or anxiety). However, research has also shown that caregiving may be associated with positive aspects or outcomes for the caregiver, some studies reporting that up to 73% of caregivers identify one or more positive aspects related to caregiving (Cohen et al. 2002).

Sociocultural Stress and Coping Model

Although the Sociocultural Stress and Coping Model (Aranda and Knight 1997; Knight and Sayegh 2010) is an extension of the stress and coping models already mentioned, it is considered relevant to highlight it individually given the extensive research carried out showing the influence on the stress process of social and cultural variables, such as race, familism, or the cultural reasons why caregiving takes place (Pinquart and Sörensen 2005). According to this model (Knight and Sayegh 2010), there exists a common core model for different ethnic groups including

stressors and how these are appraised by caregivers, with higher appraisals of burden generating more negative psychological and physical health consequences. Ethnicity and/or cultural values seem to have an important influence on mediator variables such as use of coping strategies or social support. For example, cultural groups with a strong reliance on the family may perceive higher levels of social support than other groups that do not share a salient value of the importance of the family. However, it is also possible to find dark sides of the role of the family in the caregiving process, as perceiving the obligation to care and not seeking help outside the family due to culturally transmitted norms may contribute to caregivers' distress by reducing their chances of using adaptive coping strategies for such a demanding task (Losada et al. 2010). The inclusion of sociocultural variables in studies aimed at understanding caregiver distress is also necessary in order to develop interventions sensitive to the cultural values of specific groups of caregivers that may increase both their interest in participating in the intervention and the likelihood of strengthening the effects of these interventions for improving their quality of life (Gallagher-Thompson et al. 2003a).

Vulnerability or Diathesis Models

A substantial part of the explanation why caregiving is associated with negative consequences focuses on variables previous to the caregiving. Diathesis-stress models propose that negative consequences associated with caregiving result from a combination of prior vulnerability in the carer (personality factors, emotional disorders, etc.) and the stressful event that is caregiving. In this line, some studies show how people with a history of psychiatric disorders prior to caregiving were more likely to experience a recurrence of psychiatric problems after the onset of the care-recipient's illness, as compared to a control group (Russo et al. 1995). A study by Peter Vitaliano and colleagues (2014) shows that caregivers' distress could be partially explained through exposure to caregiving-related, genetic, and environmental factors (e.g., developmental history). Joling et al. (2015) provide longitudinal support for the fact that predictors of caregivers' anxiety and depressive disorders are not characteristics of the care-recipient (e.g., neuropsychiatric symptoms) but rather of caregivers' mental and physical health at baseline. Personality dimensions, such as neuroticism or optimism, may also act as predisposing variables that can increase or reduce caregivers' chances of suffering distress (Hooker et al. 1998).

Life Events Models

Caregiver stress can be the result of having to cope with major life changes or life events. Caring for dependent persons, especially those with dementia, involves coping with numerous potentially stressful life events, several of which can pose a threat to caregivers through the stress process. The moment of receiving a diagnosis, institutionalizing the care-recipient in a nursing home, or the death of the relative are some of the most distressing events that caregivers can experience. However, research on mental and physical health consequences once care-recipients are institutionalized in nursing homes or caregiving ends due to the death of the care-recipient is not conclusive, with mixed findings having been reported (Knight and Losada 2011). Distress reductions may be explained through reduction in the number of demands or exposure to stressors (e.g., behavioral and psychological symptoms of dementia) associated with the institutionalization of the care-recipient, while increase or maintenance of symptoms may be associated with factors such as feelings of guilt or increase in financial strains associated with institutionalization or unexpected death of the relative (Knight and Losada 2011).

Models with Major Emphasis on Interventions

Behavioral Models

Behavioral models such as the one developed by Peter Lewinsohn and collaborators (1974) highlight the importance that pleasant activities or leisure have on well-being, by increasing the number of positive experiences (positive reinforcers). Research has shown that engaging in

pleasurable activities reduces caregivers' feelings of depression and chronic stress (Thompson et al. 2002). In contrast, a reduction in the number of pleasant activities or an increase in the number of aversive activities (punishment rates) contributes to distress. As already mentioned, caregiving generates many demands for caregivers, and this means a restriction in the number of activities they get to do. Nieboer and colleagues (1998) developed a model for explaining changes in depression over time, testing the role of activity restriction in this process. Through this model they confirmed that the demands associated with caregiving bring about disruptions in caregivers' life activities, increasing their depressive symptomatology (Nieboer et al. 1998). High levels of activity restriction may also increase cardiovascular risk in caregivers (Ho et al. 2014).

Mausbach and colleagues (2011) have developed a model that considers together the effect of pleasant activities and activity restriction: the Pleasant Events and Activity Restriction (PEAR) Model. According to these authors, the combination of the two dimensions permits better detection of psychological distress than considering them alone. They found that caregivers who reported low frequency of pleasant events and high activity restriction were those who reported higher levels of distress and use of negative coping strategies, as well as lower personal mastery and self-efficacy for obtaining support. Empirical support for behavioral models based on pleasant activities and activity restriction has also been obtained through interventions such as the one developed by Dolores Gallagher-Thompson et al. (Gallagher-Thompson and Steffen 1994). More recently an intervention aimed at increasing caregivers' behavioral activation has shown that, compared with a control group, participants in a behavioral activation intervention showed lower cardiovascular risk, as well as lower levels of depressive symptoms at the end of the intervention (Moore et al. 2013).

Cognitive Behavioral Model

Cognitive Behavioral Models (CBT) give a central role in the explanation of distress to people's beliefs or schemata. These beliefs or cognitions are shaped by life experiences (e.g., cultural or family experiences) and determine the way the person perceives or interprets the world. One's emotional and behavioral responses are guided by one's way of thinking. Even though the literature analyzing the influence of caregivers' thoughts or beliefs is sparse, the available studies seem to support the association between dysfunctional thoughts or irrational beliefs and caregiver distress (Losada et al. 2010; McNaughton et al. 1995). CBT models also consider as central the link between thoughts and behavior. These models share with the behavioral models an endorsement of the importance of activities as a way of increasing the availability of reinforcers in caregivers' lives. However, CBT models consider that in order to promote the performance of pleasant activities by caregivers it is necessary to treat the cognitive barriers that prevent caregivers from doing such activities (Losada et al. 2006). For example, it is not uncommon to find caregivers who believe that asking for help is not a good way to cope with caregiving, because they are the ones that know best how to care. Also, doing pleasant activities without the care-recipient may be considered egoistic, and asking for help from one's children may not be considered an option because "they have their own lives and problems." In this context, CBT interventions include exercises for changing rigid thoughts such as those mentioned as a necessary step for promoting the performance of activities (Gallagher-Thompson et al. 2003b; Losada et al. in press). The strongest support for the cognitive behavioral model comes from the intervention literature, CBT interventions having been considered empirically based therapies for reducing caregiver distress (Gallagher-Thompson and Coon 2007).

The Third Wave of Behavioral Therapies

The so-called third wave behavioral therapies includes therapies such as Acceptance and Commitment Therapy (ACT), Mindfulness-Based Cognitive Therapy (MBCT), and Functional Analytic Psychotherapy (FAP). Although they involve clearly different interventions, they share an experiential style and highlight the importance of the context and functions of the problems.

For example, most caregiving intervention research (e.g., on cognitive-behavioral interventions) has addressed the issue of training caregivers in strategies for changing cognitions or behaviors that may increase their chances of coping better with caregiving. However, caring for a relative that has a chronic or deteriorating illness such as Alzheimer's is linked to stressors (e.g., cognitive deterioration), emotions (e.g., sadness), or thoughts (e.g., "why is this happening to me") that are often impossible or very difficult to change. Trying to change, avoid, or control these events may increase caregivers' distress; on the other hand, helping caregivers to accept them may increase their chances of coping in effective ways. Training in acceptance strategies and in commitment to personal values are two of the pillars of ACT interventions (Márquez-González et al. 2010). Interest in these types of therapies has increased enormously in recent years, and although the number of studies in the caregiving field is sparse, research suggests that variables such as experiential avoidance or cognitive fusion contribute to caregiver distress (Romero-Moreno et al. 2014b; Losada et al. 2014; Spira et al. 2007), while interventions involving Mindfulness (Whitebird et al. 2013) or Acceptance and Commitment Therapy (Losada et al. in press) seem promising in terms of their positive effects on caregiver distress.

Systemic and Interpersonal Models

There is a general consensus regarding the link between the family and interpersonal relationships in the immediate context and mental health problems reported by caregivers, and theoretical models based on the importance of the family in the caregiving process have been developed (Qualls 2014). Family structure and communication styles may contribute significantly to the generation of distress. For example, expressed emotion by caregivers, a variable that can increase the chances of interpersonal conflict, is predictive of negative care-recipient behaviors such as being uncooperative or angry (Vitaliano et al. 1993). Watching the suffering associated with the physical or cognitive decline of a loved one is also a mechanism through which caregiving generates mental or physical health effects in the caregiver (Monin et al. 2010). Adequate adaptation of the family to the changes that occur in their life due to caregiving, through the redistribution of roles or improved communication styles, for example, may be crucial to the management of distress (Qualls 2014). Mitrani and colleagues (2006) found that the inclusion of family functioning in a stress process model contributes significantly to the explanation of caregivers' distress: objective caregiving burden effects on distress were mediated by family function. Considering this, it is not surprising to find family-focused intervention therapies aimed at empowering families, balancing burdens of care, or facilitating the restructuring of family members' roles (Monin et al. 2010). The inclusion of other family members in therapy has also been suggested as an important factor in obtaining positive outcomes in caregiving interventions (Mittelman et al. 2004), and evidence has been found suggesting that family therapy (e.g., Structural Ecosystems Therapy) may reduce caregiver distress but should be complemented with technological resources that help such interventions respond to caregivers' individual needs (Eisdorfer et al. 2003).

Conclusions

The main contributions of the reviewed models is that they allow an understanding as to why similar stressful or demanding situations do not generate similar mental or physical health consequences in caregivers, and this suggests potential target variables for interventions. The availability of empirically supported models or theories such as those reviewed here may contribute to the identification of factors or processes of special interest or that are key to the development of interventions.

Even though there has been a considerable increase in the number and quality of studies carried out with caregivers, we agree with Peter Vitaliano and colleagues (2014), who stated that "despite 50 years of formal caregiver research, we still need to find optimal ways to identify caregivers at the highest risk for psychological distress." This issue is complicated by the fact that research has provided findings to suggest that the

effect of stressors may vary throughout the caregiving process and that events may be perceived as stressors at some points of the process but not at others. Furthermore, coping strategies that are successful for dealing with demands or stressful situations at certain times in the process may not be successful at others. Research is also required for improving our knowledge of the sources of heterogeneity within ethnic or cultural groups (Pinquart and Sörensen 2005). These issues show that there is a clear need for more methodological sophistication in the study of the variables that influence caregivers' stress and coping resources, which could come in the form of longitudinal and experimental designs, as well as assessment procedures for complementing the use of self-report measures (Knight and Sayegh 2010; Zarit et al. 2014).

Cross-References

- ▶ Behavioral and Psychological Symptoms of Dementia
- ▶ Challenging Behavior
- ▶ Stress and Coping Theory in Geropsychology

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Stress and Coping Theory in Geropsychology

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Synonyms

Strain – psychological or physiological distress; Stressor – environmental demand

Definition

Stress refers to person-environment transactions in which environmental demands outweigh the individuals' resources, resulting in psychological and/or physiological dysregulation.

Coping refers to effortful behavioral and cognitive strategies activated in response to actual or anticipated stressful situations that serve to regulate both the stressful context and its negative socio-emotional and physiological consequences.

Introduction

Stress and coping theory focuses on how people manage the adverse effects of stress (Lazarus and

Folkman 1984). People cope with stress in a variety of ways, depending on personal preferences and/or environmental demands (Carver and Connor-Smith 2010). Coping with stress is a dynamic process that may change from moment to moment, requiring reappraisal as to whether the stressor represents a threat, harm, or challenge, and whether there are sufficient resources to manage it. Therefore, stress and coping processes are not simply causal relationships between environmental threats and responses, but transactions between the individual and the environment.

The study of stress and coping is salient to geropsychology because stress is thought to accelerate the aging process due to the repeated activation of the stress response system across the life span (Seeman and Gruenewald 2006; Almeida et al. 2011; Dallman and Hellhammer 2011). Theoretically, coping strategies mitigate the adverse effects of stress and thus promote a longer health and life span, although most studies suggest that negative coping strategies, such as expressing hostility or religious alienation, increase the risk of mortality. The goal of this entry is to provide a basic primer on stress and coping and their health effects and then discuss how these process affect and are affected by aging.

Stress

Stress is defined as challenges or threats in the environment that tax a person's resources and may result in socio-emotional, cognitive, and physiological dysregulation (Lazarus and Folkman 1984). However, the effects of stress are not entirely negative and can be positive in both the short and the long term. Stress activates the physiological and cognitive resources necessary for dealing with environmental or intrapersonal demands. In the short term, stress can facilitate cognitive, psychological, or physiological functioning, as when individuals get "psyched up" to do well on a test or in an Olympic race. Dealing with stressors can also lead to long-term growth, if individuals develop better coping skills, which can to greater mastery for future stressors. However, extreme stress, such as trauma or chronic stress, can rapidly deplete an individual's resources, leading to physiological and psychological dysfunction.

As Aldwin (2011) noted, there have been three ways of defining stress: as physiological or psychological reactions, also called strain; as environmental demands or *stressors*; and as transactions between the person and the environment that result in appraisals of threat, harm/loss, challenge, or benign.

Physiological Responses to Stress

Physiological strain is characterized by the activation of neuroendocrine stress networks, which are highly conserved across species. These networks mediate responses between stressors and physiology through a cascade of neurochemical signals that function slightly differently depending on the duration of the stressor (Dallman and Hellhammer 2011), which can be categorized as immediate, short-term, and long-term stress response. The immediate stress response system is characterized by rapid activation of the neuroendocrine system resulting in direct enervation of various organ systems. For example, the acting of standing up requires an increase in blood pressure, partially mediated through direct neuroendocrine enervation of arteries and the heart muscle. With aging comes impairment of the catecholamine system, which results in problems such as orthostatic hypotension (a failure of blood pressure to increase quickly enough upon standing), resulting in dizziness. A slightly more sustained neuroendocrine response is mediated through the sympathetic adrenal medullary (SAM) axis that releases catecholamines (i.e., epinephrine and norepinephrine) into the blood stream. For example, being threatened by a dangerous animal requires a burst of energy to either fight the animal or to flee. Catecholamines provide this energy by stimulating increases in respiratory and heart rates and increases in blood pressure. However, catecholamines are toxic and long-term chronic elevations can result in serious harm and even death, as exemplified when individuals go into shock due to extreme stress.

Thus, longer-term stress responses are mediated through the hypothalamic-pituitary-adrenal (HPA) axis. The detection of a long-term threat sets into motion a series of neuroendocrine responses starting in the hypothalamus that leads to successive responses in the pituitary and then the adrenal cortex, where glucocorticoids such as cortisol are released into the blood stream after a few minutes. Glucocorticoids mitigate the harmful effects of the catecholamines and provide a different energy source by releasing glucose from the liver for use by the muscles and brain in order to galvanize an individual for the stress management over a long period. Glucocorticoids also moderate the immune system through the release of cortisol into the blood stream, although long-term activation of the HPA axis can also result in chronic inflammation.

Cortisol fluctuates in diurnal rhythms that are characterized by sharp increases in the morning, called the cortisol awakening response (CAR), which is then followed by a general decline throughout the rest of the day. However, age, personality, and contextual factors may lead to flatter rhythms and higher levels of cortisol across the day, which, if chronically elevated, can also be deleterious to an individual. For example, high levels of cortisol over long periods of time are associated with immune system dysfunction, hippocampal shrinkage, and cardiovascular disease (Almeida et al. 2011). In turn, chronic inflammation may contribute to a host of chronic illnesses in later life, including cancer, heart disease, diabetes, and dementia.

Stressors

Aldwin (2011) identified four basic types of stressors, based upon severity and duration: trauma, stressful life events, chronic role strain, and daily stressors or hassles.

Trauma. Traumatic events include violent or life-threatening situations, which hold the potential of severe harm or death. These include combat, traffic accidents, domestic violence, rape, and natural disasters, such as earthquakes or tsunamis. One example of the long-term outcome of trauma is posttraumatic stress disorder (PTSD) in which individuals may continue to present with the negative responses to a traumatic event and have altered physiology (e.g., dysfunctional cortisol levels) long after the event has ended.

Stressful life events. Stressful life events (SLE) are more common and include problems such as divorce, loss of a loved one, and job losses. Both SLEs and trauma are associated with long-term health consequences and dysfunctional stress responses. Aldwin et al. (2014) showed that older men who have chronically moderate or high levels of stress have about a 50% higher risk of mortality than those with consistently low stress levels.

Chronic role strain. Pearlin and his colleagues (2005) defined chronic role strain as enduring stress associated with major roles such as work, marriage, parenting, household maintenance, and chronic health problems. Role strain may be due to competing social roles, such as parenting, career, and caretaking for older relatives, which may lead to considerable distress. Currently, over 43 million Americans are providing care to older adults, and it is not surprising that caregiving, especially to physically or cognitively frail older adults, is a major source of chronic stress for many families (Knight et al. 2011).

Daily stress. Daily stressors, sometimes referred to as hassles, are challenges that arise out of everyday living (Almeida et al. 2002). Examples of daily stress include arguments with children, work deadlines, and the delays associated with commuting. Usually, daily stressors do not require major life changes in adaptation although these events may disrupt the normal rhythms of daily life. While traumatic events and stressful life events are known to affect physiology and mental health in the long term, daily stressors are associated with short-term physiological changes such as increases in cortisol levels and heart rate (Almeida 2005). However, the effects of daily stressors are not necessarily restricted to that day's well-being; Aldwin and colleagues (2014) showed that chronic elevations of hassles can also lead to elevated mortality risks. Not surprisingly, daily stressors are more common than SLEs and trauma; Almeida's review indicated that adults experience daily stressors 12 days within an average month (Almeida

2005). Nonetheless, cross-sectional studies suggest that middle-aged and older adults generally report fewer daily stressors than younger adults, but longitudinal studies suggest more complex patterns in exposure to daily stressors (see Aldwin et al. 2014).

Stress as a Transaction

For Lazarus and Folkman (1984), stress was defined as a transaction between environmental demands and individual resources. Stressful episodes, such as a car breaking down, may be simply a hassle for someone with the resources to fix the car, but a major crisis for a homeless person living out of the car and who simply cannot afford car repairs. Thus, how an individual appraises the stressfulness of the situation, and then copes with it, is not simply a matter of environment or personality, but a transaction between the two.

Lazarus and Folkman (1984) defined *primary appraisal* is an evaluation of the type of the stress, which can appraised as a threat, a harm/loss, a challenge, or benign (that is, not involving any stress). These are important distinctions because some people may appraise an event as threatening, while others may appraise the same event as simply challenging, thus leading to differences in how one manages the event and the steps he or she will take in the next step of appraisals. Sometimes circumstances may lead a person to more than one type of appraisal. For example, the death of a spouse may involve not only the appraisal of a loss but is also the threat to future financial or social well-being. *Secondary appraisal* is an assessment of resources a person has to manage the stress and thus indicates how stressful the event is to that individual.

Lazarus and Folkman (1984) hypothesized that personality affects appraisal processes, and recent research confirms this (Mroczek and Almeida 2004). For example, neuroticism is associated with a higher likelihood of experiencing stressors, responding more negatively to stressors, and higher levels of stress hormone production as a reaction to stressors (Miller and Pilkonis 2006). However, consistently appraising minor events, or hassles, as highly stressful is associated with increased risk of mortality, independent of neuroticism (Aldwin et al. 2014). Nonetheless, how individuals cope with stress may be more important to long-term outcomes than simple exposure to stress (Aldwin 2011).

Coping

Coping is rooted in the understanding that there are individual differences in how people manage stress. However, definitions of and approaches to assessing coping reflect different schools and theoretical assumptions. For example, early approaches from psychoanalysis assumed that adaptation processes were largely unconscious; in general, the evolution of coping theory has gone in the direction of greater flexibility and conscious effort.

Coping Theory

Defense mechanisms. Early psychodynamic theory focused on unconscious and protective defense mechanisms that were seen as attempts to alleviate internal conflicts arising from stress. Further, defense mechanisms were seen as both automatic and enduring aspects of an individual's personality. Defense mechanisms described by Anna Freud (1971) include denial, projection, and sublimation, among others. For Freud, defense mechanisms are inherently dysfunctional because they distort reality in order to decrease psychological threat.

In contrast, Vaillant (1977) found that patterns of defense mechanisms could become more adaptive as people matured. He examined long-term interviews with the Grant Study men, a major longitudinal study which has been following healthy Harvard male sophomores. Vaillant devised a widely used four-level hierarchy that indexed the developmental progression of defense mechanisms. Level I defense mechanisms were considered pathological and characterized by objective breaks from the actuality of a stressor. Level II included defenses such as passive-aggressive behavior, acting out, and projection. The defense mechanisms in Level III were considered to be neurotic and included intellectualization, disassociation, and

repression, which were thought to distort reality less than the defense mechanisms in the previous levels. Level IV defense mechanisms included sublimation and altruism, which were seen as the most mature coping responses. This view of defense mechanisms suggested that they address more than internal conflicts and can be used as strategies for engaging with external stressors. For example, a parent who cannot reconcile the death of a child may use denial or sublimation to convert unacceptable urges (revenge) into useful patterns of behavior, such as devoting time to a group like Mothers against Drunk Driving. However, Cramer (2015) noted that it was difficult to assess how well people used defense mechanisms because it is difficult to report on unconscious processes, casting doubts on the validity of self-report measures of defense mechanisms.

Coping styles. Coping styles theories were based on both social cognition and personality theory (Aldwin 2011). From a cognitive perspective, coping styles have traditionally been defined as either *avoiding* or *approaching stressors. Avoidance coping* diverts the focus away from stressors, which has also been referred to as suppressing or blunting. *Approach coping* refers to the cognitive process of information seeking to address a stressor and has also been referred to as sensitizing or monitoring.

Avoidance and approach coping were thought to inhabit opposite poles on a coping continuum. This polar relationship may have mapped easily on typical psychological scales and simplified coping measurement and therefore provided an attractive approach for measurement. However, more in-depth investigations revealed that coping was more complicated than polar structure styles suggested. People may use both avoidance and approach in reaction to the same stressor, either sequentially or for different aspects of the problem (Lazarus and Folkman 1984). For example, a woman may initially ignore a lump in her breast, but subsequently undergo a mammogram.

The concept of enduring coping *style*s posited that they are strongly related to personality characteristics. For example, Carver and Connor-Smith (2010) found that approach styles of coping were associated with conscientiousness, extraversion, and optimism. On the other hand, they found that neuroticism was linked to disengagement coping. The results of these studies showed that coping styles could be more nuanced than polar measures of coping styles imply. For example, the span of time between when a person uses coping and when they report that event affected how people remembered the how they coped with stress. Further, age and stressor severity influenced how people coped with stressful events. These results indicated that coping styles were more variable than early explanations of coping styles hypothesized.

Coping processes. Coping processes refer to effortful cognitions and behaviors activated in response to actual or anticipated stressful situations that serve to regulate both the stressful context and its negative socio-emotional and physiological consequences. Coping is thought to be plastic, or responsive to situational demands and personal preferences, as well as sociocultural influences. Note that both problem- and emotion-focused coping can be cognitive (e.g., making plans or re-assuring one's self) or behavioral (e.g., acting to directly affect a situation or using exercise to manage stress).

For Lazarus and Folkman (1984), coping processes reflect primary appraisals which indicate the type of threat. Secondary appraisal involves identification of resources, including coping skills, as well as the level of stress. This is a dynamic process which changes across time, coping efforts may influence stress appraisals (perhaps the problem is easier or more difficult than initially thought), which in turn can lead to modification in coping strategies. Rather than reflecting stable coping styles, coping is plastic, or malleable, and can change depending on variation in situational demands or across time. How one copes with a work problem may be very different from coping with a death of a loved one. Because coping is plastic, it is also open to change – people can and do learn more efficacious coping strategies, either through therapy, stress management interventions, or the experience that comes with age.

While there is little consensus as to the exact number of coping strategies used, five of the more commonly assessed coping strategies assessed are: problem-focused coping, emotion-focused coping, social support, religious coping, and meaning making (Aldwin 2011). *Problem-focused* coping is the process of taking direct action to manage and remove a stressor. Problem-focused coping can also include seeking new information or exploring new options for handling the stressor than one otherwise employs. *Emotion-focused* coping is the process of managing the emotional responses a stressor elicits, which are often negative. These responses can range from ignoring the problem to substance use. Emotion-focused coping is often associated with negative outcomes, especially if this approach leads to rumination, catastrophizing, or engaging in poor health behaviors to handle a stressor. However, Austenfeld and Stanton (2004) showed that emotional processing, in which one tries to understand why one has these negative emotions, may lead to more positive outcomes.

Seeking social support is characterized by reaching out for emotional support and instrumental support. *Religious coping* involves turning to God, a higher power, or one's religious community for support, either through intercessary prayer or for understanding and support. *Meaning making* involves cognitively reframing stressful circumstances to come to an understanding of trauma or loss. Meaning making often compels a person to contemplate the reality of a stressor much more deeply, which may lead to more pain in the short term but have positive and adaptive outcomes later on.

Thus, it is important to be able to distinguish between the more immediate outcomes as a result of coping and the outcomes of coping that lead to long-term growth. Coping processes appear to be unrelated from situation to situation, reflecting a flexible approach tailored to different circumstances. However, patterns of coping processes tend to cluster together when data on coping processes are aggregated over time (Ptacek et al. 2006). These results do not necessarily support a personality-based approach to coping as much as they suggest that adults are better at relying on strategies that have worked well in the past.

Finally, we tend to think of coping as something that individuals do, but coping is not solely a characteristic of the individual, but depends heavily upon contextual and social resources. Individuals, families, and other social institutions provide not only social support, but also influence how we appraise stress, what coping strategies are best suited to the situation, and can facilitate or provide barriers to effective coping.

Coping and Psychological Health

The effect of stress and coping on mental health is often a product of context and coping choices a person makes. This suggests that the psychological impact of stress and coping is highly variable between individuals, and possibly across ethnic groups. Jackson et al.'s (2010) provocative finding that African Americans who used poor health behaviors as ways of coping with stress, such as smoking and eating high calorie foods, had lower rates of depression than whites but higher likelihoods of poor physical health outcomes. Of course, this does not imply that psychologists and public health experts should promote poor health behaviors as coping choices, but it does illustrate the heterogeneity of relationships people can have with stress and coping and the importance of understanding context and individual differences as predictors of coping outcomes. Palliative strategies may be the only coping options when dealing with uncontrollable chronic stress.

Problem-focused approaches to coping are generally associated with better psychological health, and emotion-focused and support-seeking approaches to coping are associated with poorer psychological health (Aldwin 2011). However, coping outcomes can be more nuanced and have different effects depending on the circumstances. For example, a strong social network is usually associated with good mental health outcomes, but the act of reaching out to the network in times of need may lead to strained relationships and psychological distress. Similarly, Pargament's (Pargament et al. 2004) work shows that religious

coping is often associated with good psychological outcomes. However, negative religious coping, or religious alienation – e.g., blaming God or feeling deserted – can lead to a negative outcome if a person finds estranged from the congregation (Abu-Raiya et al. 2015).

Coping and Physical Health

How one copes with stress appears to be associated with physical health, yet conclusions as to the extent of these effects are somewhat mixed (Biondi and Picardi 1999). Some coping strategies are associated with direct effects on health, such as calming techniques that may lower blood pressure. Coping may also interact with a stressful event such that the coping strategy will have an effect on physiological outcomes only in the presence of a stressor. For example, calming oneself in a stressful circumstance may have significant effects on heart rate, but there may be little change when there is no stressor. Coping may also mediate between a stressor and health outcome. For example, a stressful experience may lead to a specific type of coping behavior, such as substance abuse, to blunt the emotional toll of a stressor, which leads to poor health. On the other hand, people may exercise when they feel stressed, which can lead to better health long-term health outcomes.

Some coping styles, such as defensiveness and repression, may be associated with higher levels of cortisol, but this association has proven to be difficult to reproduce. However, other data suggest that the effect of coping on the immune system can be very different depending on whether an individual uses emotion-focused coping or problem-focused coping. Patients who were positive for HIV that employed problem-focused coping tended to show increases in CD4+ cells, which are instrumental in immune system signaling but tend to be lower in HIV-positive patients. However, emotion-focused coping in HIV-positive patients was related to a reduction in immune response in an already besieged immune system, but other studies of individuals coping with cancer, e.g., Masters et al. (2009), have shown that emotion processing may be related to better inflammatory outcomes. Thus, how one copes with illness may be important for well-being and even survival. Given the increased prevalence of chronic illness in later life, stress and coping processes may be of even greater importance for older adults.

Stress, Coping, and Aging

The following sections will address how stress and coping processes are affected by age and the influence they may have on the aging process.

Stress and Aging

Whether or not exposure to stress changes with age varies as a function of which type of stress is being measured (Aldwin 2011). Thus, we will address age-related changes separately for the different types of stressors identified earlier. However, we will first preface our remarks with a general discussion of age differences in vulnerability to stress.

There is little doubt that, in general, vulnerability to *physical* stressors increases with age (Charles 2010). For example, older adults are particularly sensitive to heat stress and new viral and bacterial strains, in part due to changes in the neuroendocrine and immune systems with age, but also due to underlying chronic illnesses such as cardiovascular disease or diabetes which may make them more vulnerable. In general, it appears that older adults are more vulnerable to stressors in laboratory settings, such as being injected with adrenaline or doing stressful tasks. However, older adults appear to be less vulnerable in some field studies – they often report fewer stressors and rate problems as less stressful (Aldwin et al. 2014). Older adults may have learned to distance themselves from stressors, either through taking a larger perspective or as a means of self-protection from the adverse effects of stress. However, this protection may fail if the stressfulness of the situation is too high.

Trauma and aging. Younger adults often have a higher prevalence of traumatic events, which tends to be associated with unexpected death and physical and sexual violence (Aldwin 2011). Older adults report fewer traumatic events than

younger and middle-aged adults, but older American adults are more likely to report more trauma associated with combat. However, the experience of trauma tends to be more of a function of cohort than of age, especially in those countries that have experienced war and civil unrest.

Stressful life events and aging. Early studies assumed that older age is a difficult and stressful stage of life. However, older adults routinely report fewer stressors on standard inventories. Most SLE inventories are often comprised of items that are more common among middle- and younger-aged adults (e.g., concerns with children, getting married, new jobs). However, even inventories which are more relevant to older adults show longitudinal decreases with age (Aldwin et al. 2011). In general, the types of SLEs change with age, with young adults more likely to report SLEs such as divorce, education, job loss, while older adults are more likely to report deaths of loved ones, health problems, such as chronic illness, and caregiving stressors. Nonetheless, the number of life events tends to decrease with age, with the exception health-related stressors (Aldwin et al. 2011).

Chronic stress and aging. It is widely assumed that older adults are more likely to experience chronic stress than younger adults, due to health problems, restricted incomes, and caregiving duties. However, to our knowledge, there are no studies examining age differences in chronic stress. Younger adults may also experience chronic stress, such as taking care of a disabled child, poverty, adverse working conditions, and the like. Thus, studies are needed which examine both types and the level of chronic stress in adulthood.

Hassles and aging. There are considerable individual differences in longitudinal patterns of daily hassles (Aldwin et al. 2014). Self-reports of exposure to hassles are highly variable across time and may be more related to cohort and situational factors than due to aging itself. However, the intensity or appraisals of stress ratings of hassles has been shown to follow a clear age-related or developmental pattern, with stress severity decreasing from mid to late life and then increasing again in very late life. Perhaps older adult's greater experience provides perspective on the relevance of stressors, or it may be that their health conditions may worsen with stress (e.g., high blood pressure), and thus they have learned to appraise things as less stressful to avoid getting upset.

Appraisals and aging. There are age-related differences in some appraisals. Compared to middle-aged men, older men are less likely to appraise problems as challenges, but they are also less likely to report being annoyed by daily hassles (Aldwin 2011). Surprisingly, there are few age-related differences in the number of loss or threat appraisals. Thus, older men report fewer stress appraisals overall, which is, in turn, associated with lower reporting of stress ratings.

Summary. Clearly the relationship between stress and age is complex, varying by the type and severity of stressors. However, older adults may be adept at self-protective mechanisms, especially among those than are young-old (e.g., 65–75). In part, this may reflect survivor effects – men who consistently report moderate or high levels of stressful life events, or who consistently appraise their hassles as very stressful, are less likely to survive into late life (Aldwin et al. 2014). However, even for those who survive into very late life, those protective mechanisms may begin to fail, as indicated by higher stress appraisals among the old-old (75+). The increase in health problems and cognitive impairment and the decrease in functional health in very late in life may make it more difficult to cope with stressors.

Coping and Aging

Understanding age-related changes in coping is also complex. Early researchers thought that older adults were more passive copers (Gutmann 1974). For example, Folkman et al. (Lazarus and Folkman 1984) noted that older adults report fewer problem-focused coping strategies. However, there appears to be no differences in coping effectiveness between age groups (Aldwin 2011), and it is possible that older adults may be adept at conserving their resources while maintaining an equal sense of coping effectiveness as younger adults, suggesting greater efficiency. For example, a middle-aged person may address a fallen tree in the yard by assessing the problem and trying to mitigate it. That may mean spending all day chain sawing, disposing of the remains, and cleaning up

the shavings and bark left in the lawn – a very high level of effort. An older adult may be more likely to call a tree service to come and take the fallen tree away, which requires less expenditure of effort. So the older adult is technically using fewer problem-focused strategies, but is still efficaciously handling with the problem.

Other researchers have also identified positive aspects of older adults coping. As Vaillant (1977) indicated, older adults tend to use more "mature" defense mechanisms, allowing them to more graciously deal with stress. Older adults also use more religious coping, although it is unclear whether this is a cohort or an aging effect. Nonetheless, religious coping is often effective at staving off depression (Pargament et al. 2004). There are also indications that older adults may be more efficacious in coping with interpersonal problems (Berg and Upchurch 2007). They may be better able to regulate their own emotions and not accelerate or exacerbate interpersonal problems. We suspect that this may be part of a longer-term perspective. Older adults may understand the importance of maintaining good relations in general and become less upset over specific incidents.

Johnson and Barer (1993) studied coping among the very old (80+) in San Francisco and found that they utilized various strategies to avoid and/or minimize stress in their lives, including routinization and anticipatory coping. Most older adults in their sample had developed comfortable routines which minimized stress, such as eating the same thing for breakfast every morning or doing the food shopping at specific times every week. When faced with a new situation, such as going to an unfamiliar location, they would carefully plan out their route to avoid making a left-hand turn in big city traffic. They also used downward comparisons, acknowledging their own limitations, but using the problems of others to say that, "it could be worse." Thus, they used a variety of strategies to successfully maintain psychological and social functioning.

Conclusion

In many ways, asking the question, does stress and coping change with age, is too simplistic and does not address the substantial interindividual differences in intraindividual change. Further, the answer may vary by type of stressor and/or coping strategy. Nevertheless, we have found that, in general, stressful life events decrease with age, in part due to changing roles. Young people are more likely to get married, divorced, go to jail, etc., although older adults are more likely to report losses due to bereavement and health problems. But older adults also tend to appraise problems as less stressful.

Whether younger or older adults are better copers is also not an easy question to answer. On the one hand, older adults often expend less effort in problem-focused coping, which may seem to be more passive. However, this may actually conserve energy and reflect more efficacious coping. Older adults often have learned that many, if not most, problems solve themselves or can be helped to resolve with subtle encouragements. And there is much evidence to suggest that people use more mature defense mechanisms and are better at emotion regulation and perhaps at managing interpersonal conflict. But not all individuals develop these more sophisticated and nuanced coping strategies, and those with cognitive impairment may have a particularly difficult time managing the environment and regulating their emotions.

It is likely that stress can accelerate the aging process and that older adults are more vulnerable to the negative effects of stress. However, older adults have learned various strategies to avoid and/or minimize stress in their lives, including routinization, anticipatory coping, and taking a broader perspective. Older adults may have also learned what types of coping strategies are effective for them and becoming more efficient copers and achieving goals with less expenditure of energy. Thus, coping with stress can mitigate the harmful effects of stress and is an integral part of both optimal aging.

Cross-References

- ▶ Aging and Psychological Well-Being
- ▶ Mental Health and Aging
- ▶ Psychological and Personality Testing

▶ Resilience and Health
▶ Strength and Vulnerability Integration
▶ PTSD and Trauma

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Stress and Well-Being: Its Relationship to Work and Retirement for Older Workers

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Synonyms

Effort-reward imbalance; Job demand-control

Definition

Well-being is defined as the overall mental and physical health of the individual. Work is defined as paid employment. The term 'older workers' is generally defined as those aged 50 and over, although studies sometimes use the term to refer to individuals of State Pension Age only.

Introduction

Understanding the health and well-being of older workers, and the influence stress may bear on this relationship, is currently an important issue. In response to increasingly aging populations, governments in many developed countries are seeking to increase the age of pensionable retirement to retain as high a proportion of the older population as possible within the workforce in order to overcome the financial and economic burdens arising from older people living healthier lives and therefore spending longer periods in retirement and in receipt of pensions. However, while encouraging longer periods of workforce participation may be of benefit to some older people, there is a high likelihood that extending the working lives of those employed in occupations which are characterized by high levels of stress will lead to a worsening of mental and physical health for those with existing issues or the onset of poorer health among those without.

In addition to the need to extend working lives for economic purposes, evidence consistently suggests that there are benefits to continuation of the working role in later life in terms of health and well-being, financial circumstances, and social integration. Role continuity theories promote the idea that continuing employment may provide a means of promoting good mental well-being by remaining socially productive, feeling valued, having adequate financial security, and maintaining social networks useful for both support and resources. Similarly, these theories suggest longer periods of work help combat the negative effects of role loss in later life, which bring about reductions in social identity, support networks, and feelings of purposefulness. However, again, while some occupations may easily lend themselves to the provision of these personal, social, and economic benefits for workers, others may not, and people continuing to work without these benefits are unlikely to observe any benefit of remaining in the workforce for longer periods of time.

Little is known about the effects of working in general in later life on the health of older people. Previous studies examining relationships between employment and well-being among older populations have produced mixed results, with some suggesting it might be beneficial to well-being, others that it is detrimental, and some that there is no significant relationship. There are many factors which are likely to be contributing to this variation in results, including definitions of "later-life employment" and "retirement" and the wide range of health and well-being outcomes, as well as the various means of measuring them covered by different studies. Studies which consider older workers as a homogenous group are likely to be masking effects which might be observed if workers were stratified on the basis of personal or workplace characteristics. Interestingly, when work is stratified on the basis of measures of stress, results consistently show a negative relationship between employment bearing characteristics of high-level stress and various well-being outcomes, and occupations which are characterized by low levels of stress are consistently associated with better health and

well-being. Additionally, the stress of work in later life has been shown to influence well-being not only in the period of later life employment itself but also across subsequent periods of transition into retirement as well as within early retirement. This work will outline some of the key evidences highlighting these associations and discuss the mechanisms through which work-related stress in older age potentially impacts the well-being and health of older people.

Theoretical Models of Stress at Work

Research concerning the relationship between stress and work across the entirety of the life course has focused on two key theoretical frameworks, both of which aim to reduce the complexity of common workplace interactions into key elements which may have subsequent consequences on health and well-being outcomes. The first of these frameworks uses the demand-control model (Karasek 1979), which refers to the levels of "job strain" to explain the relationship between the working environment and health. The second key framework uses the more recently proposed effort-reward imbalance model (Siegrist 1996) to demonstrate the importance of societal reciprocity within the role of a worker as a means of maintaining good emotional well-being across the working life course and beyond.

The Demand-Control Model

The job demand-control model aims to explain the relationship between work stress and well-being in terms of the balance between workload and the ability of the worker to handle this workload. The ability of workers to successfully manage their workloads by means of the opportunity to make decisions about the completion of job tasks is associated with positive workplace-based effects in terms of reduced job strain and higher job satisfaction, both of which in turn have beneficial effects on emotional well-being and subsequently on aspects of well-being which may affect the worker both in- and outside of the workplace.

The demand-control model breaks employment down into four key groups on the basis of the balance between workload and control over workload and considers the effect these differences in balance may subsequently bear on well-being. The model proposes that the worst effects on emotional well-being are observable among those with "high strain" jobs characterized by high workload demands and low control over meeting these demands. The individual experiences increased mental distress which subsequently impacts on physical health through the mechanism of increased cardiovascular tension which increases the risk of further detrimental health outcomes (Karasek 1979). Conversely, individuals with high work demands but also high levels of control to manage these demands see better well-being, probably because these workers are those in good occupational grades and managerial positions with adequate resources to handle their workloads.

The Effort-Reward Imbalance Model

Critics of the demand-control model focus on the ambiguity of what may comprise the concepts of "demand" and "control," with difficult workloads potentially characterized by either too small timeframes in which to complete high frequencies of tasks or tasks which are too challenging for the current skills of the worker. Additionally, control may be measured both in terms of the level of decision a worker has over how to handle his workload and his level of learned ability to deal with tasks in an organized and timely manner (Siegrist et al. 2004). Additionally, the model focuses on aspects of work which are specific to the workplace, rather than on aspects of work which may influence the circumstances of the individual outside of the working environment. In response to this, a more recently proposed framework of understanding the effects of occupational stress focuses on the idea of an effort-reward imbalance model (Siegrist 1996). The effort-reward imbalance model builds on the idea that the role of the paid worker is central to adult life and on the notion of social reciprocity on which paid employment is based. Social reciprocity is measured in terms of financial reward, self-esteem, career development opportunities, and job security ("gains") offered adequately in return

for the effort made in completing the tasks required within the working role ("costs"). The model then proposes that imbalances in these costs and gains lead to emotional distress and impair successful self-regulation, which in turn lead to a higher susceptibility of the worker to further problems with both emotional and physical well-being. These negative effects are likely to be observed the most among workers who suffer lower levels of reciprocity but who are considered "overcommitted" to their job, encompassing a personality-based individual variation within the effect of imbalance on working populations. The effort-reward imbalance model might be especially relevant to older populations if it is considered that older workers are more likely to find certain types of work more physically and mentally effortful and to experience fewer opportunities for promotion, role alteration, or alternative employment if desired, all of which demonstrate examples of an imbalance between effort and reward.

Although the effort-reward imbalance model draws on the relationship between stress and health in terms of the occupational circumstances subsequent to the level of effort or demand required to be put into tasks at work, the reliability of the model may benefit from its inclusion of occupational-related concepts such as salary and job security, which are likely to influence an individual's well-being in realms outside of those concerning work. For example, levels of salary have subsequent effects on the living conditions of individuals which then further impact on well-being. So, while negative effects of the demand-control model might be limited to time spent within the workplace, negative effects as specified by the effort-reward imbalance model are likely to radiate to wider areas of the individual's life and therefore offer more persistent and stronger effects on health and well-being. However, both models are useful in identifying a group of workers who are likely to be most adversely affected by work circumstances such as low control and low reward (Siegrist et al. 2004), and as will be discussed in the following section, the literature has found significant associations between these workers and poorer levels of a range of health and well-being outcomes.

Empirical Evidence

The majority of recent research into the effects of employment-related stress on the well-being of older workers and retirees draws heavily on the two aforementioned models of work stress. However, definitions of work stress are diverse, and observational data used to conduct such research may be limited in the ways in which it allows the researcher to measure stress at work. While many datasets contain measures to specifically compose scales of demand-control and effort-reward imbalance, this piece additionally considers research which examines well-being on the basis of work stratified by measures of stress such as occupational type, occupational grade, and worker satisfaction, all of which have been shown to demonstrate associations with imbalances between control and demand or effort and reward.

The relationship between stress and work and retirement can be considered from two perspectives. Firstly, work-related stress can be considered as a driver out of the workforce and into retirement, often due to stress-induced poor levels of health and well-being. Secondly, it can be considered in terms of its effects on well-being among the older workers who are still employed in stressful environments as well as on the well-being of the older people who have retired from them.

Stress as a Driver of Workforce Exit

Evidence has demonstrated that work-related stress impacts older individuals' decision to leave the workforce early, often because of negative impacts on health and well-being. Siegrist et al. (2007) found an imbalance between effort and reward to be an independent predictor of intention to leave the workforce prior to normal retirement age even after controlling for health problems and physical disabilities which are often considered to have the strongest impact on the decision to take early retirement. Similarly, Elovainio et al. (2005) examined imbalances between job demand and control and again

found these to be significant predictors of early retirement. Furthermore, the relationship between poor demand-control balance and the intention to retire early strengthened with age and was particularly prominent in individuals aged 45 and over.

Another means of measuring stress in the workplace is by means of physically demanding tasks which older individuals might especially struggle to cope with. Banks and Casanova (2003) find a greater propensity for those in physical or heavy manual work to expect to have left the workforce prior to reaching the age of 65 due to disability or health limitations, and a survey by Humphrey et al. (2003) found 11% of men and 16% of women took early retirement because their work had become too physically demanding to manage.

Older people are also likely to be driven into retirement because of mental stress in the workplace. Barnes et al. (2004) found older people were more likely to decide to leave the workforce early because they found their jobs mentally more difficult to manage in their later working years, as a result of both increased time pressure brought about by company restructuring or changes within their own ability to manage tasks and workloads as they became older. Similarly, the aforementioned survey by Humphrey et al. found 8% of both men and women took early retirement because their jobs had become too mentally stressful.

The Relationship Between Stress, Work, and Well-Being

Research which has looked at the associations between work stress and health and well-being has found detrimental effects to exist across the life course on a variety of health outcomes including cardiovascular disease (Bosma et al. 1998), coronary heart disease (Kuper et al. 2002), poor mental health (Pikhart et al. 2004), self-reported health, and type 2 diabetes (Marmot et al. 2006). As mentioned beforehand, although research concerning effects of work among older populations in general provides mixed results, research which recognizes that work should be stratified on some measure of its quality consistently finds the relationship between higher levels of work stress and well-being observed in midlife to persist into older age. In consideration of the effort-reward imbalance model, McMunn et al. (2009) found paid workers of state pension age (SPA) and over reported higher life satisfaction and quality of life as well as fewer symptoms of depression than those of the same age who were not in work, as long as they felt well reciprocated in terms of effort and reward. Older people who felt poorly reciprocated for their efforts saw no significant differences in well-being than older people who were not in the workforce. Similarly, Matthews et al. (2015) used a sample of workers and retirees of SPA and over matched on the basis of their background characteristics and found those who felt poorly reciprocated for their work had significantly higher levels of depression than both those who worked in well-reciprocated employment as well as those who had taken normal retirement at SPA. Similarly, those who continued to work in well-reciprocated employment saw significantly better self-reported health than those in poorly reciprocated work and those who had taken normal retirement. These findings have important implications for policymakers raising SPA as they suggest retirement would be more beneficial to the well-being of older people than the continuation of work which is stressful in nature. Volkoff et al. (2010) focused on the demand-control model of work stress and found that older workers with the highest levels of time pressure combined with the lowest control over the way in which they could manage their high workloads had the highest prevalence of several health disorders, including sleep disorders, experience of pain, and ability to recover from illness or injury. These workers also experienced stronger feelings of discouragement within the workplace. De Jonge et al. (2000) explicitly compared the demand-control and effort-reward imbalance models of stress and found that high levels of effort-reward imbalance were stronger predictors of poor mental and physical well-being outcomes than low levels of job control to deal with high demands. However, the study also accounted for level of worker commitment and found overcommitted workers with high demands and low control saw the poorest well-being outcomes.

This is consistent with Siegrist's (1996) notion that overly committed workers are likely to experience the strongest negative effects on well-being when there is a mismatch between reward and effort contributed to work-related tasks.

The National Statistics Socio-Economic Classification (NS-SEC) is another means of measuring work stress which relates to the notions implied by the effort-reward imbalance model on the basis of the inclusion of employment characteristics including levels of autonomy and control in the workplace, job security and salary, and the availability of opportunities to further one's career. On the basis of these characteristics, employment types can be described as one of three broad categories (each of which incorporate a range of smaller occupational descriptions): managerial and professional occupations, characterized by high autonomy and control, good job security, and good career prospects; routine occupations, characterized by low autonomy and control, poor job security, and fewer opportunities for career development; and intermediate occupations, which lie somewhere in between. Sacker et al. (2005) found those in routine occupations suffered poorer self-reported health than those in managerial and professional occupations and that differences in health widened with age, so that at age 21 there were no health differences, yet at retirement age the differences were at their greatest. The poorest health was observed among those who had worked in routine occupations throughout adult life, and effects were smaller if the individual's employment in routine occupations was preceded by time spent in occupational types characterized by lower levels of stress, suggesting the effects of work stress are accumulative over the life course and should be considered from a life course perspective. Similarly, Chandola et al. (2007) used NS-SEC and found people from lower-grade occupations saw faster declines in physical health over time than those in higher-grade occupations. For example, the study demonstrated that a 70 year old who had worked in a high-grade occupation prior to retirement saw similar physical health characteristics as that of a 62 year old who had worked in the lowest grade. The study also found that mental health improved after retirement for all occupational groups, although the rate of improvement was lower for those from the lowest grades than for those from higher grades.

Warr et al. (2004) examined well-being on the basis of individuals' role preference and found those in work with a preference for being in the workforce had higher life satisfaction and affective well-being than those who would rather have been out of work. However, well-being was found to be a function of the working environment rather than just of role membership, and better well-being was observed among those with better control over their work as well as among those with better work-related environmental circumstances, such as job security, financial position, and social networks.

Finally, work stress may be measured by the level of physical activity involved, and this may be particularly relevant in terms of older workers who are likely to demonstrate lower levels of physical functioning ability than younger workforce members and so find occupations characterized by high levels of physical or manual labor particularly stressful. Among older populations, jobs characterized by heavy manual or physical labor might be particularly prone to imbalances between both demand and control, where the individual may struggle with the physical ability necessary to manage his workload, and between effort and reward, where the individual may feel his efforts to carry out physically demanding work are not particularly well reciprocated by means of salary and job security. Often, workers in manual employment are lower skilled and less able to experience promotion or move to alternative employment types despite worsening physical health (Siegrist et al. 2004). A study by Tuomi et al. (1991) used the level of physical activity included in individuals' occupations as a measure of work stress and found that older men in more physically demanding jobs had poorer health and higher disability mortality rates.

The Relationship Between Stress, Retirement, and Well-Being

Again, research which has examined the impact of work-related stress on the retirement experience

of older people consistently demonstrates associations between jobs characterized by higher stress and poorer well-being in retirement and, conversely, jobs which are less stressful in nature and better well-being. Westerlund et al. (2009) used markers of occupational grade, psychological and physical stress, and job satisfaction to determine individuals' working conditions and found the prevalence of suboptimal self-reported health decreased after retirement for all workers apart from those who retired from the highest conditions. Additionally among older people in poorer working conditions, the prevalence of suboptimal self-reported health increased at a faster rate prior to retirement than after despite the fact that suboptimal health is commonly associated with increasing age, suggesting retirement provides a substantial relief of the stress brought about by poor working conditions. Another study by Marmot et al. (2006) found civil servants from the lowest employment grades had more than three times the mortality risk than those in the highest grades before retirement and again that after retirement the impact of occupational grade on mortality lessened and became smaller than the impact of other social measures. Mein et al. (2003) found civil servants who retired from higher occupational grades saw a significant improvement in mental health thereafter, but those from lower occupational grades did not, suggesting the potential beneficial effect of retirement from stressful work on well-being is possibly counteracted by poorer financial circumstances limiting activities available during retirement.

Discussion

Both the demand-control and effort-reward imbalance models outline the means by which mismatches between certain aspects of workplace characteristics can impact negatively on mental well-being and, through physiological stress responses, subsequently on other aspects of health, and the literature in the field provides plenty of evidence that this is the case. However, it is important to understand the mechanisms through which stress impacts on well-being and the ways in which these mechanisms might vary among different groups of older workers, not only throughout the later periods of employment but also over the transition into retirement and into the retirement period itself thereafter. If policies to extend working lives and retain as high a proportion of older people in the workforce as possible are to succeed, they need to be based on a knowledge of how different workplace stressors and characteristics are likely to both positively and negatively affect the health and well-being of the older workforce.

The evidence provided by the research outlined in the previous section of this work demonstrated the means by which work-related stress can lead to both early workforce exit and detrimental effects on health and well-being outcomes. Additionally, although the key models of work-related stress focus on imbalances of either demand and control or effort and reward, job stress might also be characterized by work which is too physically or mentally demanding in nature. Although not explicit measures of control or reciprocity, often in these instances, imbalances between control over workload and the gains received for commitment to physically difficult work are likely to be prominent. Overly physically demanding work is likely to be a form of workplace stress that is detrimental to the health of older workers in particular, and older people participating in such jobs are the most likely to have the intention of taking early retirement or actually exit the workforce before state pension age (Humphrey et al. 2003). Furthermore, increasingly physically demanding work among older populations might be particularly detrimental to both physical and mental well-being outcomes for two key reasons: Firstly, if it is considered that those who have worked in manual employment throughout adult life are more likely to have acquired disabilities or health problems as a result of their work, it may be considered that continuation of this type of employment in later periods of life will only exacerbate existing issues. Secondly, considering older people in manual employment are the most likely to want to leave the workforce early (Banks and Casanova 2003), when it is not

possible to do so, for example, because state pension age has not yet been reached and the individual cannot afford to take earlier retirement, the individual is likely to experience negative effects on both mental and physical well-being as an effect of the forced continuation of work which is difficult to carry out.

One of the key points to emerge from the literature is that individual well-being in later life is likely to be associated with the experience of stress over the life course, rather than specifically at the time retirement age approaches. The aforementioned research by Sacker et al. (2005) showed self-reported health to be poorest shortly before retirement age among those who had continuously worked in occupations characterized by higher stress levels, while those who had experienced periods of less stressful employment prior to entering a stressful occupation reported better outcomes as they neared retirement age. This idea is further backed up by the finding within the same study that there were no significant differences in self-reported health between those in high and low stress occupations at age 21, again suggesting the negative effects observed among those who have worked in stressful environments to be the result of cumulative stressful experiences. Similarly, the aforementioned increased rate of early labor market exit observed among those in manual employment due to limiting illness and disability suggests cumulative negative effects on health occur among those who participate in physically demanding work in earlier periods of their lives. This idea is strengthened again by the finding by Chandola et al. (2007) that physical health deteriorated faster among those in lower-grade occupations than among those in higher-grade occupations.

Furthering the life course perspective on the associations between older workers and retirees in relation to stress, there is evidence to suggest that participation in jobs characterized by higher levels of stress is the result of social inequalities which often stem from childhood and persist throughout adult life. This idea is furthered by work by Dannefer (2003) which states that lifelong employment in good quality occupations and circumstances is usually preceded by high educational attainment which in itself is often associated with higher social status in childhood. Furthermore, as better health is observed across the life course among those with higher incomes and better social positions (Marmot and Shipley 1996; Chandola et al. 2007), this cumulative advantage of higher quality and less stressful work can persist into older age. Those who have worked in lower stress occupations are also those who are more likely to either benefit from prolonged periods of employment in later life, as well as those who are able to enjoy better well-being in retirement due to having a level of health and financial security which allows pursuit of meaningful and enjoyable activities in place of the paid worker role.

Conclusions

There is increasing importance in understanding the effects on health and well-being of the working environment as state pension ages rise to accommodate the financial burdens brought about by aging populations. Previous research into work-related stress among older people consistently finds detrimental effects on a range of well-being outcomes among those working in stressful occupations. This association is likely to persist across the life course and throughout the transition into retirement, as well as during retirement itself.

Cross-References

- ▶ Affect and Emotion Regulation in Aging Workers
- ▶ Motivation to Continue Work After Retirement
- ▶ Work to Retirement

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Structural Neuroimaging in Geropsychology

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Synonyms

Brain Imaging; Imaging; Radiology

Definition

In vivo radiological examination of tissue, including the brain, for the purpose of identifying structural health and disease states.

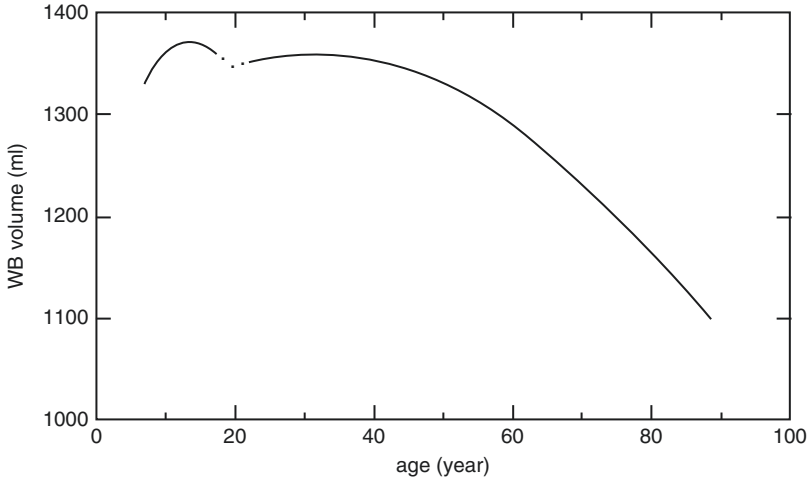
Older adults are vulnerable to a variety of neurological and neuropsychiatric disorders in which diagnosis is facilitated by contemporary neuroimaging. With clinical presentations, magnetic resonance imaging (MRI) and other imaging techniques can assist in clarifying etiology, progression, and severity of neuropathological states. Given that early and accurate diagnosis is critical to optimizing treatment, imaging is increasingly being used to expedite diagnosis and to rule out other CNS-related conditions or to provide a baseline, since in the beginning of symptom onset for disorders in the elderly, the initial symptoms may be subtle. The following section of this *Encyclopedia* will provide discussion on the role of imaging techniques in older adults, with a particular emphasis on normal aging, acquired brain injury, and dementia.

Understanding the utility of neuroimaging among older adult populations first requires a discussion of the natural morphological changes that occur as healthy individuals age. Early development consists of a steady rate of increases in brain volume, whereas by early adulthood, overall brain volume has reached its apex, which thereafter is associated with a steady rate of brain volume loss (Hedman et al. 2012). As shown in Fig. 1 from a meta-analysis of neuroimaging studies on brain volume and aging, a steady decline becomes rather evident by midlife. Some of this volume loss can be associated with cell death and cellular morphological change. Beginning at the fourth decade of life, adults inexorably experience myelin sheath deterioration, leading to a reduction of white matter volume. Concomitantly, there is also an increased gray matter loss, which is more responsible for driving the overall volume reduction (Mukherjee et al. 2002).

Figure 2 compares magnetic resonance imaging (MRI) linking age-related brain changes from childhood, adolescence, and early and older adulthood with a healthy nonagenarian that can be visualized on a brain MRI. What is distinctly viewable across the age span shown in Fig. 2 is the cortical sulci (the furrows on the surface of the brain) widen and the ventricular system enlarges. The ventricles are filled with cerebrospinal fluid (CSF) and are under pressure. Brain tissue, referred to as the parenchyma, prevents the ventricular system from expanding. Thus, as parenchymal volume is lost, whole-brain CSF increases leading to ventricular expansion and visible changes within the sulci and cisterns of the brain. In a practical sense, this means that every brain has to be assessed in reference to so-called age-typical "normal" aging.

The importance of the "normal" appearance of age-related changes as visualized in a scan is that "normal" atrophy is part of the natural aging process. Atrophy that is beyond what would be expected for someone given their age may implicate an underlying degenerative or some other disease process. For example, compare the two images in Fig. 3, one is from the coauthor (EDB) at age 67 compared to a 67 year old with probable Alzheimer's disease (AD). Note in particular the hippocampal atrophy associated with AD compared to the author's control brain.

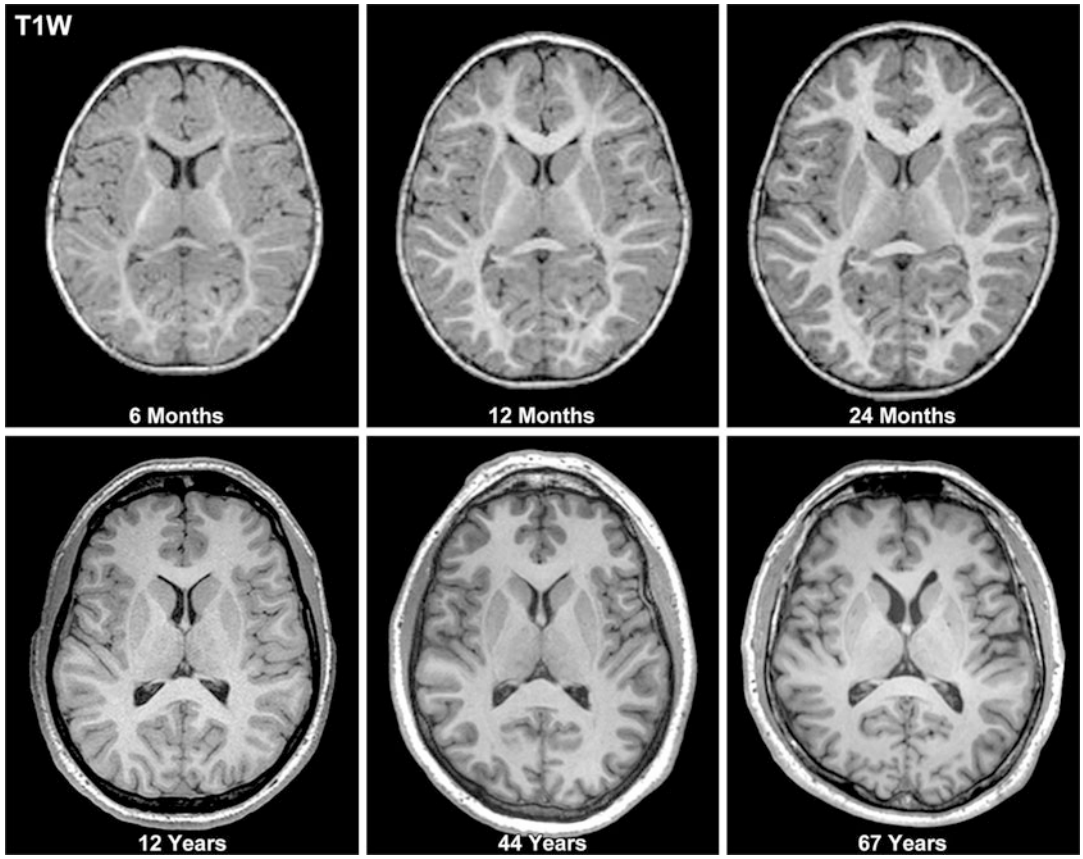
As shown in Figs. 1 and 3, current MR technology provides excellent image resolution that mimics gross anatomy with the T1-weighted



Structural Neuroimaging in Geropsychology, Fig. 1 Image was derived from a meta-analytic study of brain volume by Hedman et al. (2012). Whole-brain volume is plotted by age in this life span view from age 4 through 88. The curves are dashed around age 18–21, indicating the uncertainty in this area, since only few data were available for fitting this age range. Two separate fits were calculated for the younger (<19 years) and older (>19 years) group. Regardless of the unevenness of the earlier developmental data due to lack of consistent studies, by early to mid-adulthood, there is general stability in brain volume followed by an inexorable decline. See Fig. 2 for actual visualization of these changes

image. Current automated methods of image analysis also use the T1 image for computational purposes to derive volumes, surface area geometry, thickness, and shape/contour measures. In addition to the T1 anatomical sequence, from a pathology distinction, the other standard MR sequences including the fluid-attenuated inversion recovery (FLAIR), gradient-recalled (GRE) sequence or susceptibility-weighted imaging (SWI), and a T2-weighted sequence constitute the core clinical MRI studies typically performed. There are other MR sequences involving water diffusion especially important in assessing stroke and tumor patients, as well as diffusion tensor imaging (DTI) along with various methods for examining blood flow and contrast infusion, although these are not performed unless there is a specific referral to run such MR sequences.

The T1 images up to this point have focused on a general overall appearance of the brain from a gross anatomical perspective, but the FLAIR sequence is very helpful in identifying white matter pathology with the GRE/SWI sequences sensitive in detecting certain kinds of vasculature lesions. For example, a reduction in white matter integrity is a normal part of aging and in fact accounts for reduced cognitive efficiency among healthy adults (Voineskos et al. 2012). In addition, normal aging is associated with significant microvascular changes that mitigate physiological and cognitive functioning and results in reduced cerebral blood flow and vascularization of brain parenchyma (Steketee et al. 2016). In the age-typical MR FLAIR sequence, abnormal white matter signals in the form of white matter hyperintensities (WMHs) begin to increase in appearance after the fourth decade of life (Hopkins et al. 2006). While some white matter pathology may just be the normal cost of the aging process, in the presence of vascular disorder, ischemic changes disproportionately affect deep white matter because the penetrating vessels that feed these regions constitute the most distal aspect of the cerebrovasculature and are therefore prone to microinfarction. Excess WMHs, as shown in Fig. 4, is a pathological indicator. When indicators of hemosiderin deposition with brain parenchyma are identified with GRE/SWI sequences, these are objective indicators that hemorrhage has occurred. The presence of WMHs and/or microhemorrhages has been associated with greater likelihood of being associated with

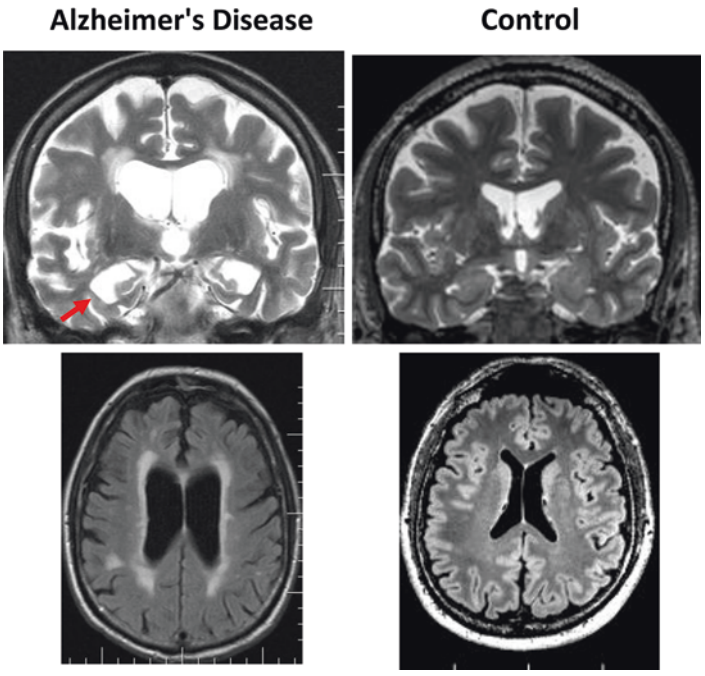


Structural Neuroimaging in Geropsychology, Fig. 2 Visual changes in the axial view of a T1-weighted MRI scan taken at the level of the anterior horns from age 6 months to 66 years are depicted (The *top images* are from Vardhan et al. (2014) and reprinted with permission)

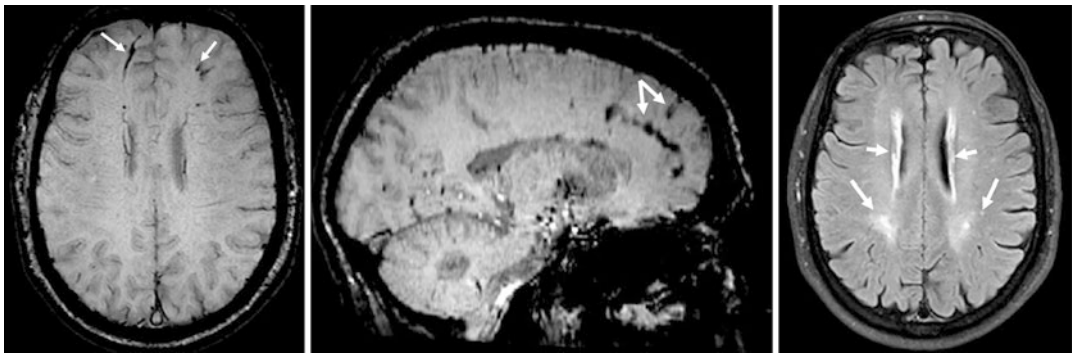
neurocognitive and neurobehavioral deficits (Wiegman et al. 2014).

Older adults also experience widespread cortical gray matter reduction with normal aging, which also impacts cognitive functioning (Thambisetty et al. 2010; Fleischman et al. 2014). As shown in Fig. 1, the rate of brain atrophy increases with age (Hedman et al. 2012), which is reflected in a reduction in cortical thickness. A most important image analysis advancement in the last decade is the automated image analyses, including measuring cortical thickness (Bigler 2015). These quantitative techniques for measuring thickness can be applied to any region, like in Fig. 5 that shows the changes in entorhinal cortex over the life span (Hasan et al. 2015). Entorhinal cortex is critically involved in processing short-term memory and affected by many disorders, including Alzheimer's disease and TBI, and such quantitative imaging can be helpful in differentiating brain health from disease processes in clinical populations.

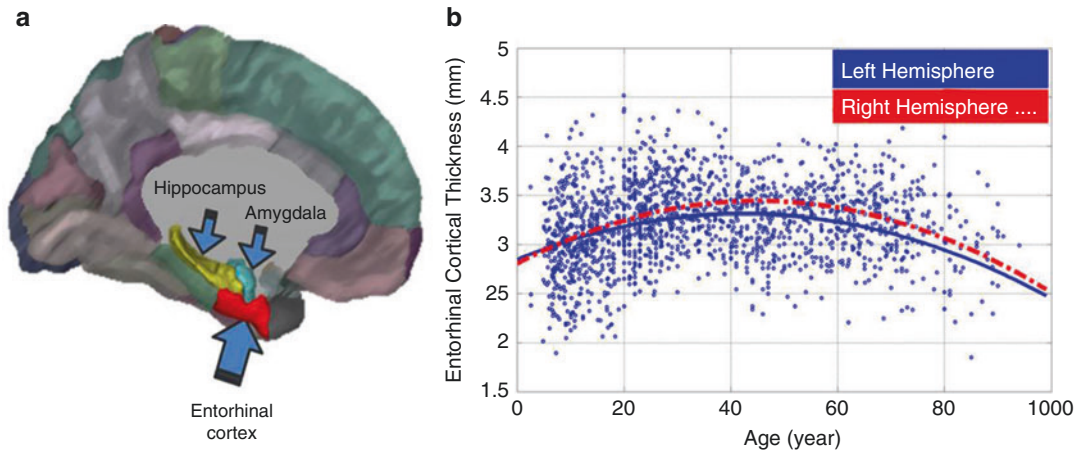
The fastest and most common brain imaging method is computed tomography (CT) which capitalizes on x-ray beam technology and tissue density to reconstruct an image of the brain. Because a CT scan can be completed within a few minutes from the time the patient is positioned in the scanner to when images are ready for interpretation, it is a quick screening method for detecting coarse brain pathology. In emergency departments, the CT is often relied upon because of its speed and disorders like brain tumor and stroke can be quickly ruled out.



Structural Neuroimaging in Geropsychology, Fig. 3 The image on the *left* is a T2-weighted coronal MRI through the hippocampus in an 83 year old diagnosed with Alzheimer's disease. This patient also had a history of cardiovascular disease and hypertension, and the axial fluid-attenuated inversion recovery (*FLAIR*) sequence shows extensive white matter hyperintensities characteristic of microvascular disease. The images on the *right* are from a healthy 67 year old. *Red arrow* points to dilated temporal horn of the lateral ventricular system and hippocampal atrophy. Note in the control the fullness of the hippocampus tends to fill the temporal horn



Structural Neuroimaging in Geropsychology, Fig. 4 The *left* (axial) and *middle* (sagittal) images depicted multiple hemorrhagic lesions from sustaining a severe TBI based on susceptibility-weighted MRI. Note in the sagittal image the depth of the hemorrhagic pathology in the frontal white matter. Some of the hemosiderin deposition may be due to sluggish venous return and dilated vessels also assumed to be the result of the TBI. The image on the *right* shows generalized white matter pathology. This TBI patient who had been injured approximately 2 years prior not only suffered from the severe traumatic injury to the brain but also extensive blood loss and hemorrhagic shock, which may have contributed to the white matter abnormalities

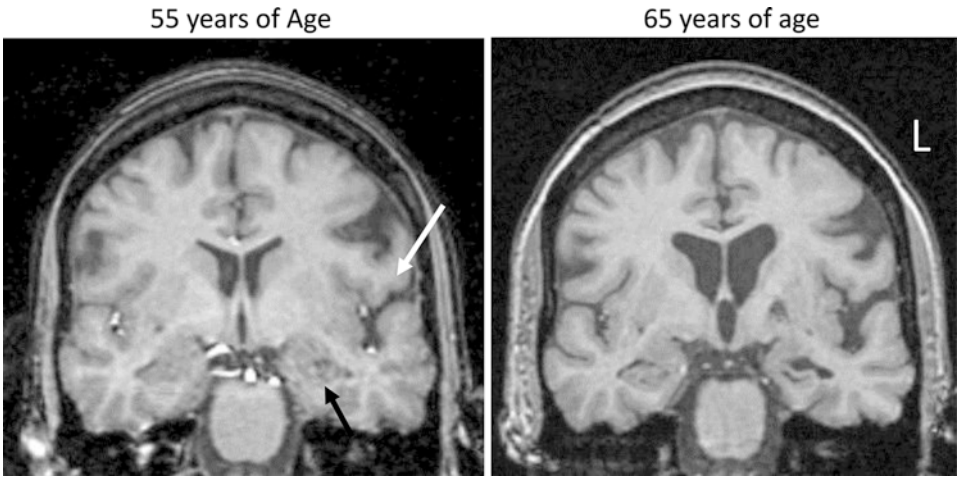


Structural Neuroimaging in Geropsychology, Fig. 5 The image shows the region of the entorhinal cortex, how it can be identified using advanced quantitative neuroimaging techniques, and how the entorhinal cortex changes with age. By knowing the normative size of the entorhinal cortex, comparison can be made with any individual who may be having symptoms of medial temporal lobe pathology, such as memory impairment (Reprinted with permission from Hasan et al. (2015)

The limitation of CT is considerable, the most prominent being the lack of anatomical detail compared to MRI and CT's lack of sensitivity to certain types of pathologies. However, CT can be adapted for use in several functional neuroimaging techniques including fluorodeoxyglucose positron emission tomography (PET) and single-photon emission computed tomography (SPECT). Both of these techniques examine the uptake of a radiotracer, used to infer if metabolic activity is reduced, such as occurs in degenerative damage or infarction, or heightened, as what might occur at the site of seizure activity. Both CT and MRI can be adapted to examine the vasculature of the brain and various types of blood flow measures. Of particular importance for neuropsychology are the MR-based techniques that are capable of detecting blood oxygen level-dependent (BOLD) changes, such that regional differences in brain activation may be identified during certain cognitive tasks. Currently, this procedure is used most in preoperative cases to best outline regions related to cognitive processes that, if possible, should be avoided during surgical intervention.

Clinical research has examined whether imaging can differentiate between normal aging, mild cognitive impairment (MCI), and more advanced states of dementia. As mentioned above, normal aging is associated with natural changes in both white and gray matter integrity and volume. Monitoring the rate of volume loss over time is one clinically meaningful approach to differentiate illness from normal aging. Specifically, a dementia process would have an accelerated rate of volume loss relative to non-symptomatic older adults (Thambisetty et al. 2010). In addition, the pattern of atrophy can help delineate different etiologies (i.e., Alzheimer's disease will have a different atrophy pattern relative to Lewy body dementia, frontotemporal dementia, etc.). For example, the case presented in Fig. 6 shows a 55-year-old female with onset of mild complaints of failing memory and language and her baseline scan, which was interpreted by radiology as within normal limits for her age. However, after a 10-year follow-up, there are clear differences, with temporal lobe atrophy, including hippocampal atrophy, more prominent cortical sulci, and ventricular enlargement. The patient's diagnosis is complicated at this stage because of sepsis and probably mild anoxic injury, but the clinical presentation appears to be FTD and the patient continues to be monitored.

Those with AD pathology will show differentially increased atrophy involving the



Structural Neuroimaging in Geropsychology, Fig. 6 In her mid-50s, this patient began to display cognitive and behavioral changes that raised the suspicion of behavioral variant of frontotemporal dementia. As seen in the image on the *left*, beginnings of left prominence of the Sylvian fissure can be visualized (*white arrow*) with some early changes in the hippocampus (*black arrow*). A decade later the differences are more apparent; there is ventricular dilation and rather profound hippocampal atrophy on the left. This patient's history is complicated by also experiencing an ischemic infarct in the left globus pallidus

hippocampus and entorhinal context relative to other forms of dementia, such as dementia with Lewy bodies (DLB). There is also evidence for serial MRI that the rate of atrophy is increased in AD compared to DLB (O'Brien 2007). When diagnosis in unclear, the use of PET and/or SPECT appears to increase the sensitivity and specificity when comparing AD to other dementias (O'Brien 2007; Palmqvist et al. 2015). The use of MRI is also often used to distinguish vascular dementia from healthy individuals and those with other dementias. That is, those with vascular dementia will often show cerebrovascular disease as seen from multiple infarcts or widespread white matter disease. This is shown in Fig. 4, using the FLAIR MRI sequence. There are limitations to the use of MRI to diagnosing vascular dementia in that there is no consensus on the degree of white matter damage required to warrant a diagnosis, but the combination of prominent white matter pathology on MRI and neuropsychological indication of cognitive decline or frank impairment is the best current indicator (Prins and Scheltens 2015). There is also the observation that white matter damage as seen on MRI does not necessarily correlate to clinical outcomes and that other disease states often present with white matter damage as well, so by itself white matter pathology is but a nonspecific finding in neuroimaging.

Imaging is able to distinguish AD from frontotemporal dementia (FTD) based on areas and patterns of atrophy; AD typically presents with bilaterally atrophic medial temporal lobes, whereas FTD will present with an anterior to posterior progression of atrophy to both frontal and temporal regions, often beginning unilaterally. Furthermore, there are now PET labeling techniques that assist in making the diagnosis of Alzheimer's disease and other dementias as well as the level of progression of the disease (Mattsson et al. 2014). The use of SPECT and PET demonstrates that FTD is often distinguishable from AD due to a unique pattern of hypoperfusion to frontal and temporal regions (O'Brien 2007). Voxel-based morphometry has been used to demonstrate frontal and anterior temporal lobe gray matter reduction in individuals with possible and probable behavioral variant frontotemporal dementia (bvFTD) relative to controls. Notably, even individuals classified as pre-bvFTD are differentiated from healthy controls in volume to the left superior temporal gyrus, the left medial frontal gyrus, and the right insula (Borroni et al. 2015). Imaging has also been

useful in identifying other rare degenerative processes with unique MRI markers including Huntington's disease, Creutzfeldt–Jakob disease, progressive supranuclear palsy, corticobasal degeneration, and multisystem atrophy (O'Brien 2007).

MRI studies consistently demonstrate that pathological changes occur in the brain even before illness onset. Specifically, MRI has been used to demonstrate that individuals with no cognitive complaints or subjective memory complaints but normal cognitive testing already show signs of atrophy similar to a pattern of atrophy seen in Alzheimer's disease (Peter et al. 2014). In fact, multiple studies have now demonstrated that a pattern of atrophy unique to Alzheimer's disease is seen volumetrically several years before the onset of clinical symptoms. In one longitudinal design (Tondelli et al. 2012), 148 healthy and cognitively normal older adults were measured at baseline and then later stratified by onset of either amnestic mild cognitive impairment (MCI) or Alzheimer's disease (AD). Here, all subjects were assumed to be healthy at baseline because researchers screened out those that were symptomatic four years after enrollment to ensure that subjects did not progress to clinical diagnosis shortly after enrollment. In this study, voxel-based morphometry demonstrated that relative to individuals who remained healthy after 10 years, those who later converted to either preclinical AD or MCI had a reduced gray matter density at baseline with a pattern of atrophy similar to that seen in AD.

Similarly, visual and volumetric analysis of atrophy to the hippocampus of individuals with amnestic MCI can be predictive of conversion from MCI to AD (Fleisher et al. 2008). In one longitudinal study of 130 patients with amnestic MCI, researchers used volumetric and surface morphometry analysis to examine the hippocampus over a three-year period. Relative to controls, researchers found that individuals with MCI had significantly reduced hippocampal volume and that those with reduced volume to the hippocampus and entorhinal cortex were more likely to convert to AD, even when controlling for demographics and cognitive functioning (Devanand et al. 2012).

In summary, although there are limitations, neuroimaging continues to be a powerful tool in both research and clinical settings, especially among older adults, who are uniquely vulnerable to acquired injuries and disease states. Imaging tools provide assessment of biomarkers that allow for early identification of disease, differential diagnosis, and longitudinal monitoring of brain health. Imaging has also provided a greater understanding of how disease states, such as AD and other dementias, develop and progress with time. As the general adult population continues to age, more research will without questions lead to additional advances in geropsychology and treatment of older adult populations.

Cross-References

- ▶ Age and Time in Geropsychology
- ▶ Cognition
- ▶ Encephalopathy
- ▶ History of Biomarkers in Geropsychology

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Subjective Age and Work

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Synonyms

Age identity; Cognitive age; Personal age; Psychological age

Definition

Numerous measures exist, yet there is little consensus on the definition of subjective age (SA). Subjective age, unlike chronological age, is a multidimensional construct that reflects how old a person feels and into which age group a person categorizes himself/herself (Kleinspehn-Ammerlahn et al. 2008). It is a self-perception of age, and common to most definitions is the notion of how hold or young individuals experience themselves to be (Montepare and Lachman 1989). According to the pioneering work by Kastenbaum et al. (1972), subjective age is a person's sense of age based upon: (1) the reflection of their own development and their interpretation of aging or how old an individual feels, looks, and acts, (2) with which age cohort the individual identifies, and (3) how old the person desires to be (Kaliterna et al. 2002). More recently, Diehl and associates conceptualize

subjective age as a specific form of self-knowledge and a part of the processes and conditions of the aging self (Diehl 2006).

Measures of Subjective Age

Kastenbaum et al. (1972) suggested subjective age largely reflected two components including how old a person looks and how old a person feels, assessed initially with single items. This was later expanded to four dimensions, leading to an often-used method of measuring SA, which was influenced by Barak (1987) and based on Kastenbaum et al.'s (1972) four dimensions of how they feel, how they look, how they act and behave, and what interests they have. Barak labeled this measure "cognitive age," and it has repeatedly demonstrated high levels of reliability (Barak 2009).

Although these four dimensions are important, most SA measures do not necessarily reflect all four dimensions. Rather, SA is often measured in various ways; in particular, using single-item assessments that reflect a global measure, multiple items which are intended to assess a single dimension and more recently multiple items that assess and reflect multiple dimensions or factors.

One-item measures. Single-item measures of SA are simple and straightforward, such as items that ask "What age do you feel?" or "Would you say that you feel young, middle-aged, old, or very old?" (Barrett 2005; Cleveland and Shore 1992; Cutler 1982) or using a single item that required employees to rate whether they feel younger, middle age, or older (Cleveland and Shore 1992). Single-item assessments of subjective age continue to be encountered in the research literature today. These items ask one of the following: (1) to specify in years how old respondents feel most of the time and then compute difference scores with actual age (Barnes-Farrell and Piotrowski 1989; Barnes-Farrell and Rumery 2000; Barrett 2003, 2005); (2) to specify what age do [they] feel, or what age do [they] feel most of the time, within a specific time frame (e.g., during the last year or month), or (3) how old individuals experience themselves to be with respect to various psychological, physical, and social attributes (e.g., a lot younger than my age; Montepare 1991, 2006).

Multiple item/dimension measures. One multi-item measure is a 47-item assessment of personal aging experience that includes items relevant to subjective age (Steverink et al. 2001). These items refer to both positive and negative statements regarding aging in a number of life domains (e.g., health, personality, social contacts). Two pilot studies showed that the 47 items reflected three factors: physical decline, continuous growth, and social loss. These findings reinforce earlier conceptualizations of subjective as a multidimensional construct (Steverink et al. 2001). This measure supports Keller et al.'s (1989) structure of subjective age.

Drawing from Levanthal's self-regulation model of health and illness, Barker and colleagues (2007) developed a multidimensional assessment of aging perceptions. In this model, illness is viewed as a stressor, and people's perception and response to this stressor affects subsequent health and longevity. These illness perceptions have a number of facets including time-bound stressors and responses, consequences, and control. The Aging Perceptions Questionnaire (APQ) incorporates this approach and consists of 32 items reflecting seven dimensions: two timeline dimensions perceptions of aging (timeline-chronic and timeline cyclical); two consequence dimensions (positive and negative); two control dimensions (positive and negative); and a seventh, emotional representation that refers to negative emotional reactions to aging. Sexton et al. (2014) developed a short version of APQ, which combined negative control and negative consequences and eliminated the timeline cyclical dimension thereby yielding a 17-item, five-factor model.

Subjective Age at Work. Rioux and Mokounkolo (2013) argue that subjective age at work is a separate construct from general subjective age. Their study also revealed subjective age at work to be a better predictor of certain outcomes related to work, such as satisfaction with professional life. Their measure includes items assessing specifically how old individuals feel, look, or act when they are at their workplace.

Other measures have taken similar approaches by assessing how old an individual feels in comparison with their work group (Cleveland and Shore 1992).

Related Constructs and Measures

Subjective age is, of course, related to many other age constructs. Examining these relationships helps to shed light on the precise meaning of subjective age.

Age identity, Psychological age, and Cognitive age. Age identity has been used interchangeably with subjective age. However, Kaufman and Elder (2002) suggest that age identity consists of four dimensions including subjective age, desired age, perceived old age, and desired longevity, with a related study tapping subjective age, other age, desired age, and perceived old age. Barak et al. (2001) suggest that age identity is a measure of cognitive age. Other researchers have assessed subjective age identity using subjective age scales (e.g., Montepare 1996; Montepare and Clements 2001).

Awareness of Age-Related Changes (AARC). Both AARC (Diehl and Wahl 2010) and successful aging (described below) are two constructs that are enjoying increasing attention in the age and aging literature and may reflect superordinate constructs of which subjective age, age identity, and so forth are subsumed. Diehl and colleagues posit that subjective age is a facet of self-knowledge. Awareness of age-related changes refers to all the experiences that a person encounters (e.g., own behaviors, level of performance or life experiences) that make him/her aware that his or her life has changed as a result of growing older.

Successful Aging at Work. A related construct is successful aging at work (e.g., Kooij 2015; Zacher 2015) and draws upon Baltes and Baltes' (1990) work on successful aging in general and extends this important work in important ways. Although its concrete meaning, assumptions, and underlying process remain unclear, successful aging refers to the conditions of the person and situations where an individual obtains a maximum satisfaction and happiness (Birren 1958; Havighurst and Orr 1955; Zacher 2015). Success can be generally defined as the securement of desired and favorable outcomes. Rowe and Kahn's (1987, 1997) conceptualization of successful aging represented a significant milestone in defining and research of this concept, and they define it as including three largely objective outcomes including a low probability for disease and disability, continued high physical and cognitive performance, and engagement in social and constructive activities. Importantly, Zacher (2015) recently proposed that successful aging at work should have the following four elements: (1) a focus on both subjective and objective outcomes relevant and important to individuals and context; (2) focus on testing intraindividual age-related changes in success aging criteria over time and across life/work span; (3) investigation of age-related mediators, and (4) description of any positive (work) outcomes of older people/employees, regardless of the age-related processes and conditions that lead to an outcome (Zacher 2015).

Often successful aging is measured using both semiobjective assessments including health indicators and more subjective mental and emotional assessments. For example, Freund and Baltes (1998) used subjective well-being, positive emotions, and absence of loneliness as measures. Further, Kotter-Grühn and Hess (2012) used aging satisfaction as a measure of successful aging.

Theoretical Frameworks

Historically, the construct of subjective age has been theoretically underdeveloped (Diehl et al. 2015), and this may have led to the generation of numerous related terms including psychological age, age identity, self-perceptions of aging, attitudes toward aging, and cognitive age. Further, in the early research on subjective age, there were few instances where subjective age was linked with life span development or human development. However, numerous aging theories can and have contributed to our understanding of subjective age including (1) Bronfenbrenner's (1994) bioecological model; (2) selective optimization

with compensation theory and socioemotional selectivity theory (SST/SSC); (3) stereotype embodiment theory; and (4) life span and life-course theory.

Ecological model. Bronfenbrenner's bio-ecological model is an example of a biopsychosocial approach to aging and is an excellent organizing framework for understanding subjective age. According to this model, individuals learn, change, mature, and age by their interactions with multiple ecologies or environments. Four levels are identified in the model: microsystem, mesosystem, exosystem, and macrosystem. Perhaps the two most influential systems in terms of affecting SA are micro- and macrolevels. In terms of shaping SA, the individual's direct interactions with an environment are most influential in shaping SA. These include proximal processes (e.g., family, work) and influence the self-directed attitudes about aging held by an individual, including how satisfied the person is with his or her own aging process, and the awareness of becoming older.

At the mesosystem and exosystem levels, subjective aging is affected through interactions between two or more microsystems (e.g., family system and health care) with the latter involving at least one system that does not directly include the individual (e.g., availability of healthcare services information on aging and quality level of physician training). Finally, the macrosystem level includes each of the previous three systems (micro, meso- and exo-) and encompasses broad age stereotypes and values assigned to "being old," which may be widely held by members of a particular culture (sociocultural perspective on age stereotypes; Hummert 2011), including cultural structures and social policies.

Selection, Optimization, Compensation, and Socioemotional Selectivity Theory. The selective optimization with compensation (SOC) model conceptualizes how people cope with age-related changes, adapt throughout their lives, and use strategies to maximize potential for successful aging. The theory emerged from the gain/loss dynamic within life span development. This is the process of how humans both grow (gain) and decline throughout the aging process (e.g., Baltes 1987).

The SOC theory has three main parts that encompass the gain/loss relationship for successful aging: (1) strategic *selection* of focusing one's resources and adapting in terms of contexts, outcomes, and goal structures, which is important because it directs a person's behavior based on their hierarchy of goals, necessary because one's resources are often limited; (2) *optimizing* potential by maximizing the gains possible, and (3) *compensating* for losses (Baltes and Baltes 1990; Freund and Baltes 2002; Baltes 1997). The socioemotional selectivity theory (SSC) focuses upon the premise that as one ages, her/his perception of time shifts (e.g., Carstensen et al. 1999). Among younger people, the future seems more distant than among people who are older; therefore, motivations and goal seeking vary between these groups. For example, younger people are more likely to invest in the future, while older individuals may focus upon enhancing current relationships and events. SSC recognizes that these social interaction goals will not only shift throughout the life span due to distinct time limitations at hand, but the selection of goals will change as well. For example, younger people will be more motivated to have knowledge-related goals, while later in life, as they age, emotion-related goals will be more important. Further, an older person is more likely to reduce their social interactions with new acquaintances while increasing time with people who are more emotionally meaningful to them.

Although both SOC and SST have been primarily assessed in relation to chronological rather than subjective age, the approaches may apply to subjective age in terms of predictions, growth and maintenance orientation, as well as an open future time perspective.

Life Span Development. The life span development perspective of aging is concerned with the development of changes across the life span and is not one particular theory; many orientations are connected with these ideas and encompass the approach. Baltes and colleagues rooted their research deeply into the life span perspective (Baltes 1987; Baltes et al. 1980, 1992). They have put forth a number of propositions about the nature of aging. These propositions include

assumptions that (1) major differences occur among normal, pathological, and optimal aging; (2) course of aging shows much interindividual variability (heterogeneity); (3) old age shows much latent reserve capacity; (4) range of reserve capacity or adaptivity shows loss with increasing aging; (5) with age, the balance between gains and losses becomes increasingly negative; and finally, (6) the self in old age remains a resilient system of coping and maintaining integrity.

Accordingly, the age individuals perceive themselves to be (subjective age) involves the experience of time along multiple dimensions – including life-course transitions. The life span perspective illuminates variation across and within life stages by identifying developmental processes and age triggers that drive age identity (Diehl and Wahl 2010). The life-course perspective highlights other temporal issues including social, cultural, and historical factors that influence developmental processes and shape age-related patterns in subjective age.

Stereotype embodiment. An emerging prominent psychosocial theory that provides one explanation for the development of subjective age is the stereotype embodiment theory (Levy 2009). Research has shown that among older individuals, negative age stereotypes held earlier in life predicted poorer health (Levy et al. 2009). Based on a series of experimental and longitudinal research, Levy proposed that age stereotypes (1) become internalized across one's life; (2) may be activated and influential unconsciously; (3) develop greater influence or salience as they become more self-relevant (as a person ages); and (4) can influence expectations through psychological, behavioral, and physical means (e.g., via multiple pathways).

Antecedents and Outcomes of Subjective Age

Subjective age is a complex psychological construct and does not always systematically reflect changes in chronological age. One can more fully understand the concept by explicating the antecedents and outcomes of variations in aging perceptions.

Antecedents

To begin, there are general categories or perspectives behind explaining the most salient antecedents associated with subjective age. These more commonly are psychological factors, the social context, or a combination of both (Berg 2007). The first perspective, psychological, is comprised of research supporting the notion that personal factors (e.g., financial stability, personality, cognitive factors) and perceptions are the main antecedents of subjective age. For instance, Arnett (1998) contends that social events do not dictate the way one perceives youth; it is their psychological state. In other words, according to this perspective, the way someone feels about their stage (e.g., financial stability) in life is going to be more indicative of their age perceptions rather than the actual events or roles themselves. It has been shown that subjective age is influenced by certain psychological variables such as life satisfaction (Chua et al. 1990), internal locus of control (Hubley and Hultsch 1994), and so on. Also, within this perspective, it has been shown that certain personality characteristics (i.e., openness to experience) serve as predictors of subjective age irrespective of socioeconomic and health-related variables (Canada et al. 2013).

Many researchers consider health to be an individual difference driving age perceptions, thus falling into this psychological perspective. There is no doubt that many health variables (e.g., general health, physical health, functional health, mental health) and stress are related to subjective age differences (e.g., Bergland et al. 2014; Chua et al. 1990; Kotter-Grühn et al. 2015). Petery (2015) tested the directionality of these health variables and found health to be both an antecedent and an outcome of subjective age. She specifically found that health was an antecedent for subjective age in people older than 50, but not for those younger than 50 years old. Previous research has examined that certain stressors early in life (e.g., sexual abuse, financial hardship) influence subjective aging (e.g., Turner et al. 1999; Johnson and Mollborn 2009). In addition, subjective health perceptions are central predictors of subjective age more than many other influential predictors such as SES and/or education (Barrett 2003; Mutran and Burke 1979).

The second perspective, the social context, is mostly concerned with the environment around the person (e.g., the workplace) and the social roles people hold. Within this perspective, it is surmised that life events and social roles are the most important antecedents to subjective age (Mathur and Moschis 2005). Life events could include moving out of the house, having children, or transitioning into retirement, and these have been shown to influence age perceptions (e.g., Benson and Furstenberg 2003). It is important to note that social interactions are complex and these antecedents might not be consistent across different cultures. For instance, it has been shown that those in Western cultures will have younger age perceptions than those in Chinese cultures (Chua et al. 1990). Additional research is needed on this topic.

It is also important to consider the workplace as a domain that can provide a great deal of influence over age perceptions. Kunze et al. (2015) examine what aspects of the organizational context lead to changes in employees' subjective age. They concluded that perceived meaningfulness of work could shape age discrepancies for workers. In other words, when employees have high work-related meaning, they are more likely to benefit from experiencing a lower subjective age (Kunze et al. 2015) when age-inclusive HR practices are present. In addition, they found that average relative subjective age was negatively related to average individual goal accomplishment in companies, which in turn is related to company performance.

The third perspective acknowledges that both psychological and social variables together play a role in predicting subjective age. Shanahan et al. (2005) highlight that there are social variables and personal qualities that can influence age perceptions. For instance, there are social roles (e.g., being a parent), social domains (e.g., with friends, at work), and traditional transition markers (e.g., marriage) that interact with personal differences (e.g., cognitive maturity) to impact subjective aging.

Finally, chronological age (CA) is a significant predictor of subjective age. Along with one's health, CA shows a stronger relationship with SA than any other predictor (Cleveland and Shore 1992; Mathur and Moschis 2005), with correlation coefficients between 0.44 and 0.81.

Outcomes

The subjective age of a person also relates to certain outcomes inside and outside of work. Within a sample of shift workers from a large manufacturing organization, older subjective age was associated with higher perceived stress at work and lower reported presence of support mechanisms (Barnes-Farrell and Piotrowski 1991). A study by Bobko and Barishpolets (2002) found increased physical tiredness in Ukrainian workers with an older subjective age, and workers with a younger subjective age generally reported better physical ability to work; the difference between felt age and chronological age was also related to self-ratings of stress factors. A younger subjective age is also related to the self-perception of achieving higher work performance and less tiredness after work days (Iskra-Golec 2002). Furthermore, Kaliterna et al. (2002) found that workers with a younger subjective age can feel more capable of mastering the mental, physical, and social demands of certain occupations. Organizations that employ workers with a younger subjective age have more beneficial performance if the company operates in a dynamic environment (Kunze et al. 2015). Rioux and Mokounkolo (2013) differentiate between general subjective age and subjective age at the workplace. They contend that both are linked to higher satisfaction with professional life, but specifically an older subjective age at the workplace is also linked to higher attachment to the workplace.

Segers et al. (2014) conceptualized a framework for age perceptions at work, called the Age Cube of Work. It has not yet been empirically tested, and the main purpose of the Age Cube of Work is currently to generate empirical questions regarding work and aging. The Age Cube includes a dimension capturing important work context variables (i.e., job, team, organization, industry, and country). Although it has been demonstrated that subjective age has been studied briefly in the workplace, much additional research is still needed to fully examine all relevant job related variables and outcomes (e.g., retirement timing).

Subjective aging has mostly been studied outside of the work context. The extent to which a person feels younger or older as her/his actual chronological age has shown to influence health outcomes. Barrett and Toothman (2014) found that a younger age identity is generally related to better health (i.e., if you feel young but are chronologically older, that is a predictor of positive health outcomes). Bowling et al. (2005) reported similar results in regard to both physical and psychological health and functioning. Furthermore, their study revealed that participants with a younger subjective age indicated higher self-efficacy and tended to rate their quality of life higher than participants with a lower subjective age. Additionally, Boehmer (2006) examined subjective age in cancer patients and found that patients who reported a younger subjective age, or feeling as old as they really were, perceived themselves to have higher health-related quality of life than patients who felt older than they really were. In another study, Boehmer (2007) also found that cancer patients with a younger subjective age indicated higher satisfaction with recovery after their surgery, as well as a lower perception of personal disability. These results indicate that subjective age is a relevant factor when considering the healing and recovery of people who are fighting with illness.

Other health outcomes of subjective age relate to mental health and depressive symptoms. Choi and DiNitto (2014) found that an older subjective age can have a negative effect on depressive symptoms, and Keyes and Westerhof (2012) demonstrated similar results by confirming that a younger subjective age is related to the increase of flourishing mental health and a decrease in major depressive episodes. Furthermore, a younger subjective age can lead to higher levels of subjective well-being, which is characterized by life satisfaction and positive affect (Westerhof and Barrett 2005). It has also been shown that a younger subjective age and therefore feeling further from death can lead to lower psychological distress (Shrira et al. 2014), and it has also been shown to lead to lower levels of C-reactive protein (CRP). CRP is associated with some physical functional limitations and quicker cognitive decline (Stephan et al. 2015b); a younger subjective age therefore has positive effects on physical and psychological health.

Other outcomes of a younger subjective age include a higher intention to perform physical activities (Caudroit et al. 2012). Also, Stephan et al. (2013) achieved improved physical functioning measured by grip strength by inducing a younger subjective age in their participants. Teuscher (2009) found correlations between a younger subjective age and higher optimism, self-efficacy, and general satisfaction. Stephan et al. (2015a) also found that people with demonstrated accelerated subjective aging had steeper and nonnormative declines in the personality traits Extraversion and Openness. Participants with slower subjective aging on the other hand showed typical patterns of decline of these personality traits. People with an older subjective age had less tendencies to be sociable, energetic, and enthusiastic. Depending on the age group though, an older subjective age can also have advantages. First-year university students can benefit from an older subjective age in regard to positive and negative affect, particularly students with vulnerable self-esteem. Students with a higher subjective age may report higher positive affect and more self-enhancement and protection against threats to psychological well-being (Fang and Galambos 2015).

While there are several outcomes of SA, it is also important to consider that some of these are mediated by the social status older people hold in society due to their age (Marques et al. 2015). There is a negative relationship between age identification and health in countries where people of older age are devalued in terms of their social status. Mock and Eibach (2011) found that a person's attitude towards aging influences the relationship between subjective age and well-being. Less favorable aging attitudes can lead to lower life satisfaction and increased negative affect when a person demonstrates an older subjective age.

Cultural Considerations

A review by Barak (2009) showed that subjective age is an appropriate construct to use across

nations and cultures. It translates well and can be measured with reliability and validity in a cross-cultural research context. It was found that there is a generally consistent pattern across 18 different countries that people felt and desired younger ages than their chronological age. In addition, Barak found a consistent pattern of ideal age being younger than subjective age, which was younger than chronological age (as he illustrates as ideal age < subjective age < chronological age). However, additional research is needed to fully explicate these comparisons and compare nations statistically (e.g., Barrett and Montepare 2015), because there are still meaningful and prominent cultural differences that exist. For instance, although both Americans and Germans feel younger than their chronological age, this relationship is stronger among Americans (Westerhof et al. 2003). Also, Barnes-Farrell et al. (2002) revealed differences in age-perceptions, specifically components of psychological age (subjective age, act age, and preferred age) among five nations that were included in their study of healthcare workers. These differences are most likely due to differing cultural beliefs regarding age-appropriate behavior and the differing values that the USA, Ukraine, Brazil, Poland, and Croatia hold for youth and/or age. Furthermore, the relationships between felt age and work strains, specifically physical fatigue, mental fatigue, and tension, differed among all five nations.

Both social roles and the social environment shape an individual's aging experience (Diehl et al. 2015), and these variables are known to differ culturally both inside and outside of work. For instance, social experiences, such as age discrimination or stereotypes, differ across groups of individuals and present important influences on subjective age. Events that serve as social markers that trigger subjective aging perceptions also differ culturally (e.g., rites of passage, sexual maturity, retirement). Subjective age research is not always conclusive. For example, some researchers have found gender differences in subjective age (e.g., Peters 1971), while others have not (e.g., Baum and Boxley 1983). These inconsistent findings can also be found with other variables such as educational level and marital status with subjective age (Barak and Stern 1986). These differences can be due to ethnic and cultural differences in the samples studied (e.g., Henderson et al. 1995).

Not only are there cultural differences cross-nationally, but there are cultural differences within similar societies. An example of this is generational differences. The cultural influences of someone in a much older cohort might not align with those of a younger cohort. Setterson and Hagestad (2015) illustrate this anecdotally by noting that a younger generation today might greatly emphasize their individuality and autonomy in their aging perceptions, whereas someone from a much older generation would not include this in their interpretation of aging as strongly and be more concerned with concepts such as "human agency." With increasing life expectancy in many countries, society is growing older, and this has implications for subjective age perceptions as well. These demographic shifts help to shape new age-expectations for individuals (Setterson and Hagestad 2015). For instance, people are healthier, family structures are shifting, life expectancy is longer, and people are staying in the workplace longer.

Future Directions

People in their 20s tend to believe middle and older age begin at a lower chronological age than do older individuals. People in their 60s often consider themselves to be middle age. Further, the gap between chronological and subjective age becomes wider as individuals become older. For example, older individuals often feel younger than their chronological age would indicate (Goldsmith and Heiens 1992). In addition, the gap between chronological and subjective age is wider for middle-aged and older women than it is for middle-aged and older men (Montepare and Lachman 1989).

Further, there is evidence from the gerontological literature that after childhood, where chronological age serves as a reasonable developmental milestone, one's chronological age increasingly

becomes a less useful description of one's "age." Historically, the initial alternatives to chronological age reflected one item or one-dimensional measures of some facet of subjective age. More recently, multidimensional measures of subjective age, awareness of age-related changes, and successful aging are all promising concepts to pursue in relation to understanding the links between age and important work outcomes.

There are a number of research questions that are important next steps. First, there is a need for clearer construct articulation and explication of subjective age or subjective aging. Research in this area is more measurement-focused currently; there is a pressing need to develop the theoretical relations among subjective age and related constructs and determine the convergent and discriminant validity of relevant age measures. Second too little is known about the psychometric properties of subjective age measures, AARC, and successful age measures. Are these overlapping measures and if so, by how much? Does the SA construct add to other constructs? Is it a part of other constructs or are other constructs facets of SA? Each of the many age constructs described here is based on similar core theories from the gerontology literature, although each uniquely draws from other theories as well. Yet few theories, if any, attempt to elaborate on the relationships among these age constructs.

Third, what work and well-being outcomes does each class of age measures predict? What unique contributions do various measures make to such outcomes and how do different measures operate jointly? (Cleveland and Hanscom in press). Fourth, what proximal (e.g., job, supervisor, coworker) and distal (e.g., stereotypes, climate) variables influence employee perceptions of their own age and the age of their co-workers? Fifth, one of the poorly understood aspects of this key construct is its malleability. The beliefs workers hold about their age and the age of others are important, but the source and determinants of these beliefs are not well understood especially within the work context. Can beliefs be modified to enhance adaptability and successful aging? For example, Diehl and colleagues have developed the AARC construct and initiated research and pilot interventions to enhance and change people's age self-perceptions. One goal of these interventions is to enhance individual well-being and position health and exercise behaviors. This laudable stream of research is one that should be tested and applied to employee in the workplace, young and old alike.

Not only older people need to be examined, but also younger people to determine whether or not subjective age and well-being can be influenced in order to enhance both one's work and personal lives (e.g., Zaniboni et al. 2014). Given the clear evidence of the increasing chronological age of many members of the workforce, finding out how beliefs about what constitutes an "old" (and a "young") worker develop and change is important.

Cross-References

- ▶ Activity Theory, Disengagement Theory, and Successful Aging
- ▶ Age, Self, and Identity: Structure, Stability, and Adaptive Function
- ▶ Age Stereotyping and Views of Aging, Theories of
- ▶ Attitudes and Self-Perceptions of Aging

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Subjective Memory

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Synonyms

Subjective cognitive decline (SCD); Subjective cognitive impairment (SCI); Subjective memory complaints (SMC); Subjective memory decline (SMD); Subjective memory impairment (SMI)

Definition

Subjective memory is one's perceived memory ability, independent of objective standards or performance. Subjective memory reflects one's perception about his or her personal memory functioning. It is a construct to be quantified, studied, and understood in clinical practice and can be referred to as subjective memory complaints (SMC), subjective memory decline (SMD), subjective cognitive decline (SCD), subjective memory impairment (SMI), and subjective cognitive impairment (SCI) (Edmonds et al. 2014; Stewart 2012).

The Construct of Subjective Memory

The precision and utility of the construct of subjective memory performance has been scrutinized since its introduction as a potential variable of interest for older adults at risk of dementia (Stewart 2012). Studies remain mixed regarding its reliability, its value in relationship to objective measures of memory performance, and its prognostic value for future memory or general cognitive decline (Crumley et al. 2014; Edmonds et al. 2014). The reliability of subjective memory has been questioned on the basis of variability in the source, which can include patients, informants, or skilled clinicians (Albert et al. 2011). Moreover, the diversity of terminology used within the construct provides opportunity for conflation of the reported concerns, be those specifically memory related abilities, nonmemory related abilities, or a combination of both (Edmonds et al. 2014).

Nevertheless, the construct of SMC has played a prominent role in the clinical appraisal of cognition, specifically as a diagnostic criterion of mild cognitive impairment (MCI; Diagnostic criteria for MCI include SMC to capture self-reported experience of change in cognitive performance and to exclude individuals with longstanding cognitive difficulties) (Petersen 2004). Edmonds and colleagues (2014) recently questioned the efficacy of SMC as an MCI criterion within a cohort of participants from the Alzheimer's Disease Neuroimaging Initiative (ADNI) previously labeled as MCI. Using hierarchical cluster analysis they demonstrated that overestimation of self-reported cognitive complaints was more frequent in cognitive cluster-derived normal subgroup, while underestimation of self-reported cognitive complaints was more frequent in an amnestic cluster-derived MCI phenotype, which is associated with progression to Alzheimer's dementia.

To address the dissociation of objective and subjective memory, Dalla and colleagues (2015) recently proposed a cognitive model of subjective memory awareness, whereby memory performance is construed as first-order consciousness or "consciousness in action," and awareness of memory performance is understood as second-order consciousness or awareness of first-order consciousness. Within such a model, congruency between objective memory, performance, and subjective ratings of said performance is mediated by awareness. Poor awareness of memory performance in the context of good objective performance constitutes cognitive dysgnosia; on the other hand, poor awareness of memory performance in the context of impairment objective performance constitutes anosognosia.

Beyond cognition, the relationship between subjective memory function and aspects of well-being has also been investigated. Mol and colleagues (2007) reviewed a small sample of studies ($n = 5$) meeting inclusion criteria for SMC in the absence of objective memory impairment. They reported consistently diminished quality of life (QoL) in older adults endorsing SMC across studies incorporating different methodologies and measures of QoL. Mol and colleagues (2009) also investigated the presence of SMC on measures of QoL (satisfaction, mental well-being, anxiety, depression) over time. Older adults with SMC at baseline reported lower overall QoL and increasing amounts of anxiety over time when compared to those without SMC. More recently, Zuniga and colleagues (2016) found that community-dwelling older adults ($n = 179$) reporting fewer memory complaints endorsed lower perceived stress, fewer adverse physical symptoms, and higher levels of happiness.

On the other hand, as the awareness and accuracy of objective memory deficits diminish over the course of neurodegenerative illnesses, it is accompanied by higher QoL ratings (Trigg et al. 2011; Hurt et al. 2010). The relationship between patient and informant report of SMC has also been shown to be relevant. While healthy individuals without SMC often align with informant report on measures of memory concern, discrepancy between self and informant report is common. Gifford and colleagues (2014) found that among healthy control participants who later converted to MCI/dementia, mutual self and informant SMC was associated with the largest increase in risk for conversion, followed by informant only, and then self only SMC. For participants with MCI, only mutual self and informant SMC and informant only SMC were associated with increased risk of conversion to dementia. Thus, obtaining collateral report of memory complaints is valuable in distinguishing pathological aging trajectories and can play a role in early intervention planning.

Prevalence in Population

SMC are common among middle-aged adults and elderly. In a sample of 1,971 adults between the ages of 25 and 85 years old, 41% of people between the ages of 55 and 65 and 52% of people between the ages of 70 and 85 years old reported being forgetful (Ponds et al. 1997). Prevalence of memory complaints varied in other community-based studies with older adults, ranging from 22% in adults 65–84 years old (Jonker et al. 1996) to over 50% in adults 65 years and older (Blazer et al. 1997). Fritsch and colleagues (2014) reported that in a sample of 499 community-dwelling older adults aged 65 and older, 27% endorsed SMC. Jessen and colleagues (2007) reported that 30% of healthy older adults acknowledge difficulty remembering recent events, as well as where certain "belongings are kept." Prevalence of subjective cognitive impairment in community adults 65 years and older ranged from 25% to 56% (Reisberg et al. 2010).

Relationship to Psychiatric Symptoms

Mood symptoms play an important role in understanding SCI. Self-reports of cognitive problems in older adults are often attributed to depression rather than being reflective of objective memory deficits, such as what would be seen in early neurodegenerative disease. Indeed, SCI is often the primary complaint in older adults with depressive symptoms, and difficulties with memory and attention are commonly reported in those who are depressed (Reid and MacLullich 2006). Several studies indicate that depression is highly correlated with memory complaints, and that SCI, as measured by self-referrals for memory evaluations and self-reported memory concerns, are more likely due to depressive symptoms rather than objective memory problems (Jonker et al. 2000). Several large studies have shown that SCI is not related to performance on objective cognitive measures and instead reflect mood symptoms and personality traits (Jorm et al. 2004; Kliegel et al. 2005). Further, Minett and colleagues (2008) also found that SCI is strongly associated with depressive symptoms in adults aged 50 or older, more so than with poor performance on objective cognitive measures. These finding suggests that mood functioning may be driving concurrent subjective cognitive concerns rather than cognition.

However, the majority of research examining the relationship between SCI and mood are cross-sectional studies or utilize healthy aging samples. Longitudinal studies of older adults suggest a more complicated relationship between mood, SCI, and cognition. While cross-sectional studies suggest that SCI is related to personality traits and depressive symptoms, when examined over time, several studies have shown that baseline SCI predicts which individuals went on to experience cognitive decline (Reid and MacLullich 2006). Similar findings suggest SCI is not just a symptom of depression, but may reflect an individual's realistic observation and self-appraisal of his or hers cognitive status, particularly with respect to the prediction of future cognitive decline (Schmand et al. 1997).

Taken together, these findings suggest an interesting interplay between mood, SCI, and

cognitive decline. There is evidence that depression is associated with worse performance on cognitive measures and SCI. But, depression may also be a by-product of a realistic awareness of subtle cognitive difficulties. Individuals who are aware of declining cognition may feel more depressed, and individuals reporting depression may describe worsening cognition, resulting in exacerbation of both depressive and cognitive symptoms (Schmand et al. 1997).

Relationship to Neuropsychological Performance

SMC may at times reflect very subtle changes in cognitive functioning that may not be recognized by neuropsychological tests. Some research indicates that people who report subjective cognitive changes are "worried well," and therefore there is no relationship between SMC and objective memory performance on neuropsychological tests (Flicker et al. 1993; Ginó et al. 2010). However, other research has indicated significant relationships between SMC and cognitive performance on objective neuropsychological measures (Reisberg et al. 2010; Amariglio et al. 2012; van Harten et al. 2013). Amariglio and colleagues (2012) found significant relationships between people with SMC and decreased performance on neuropsychological measures of episodic memory, working memory, and semantic information. Longitudinal research revealed that people with SCD demonstrate a more rapid decline on immediate recall tasks (Reisberg et al. 2010).

Several studies have also revealed that SMC in cognitively intact older adults is related to an increased risk in dementia (Geerlings et al. 1999; Reisberg et al. 2010). Reisberg and colleagues (2010) found that healthy older adults reporting SMC are more likely to experience future cognitive decline than healthy older adults who do not have SMC. When controlled for age and other similar factors, older adults with SMC were 4.5 times more likely to develop MCI or dementia than adults who did not report decline (Reisberg et al. 2010).

Additionally, Reisberg and colleagues (2010) revealed that adults with SCI, whose performance on neuropsychological measures were lower, but still within normal limits, were more likely to have cognitive decline than adults whose neuropsychological performance remained stable at follow-up visits.

Predictive Value of Future MCI and/or Neurodegenerative Disease

Subjective cognitive impairment is very often seen in individuals with mild cognitive impairment (MCI). Individuals with MCI function independently on day-to-day tasks, yet show cognitive impairment in specific areas, often memory, that is beyond what would be expected during the process of healthy aging (Petersen et al. 1999). The role of SCI is important in Petersen's conceptualization of MCI, but corroboration by an informant is also preferred. This is predicated in evidence that 35–75% of individuals with MCI have cooccurring neuropsychiatric symptoms, which also are correlated with subjective cognitive complaints and may not be as predictive as collateral reports, which are thought to be more strongly correlated with objective performance (Apostolova and Cummings 2008). Of course, Petersen's criteria also call for objective memory deficits. Longitudinal follow-up shows that individuals with MCI convert to Alzheimer's disease (AD) at differing rates. Fischer and colleagues (2007) reported a 49% conversion rate to AD for individuals with amnestic MCI after 30 months. This rate declined to 27% for individuals with nonamnestic MCI. For cognitively healthy individuals at baseline, the rate dropped further to 13%. Busse et al. (2006) estimated the maximum conversion rate to dementia in individuals with MCI to be approximately 65%. Notably, they reported that conversion rates to dementia are highest during the first 2–3 years of clinical observation (20%).

The combination of mild memory difficulties despite relatively intact general cognition often results in individuals being well aware of their cognitive decline, or even noticing subtle cognitive

changes before evidence is seen on objective measures. In point, individuals are often referred for memory evaluations after reporting subjective memory concerns to their physicians. Empirical findings on the overall accuracy of SCI to predict cognitive decline is mixed. Several studies not surprisingly show higher levels of cognitive complaints in individuals with MCI as compared to healthy older adults (Roberts et al. 2009). Specifically, individuals with MCI are often aware of experiencing decline in their general cognitive abilities, but are poor at predicting their actual memory deficits (Clément et al. 2008). Baseline SCI has been shown to be predictive of objective memory problems at a 3-year follow-up and associated with an increased risk for a future diagnosis of dementia even when baseline cognition was normal (Geerlings et al. 1999; Luck et al. 2014; Schmand et al. 1996; Tobiansky et al. 1995). Even more striking, a recent metanalysis found that older adults with SCI are twice as likely to develop dementia as individuals who are not reporting SCI, with an annual conversion rate of 2.3% for dementia and 6.6% for MCI (Mitchell et al. 2014). SCI has also been associated with poorer functional autonomy and consistent with daily functioning problems associated with MCI (Clément et al. 2008).

Yet, other studies have shown SCI has little association for either present objective cognitive difficulties or future incidence of dementia, and a recent study found that subjective memory concerns do not predict mortality over an 8-year span (Kliegel et al. 2005; Jorm et al. 1997; Roehr et al. 2016). However, the majority of studies suggest that baseline subjective memory complaints predict future cognitive decline over a 2-year span, particularly for those already carrying a diagnosis of MCI (Jonker et al. 2000). The inconsistencies in extant literature for SCI to portend cognitive decline may be partially attributed to variance in individual's level of cognitive awareness (Roberts et al. 2009). There are also differences in sensitivity to change, with some being hyper aware to any changes in cognitive status, overestimating dysfunction and falling more in to a category of "worried well." Others may be less attuned and be unaware or nonchalant of deteriorating cognitive abilities. Further, an individual's self-awareness of cognitive deficits likely depends on the level of objective cognitive difficulties. Individuals may report cognitive deficits in proportion to objective findings, but insight may deteriorate as cognitive deficits become more severe, resulting in a bell-shaped curve of self-awareness in relation to cognitive difficulties (Mitchell et al. 2014). Such variance in personality and self-awareness are difficult to control for within subjective cognitive constructs, making reliance upon SCI as both a research and clinical entity difficult. Nevertheless, while individual differences in subjective cognitive awareness may contribute to these mixed findings, the significant inconsistencies in defining the construct of SMC, along with how MCI has been operationalized, are likely the strongest contributor to the discrepancy among study findings.

Proposals for Established Criteria Informing the Construct of SMC

Concerns surrounding the definition and underlying framework of subjective memory have prompted proposals to establish uniform criteria for this construct. Abdulrab and Heun (2008) detailed the lack of consistency in current descriptions of SMC among 44 papers providing definitions of the construct. They outline essential criteria, course-specific criteria, and nonessential supportive criteria detailed in the table below (Table 1).

More recently, Jessen and colleagues (2014) have outlined a framework for studies investigating SCD in preclinical AD specifically, offering research criteria for pre-MCI SCD and features that increase the likelihood of preclinical AD in individuals with SCD (SCD *plus*). Pre-MCI research criteria include: (1) self-reported persistent decline in cognitive capacity compared to previous normal status and (2) normal normed performance on standardized cognitive tests. Both of these criteria must be present. SCD *plus* criteria that can be applied to collected data include: specific subjective decline in memory, onset within past 5 years, age of onset of SCD >60, worries and concerns associated with SCD, and subjective worse performance compared to

Subjective Memory, Table 1 Proposed criteria for subjective memory impairment (Abdulrab and Heun 2008)

Essential criteria	Course specific criteria	Nonessential supportive criteria
• Age at presentation (e.g., >50 years) Presence of memory complaints in a specified length of time (e.g., past 6 months) • Belief that memory is worse compared to earlier periods of life (e.g., when one was in high school or college) • Valid example of memory problems in everyday life • Frequency of memory problems (e.g., at least every week) • Normal objective memory performance (not-demented)	• Gradual onset (may indicate AD) • Sudden or staggered onset (may indicate vascular dementia)	• The belief that memory is worse than others of similar age • Memory worsening affirmed by an informant (close relative or friend who is in contact with subject at least monthly) • Subject spontaneously mentions memory problems if asked about any general medical concerns • Seeking medical help for memory problems

others of the same age group. In addition, confirmation of cognitive decline by an informant, presence of *APOE* e4 genotype, and biomarker evidence for AD are suggested as conferring additional likelihood of preclinical AD in individuals with SCD. Each of these recent proposals provides much needed specificity to the construct of subjective memory and offer specific criteria for more reliably assessing self-reported memory performance.

Conclusions

Subjective memory remains a construct of great interest to clinicians, researchers, and individuals themselves. While the utility of self-reported memory performance always received some scrutiny, it remains a useful clinical tool to characterize patient experience and awareness and critically is a part of the diagnostic criteria for. Recent proposals offer recommendations for narrowing the definition of self-reported memory difficulties and parsing out symptoms that may be more associated with specific neurodegenerative diseases such as AD. These proposals provide much needed clarification and definition to the construct of subjective memory and if adopted may help advance the clinical utility of this construct, which has proven difficult to grasp.

Cross-References

- ▶ Aging and Quality of Life
- ▶ Attitudes and Self-Perceptions of Aging
- ▶ Cognitive and Brain Plasticity in Old Age
- ▶ Effects of Stress on Memory, Relevance for Human Aging
- ▶ History of Cognitive Slowing Theory and Research
- ▶ Process and Systems Views of Aging and Memory
- ▶ Psychological Theories of Successful Aging

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Substance Use and Abuse

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Synonyms

Illicit drugs; Prescription drugs; Problem drinking; Substance use disorders; Unhealthy substance use

Definition

A substantial proportion of older adults use and misuse alcohol, tobacco, illicit drugs, and prescription medications, and there are several risk factors that increase an older adult's likelihood of engaging in such health behavior. Due to their particular life stage, assessing older adults for substance use or misuse presents unique challenges. Few existing treatments have been tested on older adults; however, treatments are known to be more effective when they are tailored to the older adult and take into consideration any learning difficulties or disabilities.

Background

Thirty percent of the adult US population is comprised of baby boomers, a generation of individuals turned 65 starting in 2011 (Kuerbis et al. 2014). Longer life expectancies and the size of this group contribute to estimates of the number of older adults almost doubling in size from 40.3 to 72.1 million between 2010 and 2030. In past generations, older adults reduced their substance use as they aged (Moore et al. in press). This trend was reflected in the shrinking prevalence rates of substance use disorder (SUD) across the life span. Indeed, current prevalence rates of SUD among older adults remain lower than their younger adult counterparts. Additionally, few older adults present to formal treatment programs. These two facts lead many to assume that older adults do not generally use substances and subsequently do not require in-depth assessment or treatment.

Unlike previous generations, baby boomers came of age at a time when attitudes toward alcohol, tobacco, and drug use were more permissive and accepting, leading to greater rates of alcohol and drug use overall and subsequent SUD (Kuerbis et al. 2014). SUD among this generation have remained high as they age, with a seemingly slower rate of aging out of alcohol and drug use than their predecessors. Both the increased numbers of the individuals within this population and their greater rates of use contribute to higher estimated prevalence rates. Numbers of individuals 50 and older with SUD are estimated to more than double from 2.8 million in 2006 to 5.7 million in 2020. While older adult prevalence rates are lower than their younger adult counterparts, differences between the groups are slowly shrinking. This closing gap is even more of concern when taking into account the special vulnerabilities (biological, psychological, and social) of older adults to the effects of mood-altering substances.

Terms and Diagnostic Challenges

Relying solely on formal diagnosis of SUDs and treatment utilization paints an incomplete picture of the effects of substance use among individuals 65 and older. Given their vulnerabilities with even limited substance use, older adult substance use requires expanded description. As a result, there are a variety of terms describing various forms of substance use.

Alcohol use that exceeds limits recommended by the National Institute of Alcohol Abuse and Alcoholism (NIAAA) (i.e., $\leq$ seven standard drinks per week, no more than three on any one occasion; a standard drink is defined as a 12 oz beer, 4–5 oz glass of wine, 1.5 oz of 80-proof liquor) (National Institute on Alcohol Abuse and Alcoholism 2013) has been termed *unhealthy use* (Moore et al. in press). Currently, there is no recognized safe limit for tobacco or illicit drugs. Use of these substances would be considered unhealthy regardless of amount. *At-risk* drinking refers to drinking beyond the safety guidelines and includes identifiable risks such as drinking with comorbid health or mental health disorders but has yet to result in harm. *Problem drinking* refers to drinking patterns that result in identifiable harm but are subthreshold for the *Diagnostic and Statistical Manual*, 5th edition (DSM-5), alcohol use disorder (American Psychiatric Association 2013). *Nonmedical use of prescription-type drugs* relevant for older adults is use without a prescription, in greater amounts, more often or longer than prescribed, or for a reason beyond the parameters of the prescription given by the doctor.

The term *substance use disorder* refers to the diagnostic criteria using DSM-5, of which an individual must meet or endorse at least 2 or more of 11 criteria in at least 12 months (American Psychiatric Association 2013) (see Table 1).

Criteria for SUD may not be relevant to older adults, due to specific biological and social factors unique in late life (Center for Substance Abuse Treatment 1998), potentially interfering with accurate diagnosis. Age-related physiological changes increase the effects of substances in older age, resulting in a reduction in tolerance to these substances. Thus, increased tolerance, one of the primary indicators of SUD, cannot be used to determine SUD in older adults. In addition,

Substance Use and Abuse, Table 1 Substance use disorder (formerly substance abuse or dependence) criteria, from the *Diagnostic and Statistical Manual, Fifth edition*, p. 491

DSM-5 criterion for SUD	Consideration for older adult
A substance is often taken in larger amounts or over a longer period than was intended	Cognitive impairment can prevent adequate self-monitoring. Substances themselves may more greatly impair cognition among older adults than younger adults
There is a persistent desire or unsuccessful efforts to cut down or control substance use	Same as a general adult population
A great deal of time is spent in activities necessary to obtain the substance, use the substance, or recover from its effects	Consequences from substance use can occur from using relatively small amounts
Craving or a strong desire to use the substance	Same as a general adult population. Older adults with entrenched habits may not recognize cravings in the same way as the general adult population
Recurrent substance use resulting in a failure to fulfill major role obligations at work, school, or at home	Role obligations may not exist for older adults in the same way as for younger adults, due to life stage transitions such as retirement. Role obligations more common in late life are caregiving for an ill spouse or family member, such as a grandchild
Continued substance use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance	Older adults may not realize the problems they experience are from substance use
Important social, occupational, or recreational activities are given up or reduced because of substance use	Older adults may engage in fewer activities regardless of substance use, making it difficult to detect
Recurrent substance use in situations in which it is physically hazardous	Older adults may not identify or understand that their use is hazardous, especially when using substances in smaller amounts
Substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance	Older adults may not realize the problems they experience are from substance use
Tolerance, as defined by either of the following: 1. A need for markedly increased amounts of the substance to achieve intoxication or the desired effect 2. A markedly diminished effect with continued use of the same amount of the substance	Due to increased sensitivity to substances as they age, older adults will appear to have lowered rather than increase in tolerance
Withdrawal, as manifested by either of the following: 1. The characteristic withdrawal syndrome for the substance 2. The substance or a close relative is taken to relieve or avoid withdrawal symptoms	Withdrawal symptoms can manifest in ways that are more "subtle and protracted" (Barry et al. 2002). Late onset substance users may not develop physiological dependence *or* non-problematic users of medications, such as benzodiazepines may develop physiological dependence

Table adapted from Barry et al. (2002), p. 109 (Reprinted from (Kuerbis et al. 2014))

reduced or restricted social and vocational roles that change as a result of life stage, such as retirement or mortality of age-group peers, may mask the consequences of or changes related to drinking and drug use. Finally, many older adults may misattribute problems resulting from substance use to aging. Thus, the criterion "continued use despite persistent problems" may not apply. While the new criteria may capture a greater proportion of substance-using older adults to be diagnosed with SUD (Kuerbis et al. 2014), many will remain unidentified.

Prevalence Rates of Use and Substance Use Disorders

Alcohol continues to be the most commonly used substance in later life (Moore et al. in press). As described previously, the prevalence of abstention

increases and the amount of alcohol consumed decreases as individuals age. Still, about 50% of older adults in the USA consume alcohol (Moore et al. 2005). Prevalence rates for unhealthy older adult drinkers are estimated to be 10% for women and 12% for men (Blazer and Wu 2009a). Only about 1–2% of persons aged 65 years and older have a current diagnosis of alcohol use disorder, according to DSM-IV abuse and dependence definitions, which are more conservative than DSM-5 criteria (Kuerbis et al. 2013). Prevalence rates are lower than younger cohorts due in part to a mismatch of diagnostic criteria, older adults maturing out, increased mortality among those with lifelong AUD, and difficulty with accurate diagnosis.

Tobacco use is a marker of vulnerability for older adults, and 12–14% of individuals over the age of 65 report using tobacco (Moore et al. in press). About 4% have a tobacco use disorder. It is common both in the general population and among older adults to use tobacco and alcohol simultaneously. For this reason, it is not surprising that 6% of older adults report using both. In fact, older adults who use tobacco are twice as likely to report binge drinking (Wu and Blazer 2011).

Illicit drug use is historically minimal among older adults compared to their younger counterparts. With the aging of the bgaby boom generation, however, prevalence rates of illicit drug use are increasing (Moore et al. in press). Between 2002 and 2012, use of illicit drugs in the past month among individuals aged between 50 and 65 years doubled to 7.2%. In 2012, 19% of adults 65 years and older reported ever having used illicit drugs, compared to 48% of those aged 60–64 that same year (Wu and Blazer 2011). Of those individuals who report ever using illicit substances, 12% meet criteria for an SUD in the past year. Cannabis is the most commonly used illicit substance (3.9% of those aged 50–64, 0.7% of those aged 65 years and older), followed distantly by cocaine (0.7% aged 50–64 years, 0.04% of those aged 65 years and older). With increasingly relaxed restrictions on the sale and use of marijuana, the prevalence rate of use among older adults may increase (Kuerbis et al. 2014).

Because older adults take more prescribed and over-the-counter medications than younger adults, they are at increased risk for harmful drug interactions, misuse, and abuse (Kuerbis et al. 2014). Nonmedical use of prescription medication is common among older adults. Many older adults do not view using a prescribed medication in ways it was not prescribed (i.e., for extended periods or in larger doses) to be a problem; nonmedical use of prescription medications is still generally thought to be underreported. In 2012, just fewer than two million adults 50 and older reported using prescription drugs nonmedically in the past year (Moore et al. in press). The current estimate of prescription medication misuse among older women is 11%. A national epidemiological study reported that 1.4% of adults aged 50 years and older used prescription opioids nonmedically in the last year, a rate higher than sedatives, tranquilizers, and stimulants (all $< 1\%$) (Blazer and Wu 2009b). Despite contraindications for older adults, benzodiazepines are disproportionately prescribed to older adults (Kuerbis et al. 2014). Rates of benzodiazepine use among older adults range from 15% to 32%, potentially impacted by overprescription, misdiagnosis, or polypharmacy rather than intentional misuse or abuse.

Unique Vulnerabilities to Substance Use for Older Adults

While prevalence rates of use and SUDs are lower for older adults than their younger cohorts, there are specific risks for harm from substance use for older adults (Kuerbis et al. 2014). Some risks are due to aging itself, such as changes in substance metabolism and distribution in the body. Other risks are due to specific patterns of use (e.g., 1 drink a day for 7 days vs. 7 drinks on 1 day) (Moore et al. in press) or mixing prescription drugs and alcohol, or cognitive impairment, gait disorder, or another comorbid medical problem.

Alcohol. Due to biological changes to the body in late life, alcohol has a differential impact on older adults compared to their younger cohorts (Kuerbis et al. 2014). As the body ages, lean

body mass and total body water decrease, and the liver also loses the ability to process alcohol as well as it did in earlier age. The permeability of the blood-brain barrier and the neuronal receptor sensitivity to alcohol also increase. As a result of these biological changes, an older adult who imbibes the same amount of alcohol as a younger or middle-aged adult will experience higher blood alcohol concentration and greater impairment than the other two will experience, and with less awareness of that impairment. Thus older adults experience a greater vulnerability to the ill effects of alcohol even at moderate amounts. Furthermore, older adult at-risk drinkers are more likely to experience alcohol problems as well as impaired instrumental activities of daily living, such as shopping and cooking for oneself. Complications of drinking alcohol also arise with comorbid medical and psychiatric conditions that can occur in late life. Medication interactions increase the vulnerability of an older adult's health, even when he or she may be drinking at moderate levels.

It should be noted that despite this increased vulnerability to the negative effects of alcohol consumption, older adults can experience positive health effects from moderate alcohol consumption, such as drinking within the NIAAA safety guidelines. Drinking alcohol at moderate levels is associated with decreased morbidity and mortality among older adults (Center for Substance Abuse Treatment 1998), and moderate drinking older adults often experience better health (e.g., fewer falls, greater mobility) than their abstinent and heavy drinking peers. Positive benefits of alcohol consumption among older adults are limited to very specific conditions and in some cases have negative trade-offs. For example, with moderate drinking, the risk of ischemic stroke may decrease for an older adult, but his or her risk of hemorrhagic stroke may simultaneously increase. Thus benefits of drinking must be weighed against the individual's risk factors for such conditions, as well as his or her unique biopsychosocial context, age, gender, genetics, and comorbid illnesses.

Tobacco. Perhaps due to historical factors and level of cultural acceptance over time, older adults are less likely to perceive that smoking harms health (Moore et al. in press). In fact, older adults who use tobacco have higher mortality, lung disease, coronary events, and overall physical functioning compared to younger adult tobacco users or their non-tobacco-using counterparts. Tobacco-using older adults also experience more smoking-related cancers, chronic obstructive pulmonary disease, greater decline in pulmonary function, development of osteoporosis, risk of hip fractures, and greater loss of mobility than their non-tobacco-using counterparts (Duru et al. 2010). Treatment for each of these conditions is further impaired or inhibited by continued tobacco use.

Medications and Illicit Drugs. Biological changes during the aging process also affect the impact of prescription medications and illicit drugs on the older adult body (Kuerbis et al. 2014). Benzodiazepines and opiates are processed much more slowly in an older adult body compared to a middle-aged or young adult. They should be prescribed and used with caution. Certain benzodiazepines are contraindicated for use with older adults as they tend to cause excessive sedation and the effects last far longer than for younger adults. An additional complication is that due to the sheer number of medications older adults tend to take, an older adult may not have an accurate list of the medications they are taking, including supplements. They may also see multiple doctors, each of whom is prescribing medications (often without knowing) that may interact poorly with the others or with alcohol or illicit drugs. An older adult who is prescribed a benzodiazepine, a barbiturate, or an opiate for a medical condition can expect to experience increased sedation with the simultaneous use of alcohol or marijuana. Finally, older adults may innocently or accidentally misuse a medication (e.g., taking another person's medication, confusing pills, or taking more than intended).

Cannabis' increasing acceptance, both medicinally and recreationally, may also pose unknown risks for older adults. In the general population, marijuana causes impairment of short-term memory; an increased heart and respiratory rate, as well as elevated blood pressure; and a fourfold increase in the risk of heart attack the first hour

after smoking (Kuerbis et al. 2014). For those older adults whose cognitive or cardiovascular systems are already compromised, cannabis may pose a notable risk. It is not yet clear which of the abovementioned conditions associated with tobacco use will emerge for marijuana.

Factors Associated with Late Life Substance Use and Abuse

Existing research on older adult risk factors for substance use and abuse is almost exclusively focused on alcohol use (Kuerbis et al. 2014). It is reasonable to assume that the factors associated with late life unhealthy drinking may also contribute to use of other substances; however, unique factors that may contribute to use of substances other than alcohol remain relatively unknown. Table 2 lists some of the potential risk factors associated with older adult unhealthy use of alcohol and, when known, other substances.

Demographics. Several demographic characteristics are associated with unhealthy drinking in late life. Male gender, affluence, and Caucasian race are the most prominent characteristics associated with late life drinking (Kuerbis et al. 2014). Age is also associated with unhealthy drinking – such that those below the age of 75 are more likely to be unhealthy drinkers than those above 75. None of these factors are demonstrated to predict an increase in late life drinking except for wealth. Having more affluence, more financial resources, and longer financial horizons are predictive of increased alcohol use among older adults. For other substances, female gender is associated with misuse of prescription drugs. Finally, having no or little religious affiliation is associated with a greater quantity and frequency of alcohol use.

Substance Use and Abuse, Table 2 Risk factors related to substance use in late life

Physical risk factors
Male gender (for alcohol); female gender (for prescription drugs)
Caucasian ethnicity
Chronic pain
Physical disabilities or reduced mobility
Transitions in care/living situations
Poor health status
Chronic physical illness/polymorbidity
Significant drug burden/polypharmacy
Psychiatric risk factors
Avoidance coping style
History of alcohol problems
Previous and/or concurrent substance use disorder
Previous and/or concurrent psychiatric illness
Social risk factors
Affluence
Bereavement
Unexpected or forced retirement
Social isolation (living alone or with non-spousal others)

Reprinted from Kuerbis et al. (2014)

Medical and Psychiatric Morbidity. Both alcohol use and unhealthy drinking are associated with overall better health in older age (Kuerbis et al. 2014). This is likely not a causal relationship but instead suggests that those older adults in good health are more likely to drink more than their counterparts in poor health. It has been observed that as hospitalizations, disabilities, or depression increase, drinking tends to decrease among older adults. Poorer physical and mental health also has been observed at greater rates among older adult heavy drinkers compared to their moderate drinking counterparts. Finally, pain is a key long-term predictor of alcohol use in late life (Moos et al. 2010).

Co-occurring psychiatric (e.g., anxiety, mood disorders, and personality disorders) and substance abuse disorders are assumed to occur in late life, as they do often in earlier life (Kuerbis et al. 2014); however, little to no research has explored the prevalence rates of these comorbid disorders in late life. Within the studies that examined an older adult population, high correlations have emerged between specifically alcohol use and depression and other affective disorders. This co-occurrence can complicate diagnosis and treatment for both. Aside from the common co-occurrence of tobacco and alcohol use, there is almost nothing known about polysubstance use among older adults.

Many older adults experience sleep disturbance or sleep disorders (Kuerbis et al. 2014).

Older adults commonly use alcohol as a sleep aid, despite the fact that alcohol is known to interfere with sleep cycles overall. Older adults who combine alcohol and additional prescription or over-the-counter sleep aids are also likely to experience excessive sedation and/or cross-tolerance. Furthermore, older adults who use prescription medications with abuse potential or have had a history of a SUD or mental health disorder are more likely to misuse or abuse prescription medications. Finally, cognitive impairment and a variety of dementia types tend to be prevalent among older adults with an alcohol use disorder.

Style of coping with stress or tension may also predict having a late life alcohol use disorder (Kuerbis et al. 2014). Specifically, avoidance coping is associated with a drinking problem in later life. Similarly, older adults who report using alcohol to relieve tension or stress or to relax are also associated with late-life drinking problems.

History of Alcohol Problems. Not surprisingly, individuals who report having had an alcohol use disorder before age 50 and do not abstain from alcohol in late life are much more likely to drink at unhealthy levels in older age (Moore et al. in press).

Social Factors. While there may be gender differences, generally, divorce, separation from a spouse, or being single are associated with increased or unhealthy drinking in late life (Moore et al. 2009). Within a retirement community, having a larger social life with friends and family may increase one's risk of heavy or unhealthy drinking in later life (Kuerbis and Sacco 2012). While having sustained or increased social interactions from midlife into older age, particularly post retirement, tend to increase alcohol use in general, and in some cases problem drinking, social isolation is associated with prescription drug abuse among older adults. Late life transitions and events may also increase an older adult's vulnerability to substance misuse or a SUD. Loss in many forms has been shown to be associated with substance use among older adults. Loss can take the form of bereavement for a spouse or friends, living arrangement changes, declining overall health, or loss of employment (Center for Substance Abuse Treatment 1998). Caregiving for a chronically or terminally ill spouse may increase the stress and subsequent vulnerability to substance misuse, and it may signal the loss of the relationship as it once was. Retirement can also impact substance use, depending upon preretirement conditions (Kuerbis and Sacco 2012). Preretirement job satisfaction, involuntary retirement, and workplace stress can negatively impact how the older adult copes with retirement and have been shown to increase alcohol use in general as well as drinking problems.

Screening and Assessment

Older adults are far less likely to be screened for substance use than their younger adult counterparts (Kuerbis et al. 2014). Older adults tend to be more private about their substance use than a younger cohort. As a result, often the first point of contact with an older adult substance user is within primary care. Several barriers may interfere with identification of unhealthy, at-risk, or problem use. In cases where an older adult may present with symptoms of substance use or abuse, physicians and the older adults themselves may be more inclined to identify those symptoms as a part of natural aging or another health problem. Clinicians may have insufficient time to fully assess the older adult who comes in with a clear presenting problem that may not be immediately relevant to substance use; they may avoid asking the older adult about substances for fear of embarrassing them or causing them to anger; and finally, the symptoms themselves may share similarities with other conditions. Finally, older adults tend to view their substance use behavior as normal rather than risky. They may be particularly reticent to discuss this behavior as they themselves see it as irrelevant to the problem at hand and potentially their "last pleasure." This perspective is known to be reinforced by some health care professionals, such as in nursing homes, where the substance use may be enabled to the detriment of the older adult's health.

Overall Approach to Discussing Substance Use with Older Adults

As with any person, older adults should be treated with respect. The overarching goal for any assessment should be the overall health and well-being of the older adult (Sacco and Kuerbis 2013), thus reducing shame and stigma around any particular behavior. Older adults are known to respond more fully to a supportive, nonconfrontational approach to assessment and intervention. Confrontation is not helpful or efficient in engaging an older adult to provide information about their substance use or to provide an intervention for such behavior. Efforts to identify a drug abuser rather than to assess substance use as a part of one's total health tends to cause defensiveness on the part of and stigmatization of the older adult. Questions about substance use should be asked matter-of-factly while keeping in mind that these questions may feel sensitive or intrusive to the older adult. Questions about quantity and frequency of drinking, any medications (prescription, over-the-counter, and those obtained from friends), and illicit drugs (e.g., marijuana) should be asked in a gentle, respectful manner with the assumption that the information is important whether the behavior itself is problematic or indicative of a SUD.

During assessment and intervention, it is important to keep in mind the potentially central role that substance use may play in the life of an older adult. For an older adult whose life is otherwise quite limited, he or she may view using a substance as the final vice – his or her last pleasure. Indeed, this may be reinforced by families, friends, or other health care professionals. A foreshortened sense of the future among older adults may also prolong substance use. Older adults have been found to be less motivated to change their habits around mood-altering substances compared to younger counterparts as they do not view their use as particularly severe or a problem – even when advised otherwise by a physician. In addition to differential motivation levels, a lack of self-efficacy may also be particularly problematic for an older adult. Self-efficacy is observed to decline with age when an individual perceives his or her life less and less in his or her control (Kuerbis et al. 2014). When older adults perceive the negative consequences of substance use to be a natural part of aging, this can also greatly affect self-efficacy to change. For many older adults, changing substance use habits may feel too late.

Substance Use and Abuse, Table 3 Potential indicators of substance misuse and abuse

Physical indicators
Falls, bruises, and burns
Poor hygiene or impaired self-care
Headaches
Incontinence
Increased tolerance to alcohol or medications or unusual response to medications
Poor nutrition
Idiopathic seizures
Dizziness
Sensory deficits
Blackouts
Chronic pain
Cognitive symptoms or potential indicators
Disorientation
Memory loss
Recent difficulties in decision making
Overall cognitive impairment
Psychiatric symptoms or potential indicators
Sleep disturbances, problems or insomnia
Anxiety
Depression
Excessive mood swings
Social symptoms or potential indicators
Family problems
Financial problems
Legal problems
Social isolation
Running out of medication early
Borrowing medication from others

Reprinted from Kuerbis et al. (2014)

Potential indicators or symptoms of problematic use of mood-altering substances among older adults are reviewed in Table 3. Because older adults tend to dismiss use of mood-altering substances as problematic, assessment must focus specifically on behavior rather than the older adult's opinion (e.g., do you believe you have a drinking problem?) (Sacco and Kuerbis 2013). Questions should be included in a

nonjudgmental way. An important gateway to additional information about the older adult's use of substance is asking about whether he or she runs out of medication early, borrows medication from others, or takes an extra pill to fall asleep or cope with pain. It is also important to ask about any history of use or SUDs, as these may increase an older adult's risk for cognitive decline or psychiatric disorders in late life whether or not he or she is currently abstinent.

Screening Tools

Biological screening measures are not only intrusive but can also be misleading, as any damage to the liver (a common tool used to indicate heavy drinking or overuse of benzodiazepines) may be the product of prescribed medications. Thus, the best screening tools among older adults are those that are self-report.

CAGE-Adapted to Include Drugs (CAGE-AID). The CAGE-AID is a brief screening tool, adapted from the CAGE (Kuerbis et al. 2014), to indicate potential substance misuse across the general adult population. It contains four questions: (1) Have you ever felt that you should Cut down on your drinking or drug use? (2) Have people Annoyed you by criticizing your drinking or drug use? (3) Have you ever felt bad or Guilty about your drinking or drug use? (4) Have you ever had a drink or used drugs first thing in the morning to steady your nerves or to get rid of a hangover (Eye opener)? One or more positive responses to the four questions indicate the potential for a SUD. While there are no reported studies on the CAGE-AID's efficacy with older adults, the CAGE was demonstrated to have 86% sensitivity and 78% specificity for an alcohol use disorder among older adults (Kuerbis et al. 2014). The drawbacks of the CAGE are that it does not identify older adult heavy or binge drinkers, it does not perform as well within a psychiatric population, and it does not differentiate between current and lifetime use. Clearly, the CAGE or CAGE-AID, while useful, should not be a substitute for a thorough assessment.

The Alcohol Use Disorders Identification Test (AUDIT). The AUDIT is a 10 item, self-report questionnaire that assesses for current alcohol problems (Babor et al. 2001). Items ask about quantity and frequency of alcohol use, diagnostic criteria, and other consequences of alcohol use or abuse. Scoring on the AUDIT ranges from 0 to 40, with potential for an alcohol use disorder starting at a score of 8. Hazardous or problematic alcohol use among older adults can be detected using the AUDIT; however, a lower threshold of 5 is recommended.

The Comorbidity Alcohol Risk Evaluation Tool (CARET). The CARET (Moore et al. 2002) is a screening tool that identifies not only older adults who are at risk due to their alcohol consumption but also vulnerable due to comorbid diseases, risky behaviors (i.e., drinking and driving), and drinking while taking medications. Due to its broad focus, the CARET tends to be more sensitive to identifying hazardous, at-risk, or problem drinking among older adults than other measures.

Interventions for Older Adult Substance Users and Abusers

To match the spectrum of intensity of SUDs, there is a spectrum of treatment options available to older adults to help them achieve healthy moderation or abstinence from mood-altering substances. While popular assumptions that older adults are too entrenched in old patterns to make change persist, older adults at times demonstrate treatment outcomes as good or better than younger cohorts for the treatments that have been tested. Access to treatment remains a problem in the USA, as less than 20% of the substance abuse treatment programs offer tailored treatments to an older adult population (Kuerbis and Sacco 2013). Additional barriers to treatment for older adults include geographic isolation, difficulties with transportation, inability to pay, or stigma and shame around development or maintenance of a SUD in late life. As a result of these barriers, nontraditional settings provide unique opportunities for intervention with older adults, such as

emergency rooms, senior centers, and primary care offices (Sacco and Kuerbis 2013). There is a continued, relative absence of knowledge and research on older adults with SUD and treatments that are most effective for them. Interventions discussed below are based on initial empirical support within the substance abuse field or in other fields that have demonstrated efficacy.

Brief Interventions. Brief interventions that focus on alcohol and prescription medication misuse or abuse and vary in length from 15 min to an hour are shown to be effective for older adults (Kuerbis and Sacco 2013). They are usually performed in primary care, and they tend to focus on psychoeducation and normative feedback (i.e., levels of alcohol consumption by peers) about alcohol use or proper administration of medication. Interventionists, who include nurses, social workers, physicians, or other medical staff, provide the older adult with information about potential harms and consequences of substance use, attempt to enhance motivation to change, and, where needed, refer to more intensive services. These interventions, even at their most minimal intensity, are shown to be effective among individuals in late life.

Motivational Interviewing (MI) or Motivational Enhancement Therapy (MET). MI and MET are two very similar interventions that can be implemented as a part of a brief intervention, a stand-alone intervention, or a supplement to longer-term or more intensive substance abuse treatment (Kuerbis and Sacco 2013). Both are client-centered interventions that encourage a nonconfrontational, supportive approach to encouraging healthy changes, making it in this way an ideal approach for older adults. The primary focus of MI and MET is to reduce ambivalence to change by exploring with the client his or her ideas about the pros and cons of both making a change to one's substance use and sustaining current behaviors as they are (Sacco and Kuerbis 2013). Older adults may share motivations with their younger counterparts, and they may also have uniquely strong motivations related to their life stage, such as optimal health and mental capacity (Barry et al. 2001). Despite the seemingly natural fit of MI and MET with older adults, very few empirical studies have been performed to explore whether it works with older adults in a similar fashion to younger adults. Most studies on MI or MET have excluded individuals over 65. A few studies have utilized MI with older adults addressing other health behaviors with some success (Kuerbis and Sacco 2013). However, no rigorous randomized controlled trials have tested how MI works with older adults.

Pharmacology. Pharmacological treatments used for SUD are growing for the population at large. Few medications currently approved by the Food and Drug Administration in the USA are thought to be safe for use with older adults. Disulfiram is a medication that is used as an aversive agent (Kuerbis et al. 2014). It increases the negative effects of alcohol, such that when alcohol is ingested it makes the person extremely ill. Thus the medication is only useful with rigid adherence to the prescription. Disulfiram has been used with adults 50 and older with some success, but it can also place additional strain on the cardiovascular system. Therefore it may be contraindicated for older adults. Naltrexone is an opioid receptor antagonist originally designed for treatment of opioid use disorder that has been applied to alcohol and other substances in the general population. It is thought to work by reducing craving or the pleasurable effects of the substance when it is administered. Initial research findings demonstrate a positive effect of naltrexone among older adults (Kuerbis and Sacco 2013). A major drawback of naltrexone is that it blocks the effects of opiate pain medications, limiting its application to older adults. In addition, it may enhance depressive symptoms or preexisting depressive disorders. Older adults taking this medication should be monitored closely.

Case Management. Case management models are services provided by primary care or community-based agencies that are useful and advantageous in engaging older adults with unhealthy substance use (Kuerbis et al. 2014). This comprehensive approach provides the older adult with more opportunities to address the full extent of medical and psychiatric complexities, rather than focusing solely on substance use reduction. It engages the older adult in working

toward what presumably he or she wants most: overall better health for higher quality of life. Due to the more holistic approach the older adult can feel less stigmatized for his or her substance abusing behaviors and feel that all of his or her problems are being addressed, not just the problems identified by the health care professional (Center for Substance Abuse Treatment 1998). These models are excellent for improving overall health and well-being of older adults and key in maintaining older adults in treatment.

Formal Substance Abuse Treatment. For the older adult willing to participate in the general treatment system, services range in intensity from detoxification and residential treatment to outpatient and aftercare, depending on the severity of the SUD and any comorbid medical complications (Sacco and Kuerbis 2013). Treatment and treatment settings are recommended to be tailored to the potential special physical and mental needs of older adult patients. In the relative absence of such treatments, older adults entering programs with patients of all adult ages should receive special attention when constructing treatment plans and services. For example, services should accommodate stamina for learning and physical abilities. While group treatment is often the modality of choice among treatment programs, as it serves to reduce isolation and shame, group therapy may instead enhance these feelings. Older adults may feel particularly intense shame at having these types of problems in later life, uncomfortable with speaking to persons younger than them about their personal problems, and may feel increasingly alone, such as in the case where he or she is the only older person in the group. Individual therapy should be provided in addition to providing a space for the older adult to explore issues related to recovery that are unique to him or her.

Psychotherapy. Only two types of psychotherapies have been empirically investigated in the context of substance abuse treatment with older adults: supportive therapy models (STM) and cognitive behavioral therapy (CBT) (Sacco and Kuerbis 2013). While now widely accepted that confrontational approaches to substance abuse treatment are less effective and in some cases harmful for any group, STM grew out of the acknowledgment that older adults appeared to do particularly poorly in traditional, confrontational treatments. As a result, STM was developed as a psychotherapy that utilized a nonconfrontational, supportive approach to substance abuse treatment and also incorporated psychoeducation and support around issues observed to be more common among older adults: serious physical health conditions or disease, high rates of co-occurring depression, and social isolation (Center for Substance Abuse Treatment 1998). The focus of STM is to concentrate on helping build social support for the older adult's recovery, improve self-esteem, and similar to a case management model, take a holistic approach to treatment addressing all aspects of the older adult's life. While research is still quite limited in investigating the efficacy of this approach in comparison to traditional treatments, the studies that have been done demonstrate that older adults tend to have better outcomes when treatments have been tailored to their particular life stage as opposed to those settings in which those adaptations have not been made (Sacco and Kuerbis 2013). CBT is a type of psychotherapy that focuses on identifying faulty or self-destructive sequences of thinking, feeling, and behaving within the individual that lead to problem drinking or drug use (Kuerbis et al. 2014). CBT has empirical support for its efficacy and effectiveness across all ages and most population subtypes, including older adults. CBT has been used with older adults for smoking cessation and alcohol use with stronger, more positive outcomes than the comparison treatments (Kuerbis and Sacco 2013). CBT interventions are thought to be effective with older adults because of the structured nature; presenting topics that are particularly relevant to older adult life (e.g., coping with grief); and using written materials for all education levels, taking into account slower learning capabilities, cognitive impairment, memory difficulties or visual impairments; and a slower pace of treatment.

Self-help Groups. Twelve-step programs, such as Alcoholics or Narcotics Anonymous, and other mutual aid groups can help the older adult to reduce isolation, shame, and stigma

(Sacco and Kuerbis 2013). There are no formal studies of older adult participation in such groups; however, older adults may experience shame and stigma of dealing with addiction in late life with a younger generation – similar to what can happen in formal treatment settings. Previous generations of older adults may feel more discomfort with younger polysubstance abusers, as they may present primarily to a mutual aid group for alcoholism. Baby boomers may not experience this tension. Due to the variety of mutual aid groups, some may be better suited for older adults than others, depending on pace of the group, its general focus, or physical accessibility. Older adults, like their younger counterparts, should be encouraged to try more than one meeting before deciding whether it is right for them.

Cross-References

- ▶ Behavioral Analysis
- ▶ Clinical Issues in Working with Older Adults
- ▶ Cognitive Behavioural Therapy
- ▶ Comorbidity
- ▶ Interpersonal Psychotherapy

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Subsyndromal Psychiatric Disorders

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Synonyms

Minor psychiatric disorder; Subthreshold disorder

Definition

Subsyndromal psychiatric disorders (SPD) are characterized by the presence of elevated psychiatric symptoms that do not meet full diagnostic criteria for a specific disorder. Also commonly known as subthreshold or minor psychiatric disorders, SPD are difficult to qualify and quantify given the current categorical taxonomy of mental health disorders. By definition, they are not formally recognized as a diagnosis yet share many common features with their formal diagnostic counterparts (e.g., major depressive disorder). SPD are best viewed within a dimensional approach, with symptoms being present yet falling slightly below clinical cutoff within a diagnostic spectrum, often due to not meeting diagnostic criteria for level of symptom severity, duration, or frequency of symptoms despite causing significant distress.

Subsyndromal symptoms are fairly common in the general population, as well as in older adults, and are associated with a variety of negative factors including high cost to health care, poor physical health, poor quality of sleep, and a negative impact on the family. SPD is most commonly characterized and studied for depression- and anxiety-related symptoms, which will be the focus of this section. Description of psychological disorders and their associated criteria can be found in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5) (American Psychiatric Association 2013) and the *International Classification of Disorders, Tenth Revision* (ICD-10) (World Health Organization 2004).

Presentation and Prevalence

Subsyndromal psychiatric disorders are often described in terms of depression and anxiety symptoms. Subsyndromal depression (SSD), recognized in the DSM-IV-TR's Appendix B (criteria sets and axes provided for further study) (American Psychiatric Association 2000) as minor depressive disorder, is defined as one or more periods of depressive symptoms that are identical to major depressive disorder (MDD). However, these periods involve fewer symptoms, less impairment, and do not meet full diagnostic criteria for another psychiatric disorder. The DSM-5 has reclassified the proposed minor depressive disorder as other specified depressive disorder: depressive episode with insufficient symptoms (American Psychiatric Association 2013).

The occurrence of SSD in late life ranges from 8% to 30% depending on the setting and definition of SSD (Edelstin et al. 1999). A recent US representative sample of older adults found that 13.8% of individuals have experienced subsyndromal depression over his or her lifetime. In comparison, 13.7% of the sample met criteria for lifetime MDD, suggesting a similar prevalence rate between the subsyndromal and clinical disorders (Laborde-Lahoz et al. 2014). Even this high rate may be an underestimate, as another epidemiological study reported a 31.1% prevalence for SSD in adults over the age of 65 (Judd and Kunovac 1998).

Older adults with SSD are at higher risk for developing more severe levels of depressive or other psychiatric symptoms in the future and are at a higher risk for meeting criteria for MDD or an anxiety disorder both at 1-year and 2-year follow-up, with respective conversion rates of 10% and 25% (Laborde-Lahoz et al. 2014; Meeks et al. 2011). Conversion rates from SSD to MDD

are thought to be even higher in long-term care settings, displaying a 23% conversion rate at 1-year follow-up (Meeks et al. 2011). A multitude of factors are believed to increase the likelihood of an older adult developing depressive symptoms, such as low socioeconomic status, social isolation, recent loss of spouse, poor physical health, and serving as a caregiver. Remission rates for SSD vary widely based on the setting. Longitudinal epidemiological research suggests SSD has an 18–26% remission rate over a 3–6-year period, while primary care settings show approximately 50% remission rate at 1-year follow-up. Overall, SSD appears to have a fairly chronic course with intermittent improvements in symptoms, with 61–68% of individuals diagnosed with SSD showing some level of consistent chronic depression, often fluctuating between subthreshold depression and MDD over time (Meeks et al. 2011).

Similar problems are seen across other psychiatric disorders. Anxiety in particular is one of the most common types of psychiatric conditions seen in older adults with prevalence estimates between 1% and 15% in community samples (Bryant et al. 2008). The prevalence of subsyndromal anxiety is substantially higher, with rates between 15% and 52%. The onset of anxiety symptoms when examined over the lifespan appears to be a bimodal distribution, with two-thirds of individuals developing symptoms in adolescence and the remaining one-third of individuals developing symptoms for the first time in older adulthood (Lenz and Wetherell 2009). The etiology for the emergence of anxiety-related symptoms in older adults is likely multifactorial. The degeneration of brain regions associated with inhibiting anxiety, increases in life stressors, cardiovascular changes, and increased utilization of medications, some of which have secondary anxiogenic effects, may all contribute to new onset anxiety in older adults. Many of the risk factors associated with late-life anxiety are similar to those for depression and include being female, experiencing early-life stressors, and having a chronic disability (Lenz and Wetherell 2009).

Subsyndromal generalized anxiety disorder (GAD), also sometimes referred to as minor GAD, is another relatively common psychiatric disorder seen in older adults, characterized by chronic excessive anxiety or worry that is not due to the physiological effects of a medical condition. In older adults, subsyndromal GAD may present as concentration difficulties, poor sleep quality, irritability, muscle tension, and fatigue (American Psychiatric Association 2013). The focus of the worries varies by individual, but common themes include concerns about finances, health, or the well-being of family. As older adults are often faced with multiple anxiety-provoking life stressors (e.g., chronic health issues), when making a diagnosis, clinicians should consider the difficulty the individual has with controlling worry and the level of anxiety-related impairment. Subsyndromal GAD in older adults is associated with many of the problems seen in SSD, including a higher severity of health problems and disability as compared to those who report minimal generalized anxiety symptoms. Subsyndromal levels of panic disorder, social phobia, specific phobia, and obsessive-compulsive disorder are also seen in older adults, although with less frequency. Similar to SSD, the DSM-5 captures subsyndromal anxiety as other specific anxiety disorder, stating that the category applies to a presentation in which anxiety-related symptoms are causing significant distress and impairment in functioning, yet do not meet full diagnostic criteria for a specified anxiety disorder (American Psychiatric Association 2013).

Less is written about other subsyndromal psychiatric conditions in older adults, although they may be noted or recognized as clinical issues in an older patient. Trauma-related disorders, eating disordered behavior, subthreshold bipolar disorder, and subthreshold psychotic disorders are all seen in older adults and may warrant clinical attention. While older adults may not meet full criteria for a disorder at the time of assessment, symptoms may still cause significant distress and be clinically relevant. Older adults may experience cycling or fluctuations in symptom severity which influence the level of disruption in the life of the older adult. Subthreshold disorders, when

co-occurring with other disorders, are also likely associated with worse outcome. For some disorders, such as posttraumatic stress disorder, older adults may experience a spike in symptom severity correlated with major life adjustments, such as retirement or cognitive decline.

Also, little has been written on the impact of subthreshold personality disorders in older adults. Research examining middle aged adults suggests that subthreshold levels of borderline personality disorder (PD) are associated with many of the same symptoms seen in diagnostic levels of borderline PD (e.g., suicidal ideation), stressing the importance of utilizing a dimensional rating system during assessment and symptom monitoring, even when symptoms are at a subsyndromal level (Zimmerman et al. 2013). These findings do not necessarily generalize to other PDs, such as subthreshold levels of paranoid PD, avoidant PD, and obsessive-compulsive PD, which show variable correlations between subthreshold and threshold symptoms severity (Morgan et al. 2013).

Psychosocial Outcomes

While SSD often does not meet the clinical severity of MDD, it is frequently associated with increased risk for similar issues, such as higher rates of medical comorbidities, greater difficulty adjusting to co-occurring medical diagnoses, increased utilization of health-care services, and worse functioning on other aspects of successful aging as compared to nondepressed older adults (Laborde-Lahoz et al. 2014; Vahia et al. 2010). SSD is also associated with increased functional disability in older adults, slower recovery time among patients in inpatient rehabilitation, generally decreased levels of activity, and greater levels of impairment in activities of daily living (Meeks et al. 2011). Further, recent research suggests that depressive symptom influence on quality of life is not static and is associated with functional decline over a 6-month period (Charlson et al. 2008).

Depressive symptoms are associated with a lower general quality of life across multiple domains, including physical functioning, general health, vitality, satisfaction with life, and social functioning (Diefenbach et al. 2012). Anxiety symptoms, which often co-occur with depressive symptoms, are not surprisingly associated with similar functional outcomes. Activity avoidance and anxiety symptoms are associated with increased levels of subjective pain and decreased physical functioning (Hermsen et al. 2014). There is likely interplay between psychiatric symptoms and general functioning in older adults, suggesting a cyclical relationship of increased depressive and anxiety symptoms correlating with decreased ability to function autonomously and lower levels of activity. Increased psychiatric symptoms also often lead to increased social isolation, lower levels of physical activity, and decreased frequency of participating in pleasurable activities, all which likely exacerbate mood problems.

Cognitive Correlates

Subsyndromal disorders are frequently associated with multiple negative outcomes. Elevated anxiety or depressive symptoms in older adults are often linked with poor sleep quality, increased rate of mortality, and a variety of unhealthy behaviors, such as smoking and substance abuse, which carry their own set of associated health problems. Research suggests a correlation between cognitive functioning and psychiatric symptoms, as depression and anxiety symptoms are believed to be associated with worse cognitive functioning and increased risk for future cognitive decline, nearly doubling the risk of conversation from mild cognitive impairment to dementia (Beaudreau and O'Hara 2008; Palmer et al. 2007). Similarly, depression and anxiety symptoms are common in individuals with even mild cognitive difficulties and often increase in prevalence in parallel with the severity of cognitive deficits. One possible explanation for this correlation of cognitive decline and psychiatric symptoms is that an increase in SPD symptoms is a by-product of early neurodegenerative processes and disruption of neural networks. It is also possible that depressive and anxiety symptoms may precede cognitive decline, with increases in psychiatric symptoms

resulting in a decrease in cognitive resources, thus leading to cognitive impairment.

Depressive symptoms in older adults are associated with worse performance on measures of episodic memory and executive functioning. In particular, depressive symptoms in older adults may interfere with the learning of new material. Anxiety symptoms in older adults are also associated with worse executive functioning, particularly in the context of set shifting and the utilization of executive skills to facilitate learning and memory (Yochim et al. 2013). Several other studies report consistent findings, with high levels of anxiety being associated with difficulties in memory (Lenz and Wetherell 2009). These cognitive deficits may be mediated by the type of anxiety symptom, with affective symptoms (e.g., irritability) being associated with memory difficulties, while cognitive symptoms (e.g., worry) are associated with difficulties in response inhibition (Yochim et al. 2013). These two symptom constructs may be associated with different cognitive deficits and represent dysfunction in different networks.

Clinical Considerations

The assessment and differential diagnosis of subsyndromal psychiatric disorders is difficult and especially complicated in older adults. For example, older adults have a high incidence of chronic health problems. Medical disorders common in older adults may present similar to, exacerbate, or even precipitate mental health concerns. Cardiac arrhythmias, hypothyroidism, cardiovascular problems, Parkinson's disease, and a variety of other neurological, gastrointestinal, and general medical conditions may present very similar to psychiatric symptoms. Common mood-related symptoms, such as decreased libido and changes in weight, are often seen in medical disorders and even in healthy aging, leaving the clinician in the difficult position of attempting to parse the etiology of specific symptoms. Related to medical problems, older patients are often on multiple medications and are increasingly susceptible to adverse side effect (e.g., sedation) and drug-to-drug interactions, which may cause symptoms often seen in psychiatric disorders, such as poor concentration.

Further complicating the diagnostic picture, mood symptoms are often common in patients with medical diagnoses. Adjustment to a medical condition, bereavement, and changes in physical ability and quality of life may all result in an increase in depressive symptoms. These mood-related symptoms may be interpreted differently depending on the clinician and the age of the patient. For example, depression in younger adults may manifest through somatic symptoms, such as low energy, decreased sleep, or changes in appetite. In older adults, a clinician or patient may attribute the same symptoms to medical problems or the general process of aging, resulting in a misattribution of depressive symptoms (Edelstin et al. 1999). Older adults may not recognize their symptoms as psychiatric in nature or may be disinclined to accept mood issues as an etiology. Clinicians should not immediately attribute changes in mental health status to normal aging, especially in psychiatric changes that are subsyndromal. Older adults may have a strong, coherent sense of self that does not easily integrate with acknowledging mental health symptoms or need for treatment (Cohen and Eisdorfer 2011).

The life circumstances of many elderly individuals may also complicate the accurate diagnosis of a mood or anxiety disorder. Older adults are often faced with a variety of life stressors and existential concerns including, but not limited to, increased mortality salience, adjustment to retirement, assimilation of aging into his or her self-concept, and changes in level of autonomy. Conceding changes in physical and mental health may be difficult for many patients and may be a stark reminder of the aging process and a loss of youth. Some older adults may be inclined to underreport symptoms due to cognitive dissonance with the aging process and self-concept and concern about diminishing autonomy. The potential of losing driving privileges or the ability to live alone may be on the forefront of a patient's mind and causing significant distress. Determining if realistic concerns about health problems or financial stressors

cross a threshold into specific diagnostic and statistical manual of mental disorders-5 (DSM-5) diagnostic criteria may be difficult. For example, it may be challenging for a clinician to determine if a patient's level of worry is "excessive" to a level that would indicate generalized anxiety disorder or more parsimoniously explained as a natural reaction to profound life stressors.

Conclusions

In summary, the differential diagnosis of SPD in older adults is complex, particularly when considering the prevalence and clinical import of subsyndromal presentations. For instance, SPD may lead to negative outcomes such as increased psychiatric symptoms severity, decreased physical functioning, and lower reported quality of life in older individuals. Given the strict diagnostic criteria for psychiatric disorders, older adults experiencing subsyndromal symptoms may not seek treatment and may not be referred for follow-up mental health care by their primary care provider.

Cross-References

- ▶ Anxiety Disorders in Later Life
- ▶ Comorbidity
- ▶ Eating Disorders and Eating Disordered Behaviors
- ▶ Late Life Transitions
- ▶ Mental Health and Aging
- ▶ Psychological and Personality Testing
- ▶ PTSD and Trauma
- ▶ Schizophrenia and Other Psychotic Disorders in Older Adults

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Suicide in Late Life

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Synonyms

Lethal self-harm; Self-inflicted death

Definitions

A well-accepted definition of *suicide* is: "a self-inflicted death with evidence (either explicit or implicit) of intent to die" (Silverman et al. 2007). Suicidal behavior with a nonfatal outcome is known as a *suicide attempt*. The term *suicide-related ideations* refers to thoughts about suicide, with or without intent to die. This category encompasses *suicidal ideation*, which refers to thoughts of taking one's own life, as well as *death ideation*, which refers to thoughts of death and dying without considering taking one's own life.

Introduction

Suicide, which claims the lives of nearly a million individuals globally each year, is a major public health problem. It is a problem of particular significance for geropsychology, as older adults, and especially older men, are at elevated risk of suicide. Although suicide risk increases with age, suicide is not a normal part of aging. The majority of older men and women who die by suicide suffer from depression or another mental health disorder.

Late-life suicide is a neglected topic. Suicide in late life, as at other ages, has profound negative consequences, including complicated grief for surviving family and friends. Nonetheless, surveys show that the suicide of an older adult is generally viewed as less serious than the suicide of a younger individual. Furthermore, resources for suicide-related research and prevention programs are generally targeted to younger populations, neglecting the problem of late-life suicide. Nevertheless, suicide in late life differs in many ways from suicide among younger individuals, including epidemiology, theory, risk factors, and protective factors. Thus, the need for age-specific research is especially important.

Epidemiology

Throughout the world, suicide rates tend to increase with age and peak in old-old age (age $>$ 85 years). Older adults tend to be disproportionately affected by suicide compared to the general population. For instance, in 2013, individuals over the age of 65 comprised only 14.1% of the population in the United States, but represented 17.5% of all deaths by suicide (McIntosh et al. 2013). Though suicide rates are generally elevated in older adulthood internationally, significant variability has been noted between nations. For example, suicide rates are highest in adults over the age of 85 in Australia and the United States, whereas peak rates in Japan occur in middle age.

Elevated rates of suicide among older adults appear to be largely driven by men rather than women. In most countries throughout the world,

men are more likely to die by suicide than women across all age groups; however, this gap becomes even greater in old age. For example, men over the age of 65 in the United States are approximately five times more likely to die by suicide compared to women of the same age group. On the other hand, women's risk of suicide tends to decline after the age of 60. Notably, in the United States, the suicide rate among White men over the age of 85 represents the highest risk among any age-gender-race demographic.

Late-life suicide rates in most nations also differ as a function of rural versus urban residence. For instance, in China, suicide rates in older adults are significantly higher among rural-dwelling individuals compared to urban-dwelling individuals.

The epidemiology of suicide attempts versus deaths by suicide in older adulthood also is noteworthy. Estimates suggest a ratio of 25 suicide attempts per death in the United States' general population. Among older adults, however, this ratio is drastically lower, with only four attempts per death. Nonfatal suicide attempts are three times more likely among women compared to men. The increased lethality of attempts found in older adults is likely attributable to the more prevalent use of firearms in this demographic. Older adults also exhibit greater planning in fatal suicides compared to younger adults. Thus, the lower attempt-to-death ratio may also reflect greater intent to die among older adults versus other age groups.

Theory

Several prominent theories of suicide have been applied to the understanding of suicide among older adults (Fiske et al. 2015). These include sociological theories as well as psychological theories focused on cognitive, behavioral, and interpersonal factors. A few theoretical frameworks also incorporate a life span developmental perspective.

Durkheim's classic sociological theory explains suicide as a function of social integration and regulation (Durkheim 1897). According to this theory, individuals with weak ties to society, described as having low levels of integration or regulation, are at risk of suicide primarily because they lack a feeling of belonging and are not bound by social norms. Excessively strong ties to society are also linked to suicide, through subordination of one's own interests to those of the society, but these cases are thought to be rare. Research on older adults confirms that lack of social connectedness is related to suicide in late life (Fässberg et al. 2012; Duberstein et al. 2004).

Cognitive theories by Beck and others explain suicide as a result of an individual's interpretation of events that are experienced (Beck et al. 1975). Pessimistic cognitions lead to a form of depression characterized by hopelessness, which is strongly linked to suicidal ideation and behavior in older adults as at other ages (De Leo et al. 2013).

A prominent recent theory of suicide, which incorporates social, cognitive, and behavioral components, is Joiner's interpersonal theory of suicide (Joiner 2005). According to this theory, suicide occurs only when an individual has both the desire to die by suicide and the capability of enacting lethal self-harm. The desire to die is conceptualized as stemming from a thwarted sense of belonging as well as the perception that one is a burden on others. Research generally supports the notion that perceived burdensomeness and thwarted belongingness are associated with suicidality in older adults, as in other age groups. Joiner's interpersonal theory also posits that the capability of engaging in suicidal behavior is a function of an individual's ability to tolerate pain and overcome the fear of dying, both of which are acquired through exposure to painful and provocative events. Given the fact that exposure to painful and provocative events is cumulative across the life span, the theory would predict greater capability of enacting suicide as one ages, consistent with the elevated suicide rates that are observed in late life.

There are other theories of suicidal behavior that have garnered empirical support among younger adults that may also be applicable to older adults. For example, suicide has also been conceptualized as an escape from unbearable

psychological pain by several theorists (e.g., Schneidman, Baumeister). Nonetheless, these theories remain to be evaluated in older adults.

The most relevant theoretical perspectives for explaining late-life suicide are those that integrate life span developmental theory with suicidal theory. Clark proposed a model in which certain behavioral predispositions are adaptive in youth and middle age, but maladaptive in late life, leading to suicidal behavior (Clark 1993). Specifically, this theory predicts that a heavy emphasis on independence may become problematic only in late life, when it may interfere with an individual's ability to adapt to age-related stressors such as a decline in functioning and lead to a suicidal crisis. Empirical findings in older adults are consistent with this theoretical perspective (O'Riley and Fiske 2012; Kjølseth et al. 2009).

Caine and Conwell also proposed a developmentally informed theoretical model to explain changes in suicide risk across the life span and into late life (Caine and Conwell 2001). In this framework, some distal risk factors (such as inflexible personality or childhood trauma) influence suicide risk throughout the life span. Other distal risk factors (e.g., change in role status) may emerge for the first time in late life. Mental health problems serve as proximal risk factors for suicide.

Risk and Protective Factors

There are several well-established risk factors for death by suicide, some of which are specific to older adults. Because of the relatively low base rate of death by suicide, large prospective studies or psychological autopsies (thorough investigation including a review of records and interviews with family and health-care professional after a death by suicide) are typically necessary to identify predictors. Current theory proposes that risk factors can be divided into factors likely to influence *desire to die* by suicide and factors likely to influence the *ability to enact* lethal self-harm (Joiner 2005). Factors that influence desire to die will be discussed first, followed by factors that may increase capability to engage in self-harm behaviors.

Among factors that increase the desire to die are mood disorders and related negative mood states. The vast majority of older adults who die by suicide meet criteria for a diagnosable mental disorder, especially mood disorders (Kiosses et al. 2014). Presence of a mood disorder is one of the strongest predictors of suicidal behavior (Conwell et al. 2011). Compared to younger and middle-aged adults, substance use disorders, anxiety disorders, and schizophrenia are less predictive of suicide in older adults (De Leo et al. 2013). Hopelessness is an affective state that also increases risk for suicide, even after resolution of a depressive episode (Kiosses et al. 2014).

Studies using twins have shown that genetics play a significant role in eventual death by suicide (Fiske et al. 2015). In older people, higher levels of neuroticism, lower levels of extraversion, and lower levels of openness to experience are personality traits that have been found to be related to death by suicide (Conwell et al. 2011). Poor emotion regulation and negative emotions such as anxiety are also risk factors for suicidal behavior (Kiosses et al. 2014). Physical illness, disability, and pain have also been linked to suicide in late life (Conwell et al. 2011). Physical health problems can also contribute to depression, which may explain part of the link (Fiske et al. 2015). Low social connectedness, or thwarted belongingness, is believed to increase the desire to die by suicide among older adults (Joiner 2005).

Among factors associated with the ability to enact lethal self-harm, history of suicide attempt is a consistently strong risk factor for death by suicide. Exposure to death and dying should also lead to habituation and thereby increase a person's capability of enacting lethal self-harm, although this proposition remains to be tested directly in older adults (Fiske et al. 2015). The availability of readily lethal means, especially firearms, will increase the individual's ability to enact lethal self-harm. Men's greater rates of suicide may be partially explained by their use of more lethal means (i.e., firearms). In addition to increasing desire to die, social isolation may increase suicide

deaths by reducing the likelihood that someone would be present to intervene.

Considering cognitive functioning, older adults in the beginning stages of cognitive decline may be most at risk for death by suicide because they are still capable of planning and carrying out highly lethal behavior, especially in the presence of a depressive disorder (Kiosses et al. 2014). However, older adults who attempt suicide show impaired decision-making, compared to other groups (Kiosses et al. 2014). The relations among aspects of cognitive functioning and suicidal behavior continue to be explored.

Protective factors for older adults include social connectedness and support, an absence of the above risk factors, and any personal "reasons for living" (Fässberg et al. 2012). These reasons may include religious beliefs, ties with loved ones, a desire to continue to accomplish or experience events (e.g., a grandchild's graduation), and a view of suicide as morally wrong (Fiske et al. 2015).

Assessment

Given the high prevalence of suicide among older adults, the availability and use of accurate, practical assessment methods and tools represent critical public health issues. One avenue for increasing the accuracy of clinical assessment of late-life suicidality is to utilize contemporary, empirically supported models of suicidal behavior, which incorporate well-established risk and protective factors. The fluid vulnerability model provides a useful framework for suicide case conceptualization (Rudd 2006). Specifically, the fluid vulnerability model posits that an individual's suicide risk at any given time is comprised of both chronic, baseline risk factors (e.g., male gender, mental health diagnosis) and acute risk factors (e.g., recent death of spouse, feelings of hopelessness). Protective factors (e.g., religiosity, positive social support network) are also important for consideration. In light of the fact that there are both developmental and cohort differences in risk and protective factors, it is widely considered crucial that suicide assessment with older adults be tailored as much as possible to this specific population.

Though unstructured, informal clinical interviews are frequently used to assess for suicide risk in later life, specialized assessment instruments exist that can greatly enhance clinical decision-making. Such tools can assist in providing a more comprehensive understanding of an individual's current suicide risk and protective factors. Further, a wealth of research has demonstrated the benefits of administering brief depression screening tools in settings frequented by older adults in order to identify depressed (and potentially suicidal) older adults who might otherwise go unrecognized. Primary care is an especially important example of such a setting, as three-fourths of older adults who die by suicide visit their primary care provider during the year prior to suicide (Luoma et al. 2002). Almost half visit primary care within the 1 month prior to suicide (Luoma et al. 2002). Available late-life suicide assessment instruments consist of both clinician-administered tools and self-report tools, including some tools that directly assess suicidal thoughts and behaviors and others that measure factors known to be related to suicide (e.g., hopelessness, reasons for living, depression).

Because suicide differs in later life compared to earlier life in many important ways (e.g., risk factors, protective factors, lethality), it is essential that assessment instruments exhibit adequate psychometric properties, particularly content validity, in older adult populations. For example, the Geriatric Suicide Ideation Scale (GSIS) is a 31-item self-report measure that assesses both direct suicidal thoughts and behaviors (e.g., suicidal ideation), as well as factors known to be associated with late-life suicide (e.g., death ideation, meaning in life; Heisel and Flett 2006). The GSIS has demonstrated promising psychometric properties among older adults, including internal consistency and construct validity. Instruments that indirectly assess suicide risk via related factors (e.g., hopelessness) also may be especially useful with older adults, considering that older adults are less likely than younger adults to endorse overt

suicidal ideation and, yet, more likely to enact lethal self-harm. A critical review of individual assessment methods and instruments for late-life suicidality is beyond the scope of this entry. However, the interested reader is directed to Dennis and Brown (2011) for assessment recommendations.

There are a number of factors that represent barriers to the accurate assessment of suicidality in later life. Many individuals are hesitant to discuss suicide with older adults due to concerns about potential iatrogenic effects (i.e., discussing suicide might lead to an increase in suicidal thoughts and behaviors). However, a plethora of research has discounted this myth. In addition, many clinicians lack training in managing the care of older adults with heightened suicide risk. Finally, ageism and age-related biases can impede accurate assessment of late-life suicidality. For example, individuals may be more likely to attribute suicidal ideation to normative aging processes in older adults and, thus, less likely to facilitate connecting suicidal older adults with adequate treatment services.

Intervention

There are relatively few empirically supported interventions for late-life suicide (LaPierre et al. 2011). In general, suicide prevention may be described as falling along a continuum of universal, selected, and indicated strategies (Erlangsen et al. 2011).

Universal strategies are applied to the entire populations. For example, legislation that restricts access to firearms in certain US states has been shown to reduce suicide deaths among older adults (Conwell et al. 2011). Several large-scale screening programs have been evaluated with respect to reducing suicidal behavior in Japan and Europe (Fiske et al. 2015; LaPierre et al. 2011). These programs involved screening of older adults for depression and then treating with combinations of psychosocial and psychiatric interventions. Existing evidence suggests that universal approaches can prevent suicides in older adults, but that older men may require psychiatric intervention, not just psychosocial intervention, in order to reduce suicide deaths.

Selected preventive interventions are used for individuals at risk for suicide, before the occurrence of suicidal behavior, but are not specific to suicide-related outcomes. It may be difficult to identify and reach older adults in need of treatment. One way to identify older adults in need of intervention is to use gatekeepers. In the case of older adults, "gatekeepers" may be primary health-care providers, mail carriers, individuals delivering meals, clergy, or other workers who might be in a unique position of contact with older persons (Conwell et al. 2011). Other preventative interventions could be to encourage church or other community activities and to promote access to medical care to relieve disability and pain (Conwell et al. 2011). Telephone-based outreach programs have been shown to reduce suicide and suicide-related outcomes in older adults with psychiatric and medical problems (LaPierre et al. 2011). Because depression is strongly related to suicidal behavior, several large studies have shown reduced suicide-related ideation with the use of depression care managers in primary care (LaPierre et al. 2011). Pharmacological treatments, in particular lithium and antidepressants, are associated with reduced suicide deaths among older adults (Fiske et al. 2015). However, no pharmacological treatment has been developed to specifically target suicidal behavior.

Indicated preventative interventions are used to directly intervene with an individual who is deemed to be at high risk for death by suicide, based on the presence of suicide-related ideation or a suicide attempt (Erlangsen et al. 2011). Indicated interventions for older adults should include multimodal strategies that provide the ability to reach a provider during a time of crisis or for support and the involvement of significant others in treatment as well as address a range of social, emotional, and medical needs (Erlangsen et al. 2011). Because older adults tend to make highly lethal suicide attempts, intervening before an attempt (at the universal or selected levels) is desirable.

Psychotherapy that directly addresses suicidal behavior has generally been developed and tested

with younger samples. However, cognitive and cognitive-behavioral therapies, dialectical behavior therapy, and problem-solving therapy are effective for reducing depression among older adults and show promise for reducing suicidal behaviors (Fiske et al. 2015). Interpersonal therapy is another type of psychotherapy that may be useful for older adults because of its focus on relationships and role transition and has been shown to reduce suicide-related ideation and depressive symptoms among at-risk older adults (LaPierre et al. 2011).

Safety plans are often used with adults who report suicide-related ideation. Safety plans consist of a list of steps that the individual agrees to take if he or she is having thoughts of suicide. These plans generally include coping strategies that the individual has found helpful, phone numbers of supportive family and friends, phone numbers of providers, and contact information for crisis lines and emergency services. Safety plans should not be confused with no-harm contracts (i.e., oral or written agreements by which patients promise not to hurt or kill themselves), which have not been shown to be effective and are not recommended.

Overall, the evidence supporting interventions for suicidal behavior among older adults is minimal but building. Multimodal and comprehensive strategies are recommended in order to identify, support, and treat older adults at risk for suicide (LaPierre et al. 2011).

Conclusions and Future Directions

Suicide is an important issue in geropsychology, considering the elevated risk, particularly among older men. Late-life suicide is best understood by integrating theories of suicidal behavior with a life span developmental perspective. The interpersonal theory of suicide, which proposes that suicide can be understood as a joint function of desire to die and capability of enacting lethal self-harm, appears to have particular relevance for explaining late- life suicide. Risk factors for suicide in late life include genetics, depression and other mental disorders, certain personality traits, poor emotion regulation, hopelessness, history of suicide attempt, impaired decision-making, and social isolation. Protective factors include social connectedness. Further research is needed to distinguish between factors that influence desire to die and factors that influence capability to enact lethal self-harm.

There are reliable and valid methods of assessing suicide risk in older adults, to include self-report and clinician-rated measures of suicidal ideation as well as instruments that assess depressive symptoms and hopelessness but can predict suicide. Because a majority of older adults who die by suicide present to primary care shortly before the death, it may be particularly useful to introduce suicide risk assessment into this setting. Training for professionals may be helpful in reducing barriers to accurate assessment of suicide risk in this population.

There is emerging evidence supporting several types of interventions to prevent suicide in late life. Universal preventive strategies with some empirical support include means restriction (especially related to firearms, such as laws implementing background checks and waiting periods) and large-scale screening for suicide risk. Selected approaches with empirical support include outreach programs (e.g., telephone outreach or gatekeeper training) and treatment for depression and other disorders. Indicated preventive strategies also show promise, but further research is needed.

Additional research on late-life suicide is urgently needed (Szanto et al. 2013). Discovery-related research that distinguishes between risk for suicidal desire and risk for acquiring the capability of engaging in self-harm would be particularly useful. Research is needed to provide additional well-validated, age-specific assessments of suicide risk, including measures that distinguish between normal thoughts of death and suicidal ideation (Szanto et al. 2013). Research is also needed to evaluate the feasibility of conducting large-scale screening and intervention for suicide risk, especially at care transition points within the health-care system (Szanto et al. 2013). Intervention-related research is needed to establish the efficacy of universal,

selected, and indicated preventive strategies within this age group. Finally, additional training is needed to prepare clinicians and others to detect and intervene when an older adult is at risk of suicidal behavior. Suicide is not a normal part of aging, but suicide prevention is part of the job of everyone who works with older adults.

Cross-References

- ▶ Clinical Issues in Working with Older Adults
- ▶ Depression in Later Life
- ▶ Interpersonal Psychotherapy
- ▶ Loneliness and Social Embeddedness in Old Age
- ▶ Mental Health and Aging
- ▶ Problem-Solving Therapy
- ▶ Training Psychologists in Aging

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Survey of Health, Ageing and Retirement in Europe (SHARE)

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Overview

The Survey of Health, Ageing and Retirement in Europe (SHARE) is a unique multidisciplinary and cross-national panel database of ex ante harmonized microdata on health, socioeconomic status, and social and family networks covering most of the European Union and Israel. To date, SHARE has collected five waves of data in 2-year intervals since 2004, including current living circumstances and retrospective life histories. A sixth wave is currently (2015) in the field. Four additional waves are planned until 2024.

More than 230,000 interviews conducted so far give a broad picture of life after age 50, measuring physical and mental health, both objectively and subjectively; economic and noneconomic activities, income, and wealth by sources; intergenerational transfers of time and money within and outside of the family; as well as life satisfaction and well-being. The data are available to the scientific community free of charge at www.share-project.org after registration.

SHARE is harmonized with the US Health and Retirement Study (HRS) and the English Longitudinal Study of Ageing (ELSA) and has become a role model for several aging surveys worldwide. SHARE's scientific power is based on its panel design that grasps the dynamic character of the aging process, its multidisciplinary approach that delivers the full picture of the individual and societal aging, and its cross-nationally ex ante harmonized design that permits international comparisons of health, economic, and social outcomes in Europe and the USA.

Due to their harmonization, the SHARE data and their international sisters encompass a worldwide "historical laboratory" to assess the effects of different policies on health, socioeconomic status, and well-being after age 50. To date (May 2015), more than 1,200 SHARE-based publications assess the chances and challenges of individual and societal aging by exploiting the links between health, economic, and social conditions over the life course observable in SHARE.

Among the key findings is a European North–South gradient in many more dimensions than previously documented. In addition to the well-known income gradient, the health and well-being differences between North and South contradict mortality data and folklore about healthy Mediterranean lifestyle. SHARE has sparked an entire new area of research by revealing a strong correlation between early retirement and the loss of cognitive abilities, social contacts, and well-being. Equally impressive are findings that the large international differences in the uptake of early retirement and disability benefits are more strongly correlated with economic incentives than with health and age.

Background and Development

Population aging is one of the great societal challenges of the twenty-first century. Beginning in the 1990s, this trend mostly affected wealthy countries but is coming up in poorer nations due to their declining fertility rates. According to Eurostat, the rate of older people (65 years and above) in Europe, in relation to persons in their working age, is expected to almost double from 17% in 2010 to 30% in 2060. This is unparalleled in human history and poses big challenges to the welfare state. In 2060, for every one working person, there will be one retired person.

While the demographic trends and its two main causes (low fertility and increasing life expectancy) are clear, not enough is known about consequences and implications of population aging and its manageability through public policy. Understanding how the aging process will affect all of us and disentangling the influences of different cultures, histories, and polices is an important task for researchers in anthropology, demography, economics, epidemiology,

gerontology, history, and sociology in order to turn the challenges of population aging into opportunities.

In response to the European Commission's strong interest in obtaining scientific evidence on population aging in its member states, SHARE was created as a longitudinal survey infrastructure by and for researchers from multiple disciplines (Börsch-Supan et al. 2005). While its development started only in 2002, SHARE has already become one of the crucial pillars of the European Research Area. Since 2012, it is the first ever European Research Infrastructure Consortium (ERIC), with a new legal status and many of the advantages of major international organizations, as well as a long-term perspective up to 2024. The ultimate goal is to provide high-quality microlevel panel data of economic, social, and health factors that accompany and influence aging processes at the individual and societal level. In addition to its multidisciplinary and longitudinal nature, SHARE was set up to be a cross-national enterprise to enable researchers investigating how different European welfare state regimes moderate and mediate consequences and implications of population aging. The data from Europeans aged 50 and over from 18 European countries and Israel are provided free of charge to the scientific community.

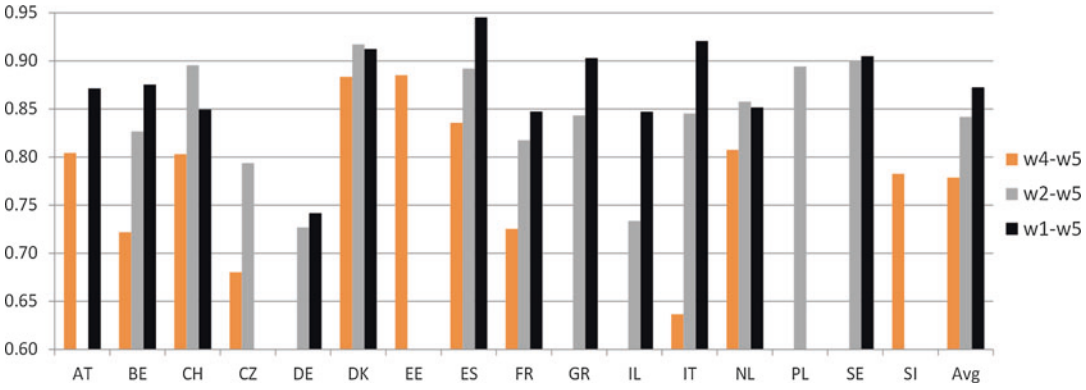
Two more features make SHARE a highly valuable source for genuine cross-cultural comparisons. First, SHARE is closely modeled after and constantly harmonized with its sister studies HRS in the USA and ELSA in the UK. This model has sparked and informed exciting new survey research on aging all over the world, e.g., Japan (JSTAR), China (CHARLS), Brazil (ELSI), South Korea (KLOSA), and India (LASI) which puts SHARE into a truly global perspective. Second and as opposed to these global sister surveys, SHARE in itself is a multinational survey. The SHARE interview is ex ante harmonized, and all aspects of the data generation process, from sampling to translation, from fieldwork to data processing, have been conducted according to strict quality standards. Maintaining this ex ante harmonization in spite of national differences and decentralized funding poses great scientific and governance challenges.

Participation and Population Coverage

After five waves of SHARE, more than 230,000 interviews have been conducted with about 86,000 respondents aged 50 and over and their potentially younger partners in 20 countries (Austria, Belgium, Croatia, Czech Republic, Denmark, Estonia, France, Germany, Greece, Hungary, Ireland, Israel, Italy, the Netherlands, Poland, Portugal, Slovenia, Spain, Sweden, and Switzerland). A person is excluded if she or he is incarcerated, hospitalized, or out of the country during the entire survey period, unable to speak the countries' language(s), or has moved to an unknown address. In addition, current partners living in the household are interviewed regardless of their age. All SHARE respondents that were interviewed in any previous wave are part of the longitudinal sample. They are traced and reinterviewed if they moved within the country (for more information see the SHARE methodology volumes (Börsch-Supan and Jürges 2005; Schröder 2011; Malter and Börsch-Supan 2013)).

SHARE is a multinational survey, which involves differences in sampling resources between countries. Consequently, sample frames are chosen in accordance with the best available frame resources in the country to achieve full probability sampling. Most SHARE countries have access to population registers. SHARE provides sampling design weights to compensate for unequal selection probabilities of the various sample units. Without such weights it is not possible to obtain unbiased estimators of population parameters of interest.

Despite the complexity of the survey instrument and partially decentralized funding, most countries managed to stick to the schedule of having a SHARE data collection every second year. The major exceptions are the later fieldwork periods in Israel in Wave 1 and 2 and, due to funding problems, in Poland in Wave 4. Also, due to lack of sufficient funding following the economic crisis, Greece could not take part in the fourth and fifth waves but is joining again in Wave 6. After merging the Irish SHARE study with TILDA, the Irish Longitudinal Study on Ageing (Kearney et al. 2011), there will be no



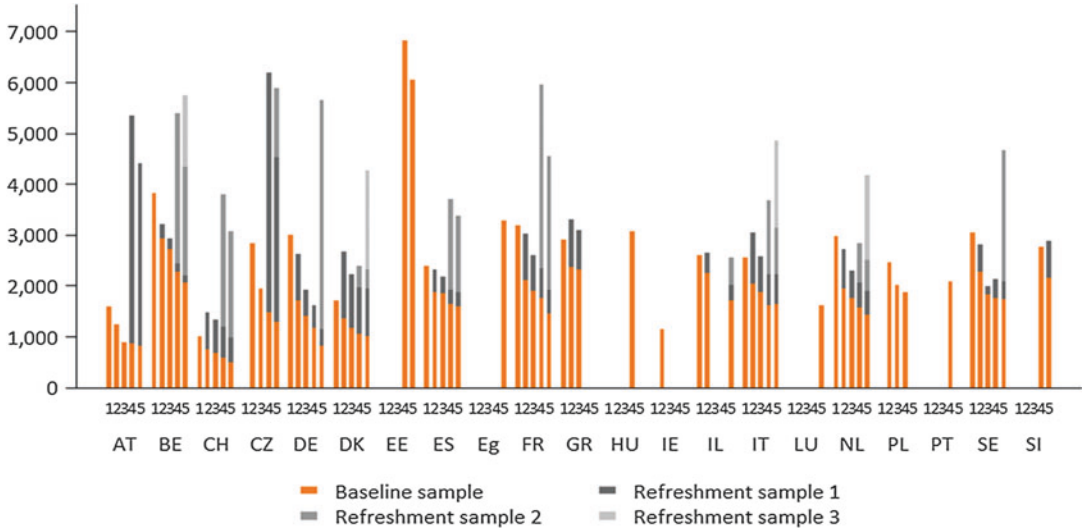
Survey of Health, Ageing and Retirement in Europe (SHARE), Fig. 1 Average 2-year retention rates by sample and country

stand-alone SHARE in Ireland after Wave 3. However, TILDA has taken over substantial parts of the SHARE questionnaire into their study.

The gross samples for the initial wave in 2004 were locally drawn in each of the 12 participating countries. They have been based on sampling frames which acknowledged country-specific circumstances such as the availability of register information, need for screening, expected response rate, etc. This has resulted in more than 50,000 addresses overall. Response rates in the first wave, defined as the proportion of selected households including at least one eligible person from whom an interview was successfully obtained, were about 62% on average. In total, 31,115 interviews were conducted. Existing variation in performance over countries was for the most part consistent with previously known patterns from other international surveys. Cooperation at the individual level was only slightly lower than at the household level. Conditional on household participation an interview could, on average, be obtained from more than 85% of eligible household members.

In the second wave of SHARE, three new countries entered the study. Response rates for the new countries were on average very similar to Wave 1 (about 61%). Additionally, refreshment samples were drawn to increase net sample size and compensate for attrition in the longitudinal sample. Here, response rates were on average a little lower than in the first wave (54%). Individual retention with regard to the longitudinal part of the sample was about 73%. Starting in Wave 2, end-of-life interviews on deceased respondents were administered to relatives or other close persons to the deceased. In total, 34,415 Wave 2 interviews plus 533 end-of-life interviews (EOL) were released, including 18,742 longitudinal interviews. For the third wave, the SHARELIFE study with retrospective life history interviews, no additional households were sampled. 26,836 interviews and 1,139 EOL interviews were conducted in panel households, including 1,158 first interviews with new or previously noncooperating spouses. The resulting individual retention rate was about 77%. In Wave 4, net sample size was substantially increased by including four new countries and drawing refreshment samples in most of the established countries. Altogether, 58,489 interviews, of which 21,566 were longitudinal, and 1,110 EOL interviews were released. Response rates in the baseline (56%) and refresher samples (49%) were on average lower than in previous waves. In this respect SHARE is no exception to the general decline in response rates in face-to-face surveys in Europe and worldwide (Matsuo et al. 2010).

Figure 1 depicts the average retention rate of panel members. It varies a great deal across countries. The average retention rate across all countries and waves is 81%, for the most recently



Survey of Health, Ageing and Retirement in Europe (SHARE), Fig. 2 Data released in SHARE by country and wave

sampled persons 77%. For those interviewed for the first time in Wave 1 (Wave 2, resp.) and reinterviewed in Wave 5, this rate reaches 87% (84%). This reflects the high retention of long-term panel members including the recovery of those respondents who missed a wave. Actually, for every person lost between Wave 4 and Wave 5, almost one person could be recovered from previous waves.

Since 2005, 11 scientific data releases of the SHARE data were compiled. Figure 2 gives an overview of the released interviews by country, wave, and sample.

Variables Collected

SHARE consists of normal panel waves (Waves 1, 2, 4, 5, and 6) and retrospective life histories (Waves 3, repeated for all new respondents in 7).

SHARE panel. Covering the key areas of life, namely, health, socioeconomics, and social networks, SHARE includes a great variety of information: health variables, physical measures and biomarkers, psychological variables, economic variables, and social support variables as well as social network information (see Table 1 for more details):

- ***Health variables*** include self-reported health, physical functioning, physical measurements such as grip strength, walking speed, peak expiratory flow, chair stand, and body mass index (BMI); health behaviors; and the use of health-care facilities. Wave 6 will add biomarkers extracted from capillary blood such as glycated hemoglobin (HbA1c), a marker of diabetes; C-reactive protein, a marker of cardiovascular disease; cytokines such as TNF-alpha, IL-6, and BDNF, involved in low-grade inflammation, frailty, and cognitive function; and Vitamin D.
- ***Psychological variables*** include mental health components such as depression, several tests of cognitive functioning, well-being, life satisfaction, and control beliefs.
- ***Socioeconomic variables*** include current work activity, job characteristics, job flexibility, opportunities to work past retirement age, employment history, pension rights, sources and composition of current income, wealth and consumption, housing, and education; in some countries linkage to administrative data on employment, labor income, and pension claims.
- ***Social support variables*** include assistance within and beyond families, transfers of income and assets, social networks including

Survey of Health, Ageing and Retirement in Europe (SHARE), Table 1 Information collected in the SHARE panel Waves 1, 2, 4, 5, and 6

Questionnaire modules	Examples
Coverscreen	Year and month of birth, sex, household composition
Demographics	Education, marital status, country of birth and citizenship, parents and siblings
Physical health	Self-rated health, diseases, weight and height, (I)ADL limitations [(instrumental) activities of daily living]
Behavioral risks	Smoking and alcohol, nutrition, physical activity
Cognitive function	Self-rated reading and writing skills, orientation, word list learning immediate and delayed recall, verbal fluency and numeracy
Mental health	Depression scales (Euro-D and CES-D), quality of life (CASP-12)
Health care	Doctor visits, hospital stays, surgeries, forgone care, out of pocket payments
Employment and pensions	Employment status, individual income sources (public benefits, pensions), job, work quality
Children	Number and demographics of children
Social support	Help and care given and received
Financial transfers	Money/gifts given and received
Housing	Owner (mortgages, loans, and value), tenant (payments), type and features of building
Household income	Income sources all household members
Consumption	Expenditures for food, goods, services, ability to make ends meet
Assets	Bank and pension accounts, bonds, stock and funds, savings
Activities	Voluntary work, clubs, religious organizations, motivations
Expectations	Expected inheritances, life expectancy, future prospects
Interviewer observations	Willingness to answer, understanding of questions, type of building, neighborhood
New modules after Wave 1	
Since Wave 2: end of life	Death reasons and circumstances
In Wave 4: social networks	Ego-centered network, contact, emotional closeness, geographical distance, satisfaction with network

ego-centered network size and intensity, and volunteer activities.

The interviewers used computer-assisted personal interviewing (CAPI) to collect most of the data in all waves. In addition self-administered questionnaires (drop-off) were handed out in Waves 1, 2, and 4 after completion of the CAPI. If respondents deceased, EOL interviews were conducted face to face (CAPI) or by telephone (CATI) with a proxy, collecting the information regarding the respondent's last year of life. Proxy interviews were also used when respondents were not able to do an interview, for example, due to health reasons.

Even though SHARE is a panel survey with a stable core questionnaire over time, innovative research questions, physical measurements, or modules have been incorporated in each wave. For example, in Wave 2, two physical measurements – peak flow and chair stand – were added (see next section for details). In Wave 4 a completely new module – the social networks module based on a name-generator approach – has been implemented to learn more about the social connectedness of respondents. In Wave 6 dried blood spots were taken to measure blood sugar, C-reactive protein, and cholesterol.

To assure an easy and fast entry into cross-national data and high convenience while working with the data, it is necessary that certain variables are readily provided, especially those that allow a valid comparison between countries, such as the International Standard Classification of Education (ISCED). Besides internationally standardized variables, SHARE datasets provide further generated variables that ease or enhance working with SHARE data as well as different kinds of weights and multiple imputations (see the documentation at www.share-project.org/data-access-documentation/).

SHARELIFE retrospective life histories. In SHARELIFE, retrospective data with respect to childhood living circumstances, partners, children, accommodation, employment, and socio-economic and health conditions were collected with the help of a "Life History Calendar" similar to the one applied in ELSA (Schröder 2011). The combination of the SHARELIFE with SHARE

and ELSA data thus gives a detailed picture of the current status of individuals in Europe with a view across their entire life courses (Börsch-Supan et al. 2011). Table 2 provides more details.

Physical measurements and biomarkers. Until today, physical measurements and biomarkers were mostly taken in smaller, nonrepresentative clinical studies. In the last couple of years, more and more large-scale surveys added physical measurements and biomarkers to their program since standard health questions in surveys are often subject to the respondents' own interpretation (of the question), own evaluation or perception (of health status), and own knowledge (of health status). The value of subjective health measurements is undeniable, but some research questions require objective measurements. Biomarkers enable researchers to validate respondents' self-reports and therefore to study the amount and determinants of under-, over-, and misreporting in large-scale population surveys. Biomarkers can help to understand the complex relationships between social status and health and allow identification of predisease pathways, since physiological processes are often below the individual's threshold of perception. From the first wave on, SHARE combined self-reports on health with physical performance measurements. Dried blood spots have been collected in Germany during Wave 4, and a full-scale collection of dried blood spots in all countries is taking place in Wave 6.

Linking survey and administrative data. Survey data can cover a wide range of topics. However, the information provided by respondents is often incomplete or inaccurate. Administrative data on the other hand are much more complete and accurate since they are process generated. The disadvantage of administrative data is that the information is limited to certain topics only. Linking survey data with administrative data is a way to combine the best of both worlds. SHARE thus cooperates with the German Pension Fund (DRV) and has linked the German survey data with administrative data held by the DRV in a pilot study in the third wave of SHARE. The administrative data consists of two parts: The first part is longitudinal and includes sociodemographic characteristics (such as age, sex, number and age of

Survey of Health, Ageing and Retirement in Europe (SHARE), Table 2 Retrospective information collected in SHARELIFE (Wave 3)

Questionnaire modules	Examples
Start of the interview	Year and month of birth, sex
Children history	Pregnancies, births, children characteristics, maternity leave
Partner history	Living arrangements, marriages, divorces
Accommodation history	Residences (country, region), moves, types of accommodation, ownership
Childhood circumstances (Age 10)	Accommodation features, number of books, school performance
Work history	Employment status, job characteristics, income
Work quality	Effort, demand, control, job circumstances
Disability benefits	Disability leaves, work reduction, disability pension
Financial history	Investments in stocks, funds, insurance uptake, retirement savings
Health history	Hospital stays, illnesses, diseases, current self-rated health
Health-care history	Vaccinations, doctor visits, preventive checkups, health behaviors
General life	Periods of happiness, stress, financial hardship, hunger, persecution, oppression
Interviewer observations	Willingness to answer, understanding of questions, type of building, neighborhood

children, and education) and detailed information about the working history as well as all activities which generate public pension entitlements. That data is implemented as a panel database beginning at age 14 which provides that information on a monthly base. The second part is cross sectional and only available for retirees. Included is information on the calculation of the pension benefits. The two datasets are updated every year (Korbmacher and Czaplicki 2013).

Data Usage

Access to the infrastructure via two data archives is free for all scientists globally, subject to European Union data protection regulations: http://www.share-eric.eu.

The scientific power of SHARE is based on three elements: its panel design which grasps the dynamic character of the aging process, its multidisciplinary approach which delivers the full picture of the aging process, and its ex ante cross-national harmonization which permits rigorous benchmarking and policy evaluation across countries. Such a data set takes time to build up. Since 2004, when SHARE was started, the number of countries almost doubled from 11 to 20.

SHARE has succeeded surprisingly fast to create a large user community. Since the first public release of SHARE data in April 2005, SHARE has attracted more than 4,300 registered users with an unbroken, more than linearly increasing trend. Since we count registrations not including work students and students in class, we estimate an approximate number of 10,750 actual users. While users include mainly scientists from Europe, researchers from the USA are now the second largest user group after Germany, before Italy and the Netherlands. We interpret the acceptance of SHARE by so many researchers, and particularly in the USA, as an indicator of SHARE's high scientific value.

Arguably the best indicator for the success of a research infrastructure is the number of published findings emanating from it. In addition to four comprehensive volumes of first results from the SHARE baseline, longitudinal, and retrospective waves (2004–2012) which have been complemented by several national collections of findings, more than 50 books and 1,000 articles in peer-reviewed journals and volumes have been published based on SHARE data. This is the current state. Based on the experience of other panel data, their usefulness and thus user and publication numbers will increase steeply with the number of future waves.

SHARE has generated some surprising findings which have received wide-spread attention. Three examples may show the breadth and quality of successful SHARE-based research:

- Already the first wave of data revealed a European North–South gradient in many more dimensions than previously documented. While the income gradient was known, thanks to earlier Eurostat data, the health and subjective well-being differences between the North and the South of Europe were a surprise because they contradict mortality data and folklore about healthy Mediterranean lifestyle. These findings pose new fundamental questions, e.g., about the economic, social, and medical causes for a divergence between mortality and morbidity.
- Another surprising finding from SHARE has sparked an entire new area of research and a lot of controversy: SHARE data revealed a strong correlation between early retirement and the loss of cognitive abilities both within and between European countries. A fruitful cooperation between cognitive psychologists, gerontologists, economists, and sociologists has begun to identify the causes for this finding which range from the cognition-stimulating effect of work even if it is unpleasant to the social isolation experienced by many retirees. It sheds new light on the EU's strive for active aging.
- Equally surprising is the finding that the large international differences in the uptake of disability benefits are not at all correlated with health or demographic differences in Europe, such as those mentioned above between the North and the South. Rather, they are almost

completely explained by the different rules and regulations of the various disability insurance schemes in the member states and document how powerful economic incentives are for retirement behavior.

Many of the SHARE findings have strong policy implications for aging societies, such as tighter targeting rules for disability insurance or a stricter handling of early retirement pathways. SHARE has been successful in providing help for evidence-based policy making, both at the European Union and the member state level. SHARE is also intensely used by the Organisation for Economic Co-operation and Development (OECD) and the World Health Organization (WHO).

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Sustainable Employability and Aging

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Synonyms

Adaptability; Career potential; Sustainable careers

Definition

Employability is the capacity of continuously fulfilling, acquiring, or creating work through the optimal use of competences. Sustainable careers are the sequence of an individual's different career experiences, reflected through a variety of patterns of continuity over time, crossing several social spaces, and characterized by individual agency, herewith providing meaning to the individual.

Over the past decades, substantial evolutions have taken place in the world of work which has important implications for the nature of careers. Careers have become more insecure, both from an organizational and an individual viewpoint. Employability has become a critical condition both for the sustainability of employees' careers and for organizations, which for their performance depend on the employability of their workforce. The aging of the workforce has brought these challenges even more to the forefront. Employees will have to work longer and thus will need to safeguard their employability also at older ages. For organizations, investing in employability of their aging workforce requires a shift in mindset which requires a different stance toward the meaning of age in careers. The goal of this entry is therefore to examine the role of age in employability models and to address the notion of sustainable careers.

Overview of This Entry

This entry consists of six main parts. First, we define the concept of employability. Second, we discuss the process of self- and other appraisal of employability and the challenges for organizations to overcome common age-related stereotypes about employability and performance. In the next two parts, we summarize empirical findings on the role of age in the relationships between employability, on the one hand, and career success and job search intensity, on the other hand. In the fifth part, we take a closer look at the notion of sustainable careers and its meaning from the perspective of employability throughout the life span. We close this entry by highlighting some important reflections on future research and practice in the domain of sustainable careers.

Defining and Operationalizing the Concept of Employability

Employability is a concept that is studied from different angles and defined on more than one level (individual, organization, industry, society). The concept came into use from about 1955 (Versloot et al. 1998) and has acquired different meanings over time. The particular context in which employability is used influences its definition. There has been a lack of studies integrating the different perspectives adopted in employability research. Business and management studies, HRM, HRD, educational science, and career theory are each examples of the use of the concept on different levels and the different meanings that are attributed to employability. This has led to the concept of employability remaining rather abstract and vague. Apart from the great variety in employability definitions, one could consider the concept as useful in pointing to certain historical work and organizational developments in Western countries. More specifically, one may detect a relation between the conceptualization and the transition of an industrial to a postindustrial society. Employability in that sense is a symbol to address work-related problems related to this transition.

Scholars have described the development of the concept from the 1970s to the 1990s (time span not the same for each country), and this development is characterized by a shift of 'government' to 'organization' to 'employees' as the most important party responsible with regard to employability concerns, here defined as deployment. Three time periods correspond to three different definitions of work from the perspective of those different parties, namely, full employment (government), putting people to work with a match between supply and demand (organizations), and attractive paid work (individual) (Thijssen 2000). A parallel shift in studied target groups occurs from "population groups" to "internal organizational segments" to "very specific target groups," such as employees in their thirties.

Definitions of employability at an individual level are abundant (e.g., Versloot et al. 1998; Forrier and Sels 2003), each emphasizing different as well as similar career aspects on the part of individual employees, but all with employment as outcome: physical suitability, cognitive suitability, (career) development, learning, de-specialization, flexibility, adaptation to (fast) changes, and mobility (both external and internal). Employability is believed to accommodate several or all of these aspects, depending on the angle from which it is studied and consequently cannot be seen as a unidimensional construct.

In search of the core of the concept, various attempts have been made to capture and to categorize its constituent dimensions. We define employability as the capacity of continuously fulfilling, acquiring, or creating work through the optimal use of competences (Van der Heijde and Van der Heijden 2006). This definition is compatible with definitions like "the chance for employment on the internal or external labour market" (Forrier and Sels 2003) and "a form of work-specific active adaptability that enables workers to identify and realise career opportunities" (Fugate et al. 2004). It implies a permanent acquisition and fulfillment of employment within or outside the current organization, for present or new customer(s), and with regard to future prospects (Van der Heijden et al. 2009).

Several studies in the field of employability have used a thoroughly validated measurement instrument (Van der Heijde and Van der Heijden 2006), with high psychometric qualities, wherein domain-specific expertise (occupational expertise is defined as domain-related knowledge and skills.) is complemented with four more generic competences: (a) anticipation and optimization (anticipation and optimization is defined as preparing for and adapting to future changes in a personal and creative manner and striving for the best possible results), (b) personal flexibility (personal flexibility is defined as the capacity to adapt easily to all kinds of changes in the internal and external labor markets that do not pertain to one's immediate job domain), (c) corporate sense (corporate sense is defined as the participation and performance in different work groups, such as organizations, teams, occupational communities, and other networks; sharing responsibilities, knowledge, experiences, feelings, credits, failures, goals, etc.), and (d) balance (balance is defined as compromising between opposing employers' interests as well as one's own opposing work, career, and private interests (employee) and between employers' and employees' interests). The first two dimensions are flexibility dimensions, discernible as one proactive/creative variant and one more passive/adaptive variant. Corporate sense represents the requisite increase in social competence. The dimension of balance is added, taking into account the different elements of employability that are sometimes hard to unite and which require fine-tuning, such as current job goals and career goals, to give an example (Van der Heijde and Van der Heijden 2006).

In the remainder of this entry, we will go into the role of age in the relationships between employability, on the one hand, and career success and job search intensity, on the other hand, and on the meaning of sustainable careers from the perspective of employability throughout the life span. However, in order to better understand the possible impact of employee age upon multisource ratings of employability (self-ratings versus supervisor ratings), it is of utmost importance to understand the phenomenon of age-related

stereotyping in performance ratings and possible ways for organizations to combat this.

Age-Related Stereotyping in Appraisals of Employability: Self-Other Disagreement in Performance Ratings

Age-related stereotyping is an important phenomenon where assessments concerning quality and performance assessments about the employee's current functioning or about his or her future career potential (employability) are made by supervisors. Every human being forms stereotypes in order to make his or her world more orderly and predictable, with supervisors in working organizations being no exception. However, many stereotypes are based on cognitive errors. These errors are most likely to occur where people do not have extensive contact with the subject in question and where they do not have any additional information about the individual members of a group. In judging employees whom we do not know very well, we may see them all mainly as members of one and the same group with a common set of attributes. The outcomes of previous research indeed confirm that supervisors have a more negative opinion of the functioning of the over fifties compared with that of starters and mid-aged employees (e.g., Van der Heijden 2001).

Moreover, the nature of the ratee, self, supervisor, colleague, or customer (multisource ratings or 360° feedback methodology) produces very different information about the employee. One manager's idea of, for example, the worker's employability may be concretely quite different from another's. After all, any rating is only an indication of how the person (often the manager) applies a fuzzy criterion. Especially in the case of a poor operationalization of the performance indicator in question, rating systems give people a false sense of security, protection, and objectivity. Yet all assessments, of whatever kind and in whatever context, occur in the cognitive processing of an individual human being. As assessment occurs "in the head," it is always, necessarily, and by definition subjective (Van der Heijden and Nijhof 2004). Now, of itself, this is neither good nor bad. That is just how it is. The important question here is how we respond to the inevitable subjectivity of assessment and to the fact that judgment depends on values and accordingly is subject to response sets, for example, due to stereotyping.

The accurate interpretation of differences in appraisal by different sources requires that one can assume that each set of raters uses the same metric. If, for whatever reason, one group of raters interprets the text of an item or a set of items differently from another group, the resulting differences in the ratings may be the result of not only the observations of the raters but also of the interpretative difference elicited by the item (Penny 2001). The findings of previous empirical studies on occupational expertise, being an important indicator of employability, indicate that employees "think" somewhat better of themselves than supervisors do or at any rate they give a rosier image (Van der Heijden 2001). The scale ratings given by the employees themselves are all significantly higher than the corresponding ones made by their supervisors. This is not thought to be caused by the measurement instrument itself, because the scale reliabilities and discriminant validity are high, both for the self-ratings and for the supervisor ratings. The tendency to present oneself positively, the so-called leniency effect, is common in performance ratings (Golden 1992).

Nonetheless, that an item can function differently for different groups of raters suggests the existence of a degree of measurement inequivalence between the rater groups, and this inequivalence may be indicative of systematic bias in ratings between particular groups of raters. This outcome raises important questions about the reliability and objectivity of performance ratings in general. It might be that self-ratings reflect a reliable but somewhat more differentiated self-image. Supervisors are more consistent in answering. If they are asked to account for their employee's performance, it seems that they are inclined to give unanimous answers, meaning that the scores for items are more accommodated to each other. That is to say, the ratings made by supervisors are more colored by the ratings for other items and, also, for other dimensions of the attribute that is to be evaluated.

Possibly, the supervisor ratings are strongly influenced by a response set, for instance, the degree to which they like or dislike the employee in question as a person. It is well known that such liking–disliking factors, or the "halo effect," can have a strong effect where persons are required to give valid and dependable judgments of other persons, but are not well informed enough to base their judgment on observations of real-life behavior of these people or on relevant real-life events that they are involved in. Ratings by supervisors are based on a much smaller amount of information, leading to the so-called effect of under-sampling. The effect of under-sampling arises because of the fact that supervisors tend to be more superficially acquainted with their employees, due, for instance, to a lack of communication between the two parties (employee and supervisor), especially in the case of higher-level employees, whose work is highly independent and often solitary even. The effect of under-sampling is thought to give rise to the occurrence of response sets. An example of a response set that can be highly influential is stereotyping, for example, on account of age (Rosen and Jerdee 1976).

Based on the outline given above, we conclude that it is not sound from a statistical point of view to aggregate the scores from different sources: for example, the employee and the supervisor. In fact, this procedure may be very misleading. We should rather spend much more time in analyzing the exact meaning of data on performance assessments emerging from the 360° feedback methodology. If we do not take the time to do so, we are in danger of conducting "sophisticated" analyses before understanding the exact nature of perceptions about the employee's current functioning or about his or her future career potential (employability), that is to say, before having established the measurement equivalence.

Specifically, there are two aspects of measurement equivalence: (a) conceptual equivalence, the comparability of constructs, and (b) psychometric equivalence, the comparability of psychometric properties of measurement scales (Cheung 1999). *Conceptual equivalence* exists when, for example, employees and their supervisors use the same conceptual frame of reference for evaluating, for instance, the worker's employability, that is, in case raters use the same items to represent dimensions and assign similar weights to items, appearing from factor form equivalence and factorial invariance. As regards *psychometric equivalence*, there have been many studies that examine the properties of self-rated performance, and response bias, such as measurement errors, low variability, and leniency error, to mention some frequently found aspects. When comparing self-ratings with supervisor ratings, response bias not only attenuates the power of statistical analyses, but non-equivalent psychometric properties (unequal response sets) also lead to biased results.

The same would apply to ANY appraisal instrument, whether one uses multiple sources or just a single manager. The fact is that we do not think about this as a problem where a single manager carries out the performance appraisal. However, if we consider five managers rating the same employee, we would run into the same problem of poor psychometric qualities. If the appraisal system that we use to make decisions on mobility, firings, promotions, pay raises, etc., can be demonstrated to have low psychometric qualities, for instance, due to age-related stereotyping, it may even confront the company with a variety of problems, like lawsuits and accusations of discrimination on the basis of illegal criteria. Lawsuits apart, decisions that are perceived as unfair will have negative consequences on the motivation, loyalty, and extra-role behavior of employees (e.g., Nijhof et al. 2000). Earlier research in the field of organizational justice theory shows that this kind of procedural unfairness indeed has strong effects on the performance and citizenship behavior of subordinates (e.g., Rutte and Messick 1995).

In order to truly make use of knowledge of perception differences and to openly share the information, employee and supervisor should have an elaborate base of information to talk about the differences in perception. Supervisors should do their utmost to gain greater insight into the potential of one's workforce and should therefore bridge the gap that exists between them and their subordinates, especially as the supervisor's opinion is to a great extent influential upon the

career of the individual employee. We also advocate more interaction between supervisor and employee, and in fact between all parties involved, given the expected buffer function of increased interaction in the light of stereotyping (*unknown … unloved; known … loved*), for instance, on the base of age.

However, ratings on their own do not convey sufficient information for people to improve. In order for staff to develop and learn, they need to know what they should change, where (specifically) they have fallen short, and what they need to do. In some cases, a personal coach may be the key to deal with the inherent discrepancies found in multisource ratings. Moreover, expert behavior is something that has to be learned on the work floor with feedback from supervisors and close colleagues. When skills are developed "on the job," staff members function as codevelop partners, and the chances that self-perceptions of performance appraisals do not correspond with the perception of other parties will diminish (Stoker and Van der Heijden 2001).

Employees should not just learn by means of courses or training programs, but by working together with their supervisors. Supervisors can be "sponsors" of several assignments throughout these courses. In this way, they can help facilitate the development of their subordinates. Implementing 360° feedback for developmental purposes centers on communicating evaluation information to the focal employee. This process is aimed at increasing employees' self-awareness, helping them to set goals, focusing on areas of development, and, ultimately, altering their behavior to improve job performance and to stimulate greater dialogue between all parties involved (Stoker and Van der Heijden 2001).

In the next two parts of this contribution, we will go into the role of age in the relationships between employability and two important outcomes (career success and job search intensity). Although age has often been included as a covariate or confounder in previous employability research, few researchers have explicitly studied age differences in the relationships between model variables.

The Moderating Role of Age in the Relationship Between Employability and Career Success

Career success refers to real or objective, and perceived or subjective accomplishments of individuals in their work lives (e.g., Judge et al. 1995). From an objective perspective, career success is evaluated using external reference points or norms and is operationalized by means of quantifiable employment history criteria that include promotion rate, income or salary, and attained organizational level. Obviously, performance appraisals about current or future functioning of individual employees play a major role in decision processes regarding their objective career outcomes.

Therefore, it is likely that employability (or career potential) is positively associated with career success (Van der Heijde and Van der Heijden 2006). Moreover, as decisions about career mobility appear to depend heavily on career and life stage considerations (Feldman and Ng 2007), it is expected that employee's age moderates this relationship in case supervisor ratings are used.

Few career researchers have studied differences in relationships between model variables for distinguished age groups. However, differences in self-reported and supervisor ratings of employability and subsequent career outcomes, depending upon employee's age, are plausible considering the prevalence of age-related stereotyping (Van der Heijden et al. 2009) and increased person–environment (P–E) fit for older workers (Wright and Hamilton 1978). Negative stereotypical beliefs about older workers may stem less from their current performance levels, yet more from fears of their supervisors as regards their future prospects. And equally distressing, just as immediate supervisors make relatively negative assessments of the "pay-off" period for career investments, older workers themselves also deliberately take into account whether the investment is worth the effort (that is to say, a self-fulfilling prophecy occurs; see also Van der Heijden 2001). As such, they confirm the negative differential treatment they receive in their work environment, and we may therefore expect a

stronger positive relationship between supervisor-rated employability and career success of the youngsters versus the over forties.

As regards the increased P–E fit for older workers, earlier career development theories focused on the idea that one's self-concept becomes more clearly defined with age, and that career choice is a process of matching one's self-concept with images of the occupational world (Watkins and Subich 1995). Similarly, the "job change" hypothesis (Wright and Hamilton 1978) states that due to experience, seniority, and skills, a selective group of active older workers will have obtained a relatively better P–E fit and higher occupational levels with more job control compared to their younger colleagues. The increased P–E fit for older workers may result in a relatively stronger relationship between self-rated employability and career success for the over forties, compared to their younger counterparts.

Indeed, in previous empirical work, it was found that for the younger workers self-reported employability contributes to both overall promotions and current gross income, while supervisor ratings appeared only to contribute to current gross income (Van der Heijden et al. 2009). For the over forties, on the other hand, highly different results have been found. Self-reported employability appeared to be positively related to overall promotions, while in case the supervisor ratings of employability were used, the relationship was negative (Van der Heijden et al. 2009). Possibly, our results reconfirm the prevalence of age-related differences in supervisory attitudes (e.g., Van der Heijden 2001). Moreover, it is conceivable that for the over forties in particular, the previously discussed "instrumental style of leadership" plays an important role (Van der Heijden 2001).

The Moderating Role of Age in the Relationships Between Occupational Expertise, Self-Perceived Employability, and Job Search Intensity

Job search intensity refers to the frequency with which job seekers engage in job search behaviors or activities (Blau 1994). One of the factors leading employees to search for another job on the external labor market is their self-perceived employability. While employees' perceptions of *internal* employability (i.e., the idea that there are alternative jobs available for them in their current organization) might reduce the likelihood of external job search, their perceptions of *external* employability (i.e., the idea that there are alternative jobs available for them in the external labor market) might increase the likelihood of external job search. Notwithstanding the opposing effects of internal and external self-perceived employability on job search intensity, both are likely to be positively affected by occupational expertise. Occupational expertise may strengthen employees' labor market value, so that they become more employable, not only in the internal but also in the external labor market (Forrier and Sels 2003).

Although these relationships make sense from a theoretical viewpoint and can be supported with earlier empirical work, the question remains to what extent age may play a role in affecting these relationships. Most studies tend to focus on the main effects of age on outcomes like occupational expertise, employability, or job search. It is equally important however to understand whether the relationships between these variables hold across different age categories. For instance: Will an employee aged 55 plus be as likely to engage in job search when he or she has low perceptions of internal employability in comparison with an employee aged 25? There are several theoretical reasons to expect different dynamics depending on age which can be deduced from theories on life-span development, motivational theories, and literature on opportunity structures. More specifically, one can expect that these relationships will become weaker with increasing age.

An empirical study among employees working in private sector firms provides mixed support for the moderating role of age (De Vos 2999). In accordance with socio-emotional selectivity theory which posits that older employees are less driven by growth motives and more by socio-emotional motives (Carstensen et al. 1999), older employees were less likely to engage in job search when their perceived internal employability was

low, compared to their younger counterparts. However, age did neither moderate the associations between perceived external employability and job search nor the associations between occupational expertise and perceived internal or external employability.

Based upon these findings, we posit that it is important for organizations to understand that occupational expertise is a critical antecedent of perceived employability. However, referring back to the distinction between self and other appraisals earlier in this entry, these self-perceptions of employability will not necessarily be consistent with how others might perceive the employability of older workers – while it will still be these others who might affect older workers' actual opportunities in the internal labor market. As a result, organizations might risk to decrease the motivation and engagement of older employees who, despite their occupational expertise, do no longer perceive internal opportunities for further growth or development but yet stay in their current organization. This might have negative consequences for the sustainability of careers of the employees involved, for the dynamics and motivations in teams of colleagues, and for organizational performance in the long run.

Toward Sustainability Across the Life Span

Based upon this entry, we may conclude that there is indeed a broadly held and persistent view that older workers are less able to cope with the demands of the modern, complex, and competitive organization than younger employees and that older workers' ability or motivation to change jobs or to learn new skills and expertise has deteriorated. Moreover, the possible danger of a self-fulfilling prophecy even worsens the situation, referring to the emotional, attitudinal, and behavioral reactions of the older worker to the instrumental leadership style that is only focusing upon the here and now functioning and wherein supervisors ignore the strength and capacities of their senior staff members. These reactions might, for example, consist of a decrease in motivation and engagement, a decrease in efforts from the employee's side to actively engage in their future employability enhancement, and increased immobility which is translated in "getting stuck" in their current organization wherein no further opportunities for growth and development are perceived, to mention but a few.

Enhancing workers' competences throughout their life span and adjusting their workplaces and tasks will offer these workers significant future career potential within the labor market. HRM policies should be rooted into a so-called "conservation" model, wherein employees, regardless of their age, are seen as long-lasting valuable organizational assets, instead of the long-adhered "depreciation" model. As older employees are not less motivated to acquire new knowledge and skills, compared with their younger colleagues, management, in particular one's immediate supervisor, should focus upon facilitating employability and career success across working life. With an age-conscious HRM policy, aging of the working population does not need to pose a threat.

Moreover, individual development plans are needed that are based upon valid and reliable multisource instruments and sufficient guidance and training for the raters, not in the least place aimed at detection rating biases. To our opinion, the employability measurement instrument that has been described earlier has high practical value and might be used for comparing current competences and future career potential of employees working in different organizational units or departments. The latter might produce an improvement in recruitment, staffing, and career mobility practices. Moreover, the instrument enables us to further investigate the relationship between individual, job-related, and organizational career activities, on the one hand, and employability, on the other. This might eventually lead to useful recommendations for enhancing lifelong career success, as age-related changes may be carefully detected as well.

However, in order to really help organizations with suggestions on how to protect workers' employability across the life span, we need a sound conceptualization of the concept of

sustainable careers. "Sustainable careers" is defined as the sequence of an individual's different career experiences, reflected through a variety of patterns of continuity over time, crossing several social spaces, and characterized by individual agency, herewith providing meaning to the individual (De Vos and Van der Heijden 2015).

Different patterns of *continuity over time* (De Vos and Van der Heijden 2015; Van der Heijden and De Vos 2015) mean that in the sequence of different kinds of career experiences, periods of employment can be interchanged by periods of part-time work, volunteering, unemployment, sabbatical leave, care-giving, and so on. A career is, in essence, dynamic. It is a cycle of events and decisions that determine the work people are doing, the changes they make from one job to another (within or across organizations), or transitions between paid work and other statuses (e.g., nonpaid work, unemployment, temporary leave, and retirement). These events, decisions, and their outcomes (i.e., subjective and objective career success) are intertwined.

Also, the *social context* (De Vos and Van der Heijden 2015; Van der Heijden and De Vos 2015) wherein careers unfold has undergone significant changes. Careers are enacted within and across different types of social contexts (work, home, friends, leisure), and they increasingly take place across several different employers. Continuity here implies that influences of actors and factors in the social space, as well as the choices individuals make regarding (the combination of) the different social spaces they live in, may impact the sustainability of their careers.

By *agency* (De Vos and Van der Heijden 2015; Van der Heijden and De Vos 2015), we mean that how the career develops over time is the result of many choices made by the individual owner of the career, not the mere consequence of external influences and constraints stemming from this social space. Choices are made in line with the individual's career and private needs and aspirations, yet, obviously, these have to be aligned with organizational (employer) objectives and cannot be separated from the individual's broader life context in order to balance or compromise between (opposing) the individual's work, career, and private interests, on the one hand, and (opposing) the employer's interests, on the other hand (Van der Heijde and Van der Heijden 2006; Van der Heijden et al. 2009).

Finally, careers entail a continuous need to produce new expertise, while, at the same time, they create new opportunities for development. The qualifications that are required for a job are becoming increasingly complex while, simultaneously, the "half life" of these qualifications is becoming increasingly shorter. Employees who are able to make their careers sustainable and who are able to survive the current needs are the ones with not only the most up-to-date knowledge and skills but also the capability to continuously build up the new expertise requirements while deriving *meaning* (De Vos and Van der Heijden 2015; Van der Heijden and De Vos 2015) from their professional activities.

This line of reasoning on the notion of sustainable careers brings age and employability at the core of careers. As careers have changed, the challenges for realizing sustainability throughout one's career are particularly prevalent when one considers the demographics, that is, the aging workforce, yet in contradiction, the highly prevalent focus on employability and career success of employees in their early career stages. We need new empirical models and HRM policies and practices to safeguard employability throughout the life span, thereby considering that careers have a longer life span than what is often assumed in organizational career management approaches and individual career choices. In other words, employability is a critical criterion for ensuring that employees remain motivated and able to fulfill work-related roles at all ages.

Cross-References

- ▶ Age Stereotypes in the Workplace
- ▶ Age-Related Changes in Abilities
- ▶ Human Resource Management and Aging
- ▶ Motivational Theory of Lifespan Development
- ▶ Retirement and Continuity Theory
- ▶ Selection, Optimization, and Compensation at Work in Relation to Age

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Swiss Interdisciplinary Longitudinal Study on the Oldest Old (SWILSOO)

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Synonyms

Longitudinal studies

Definition

SWILSOO is a Swiss longitudinal study with a follow-up of 10 years (nine waves; 1994–2004) of 340 participants and 5 years (five waves; 1999–2004) of 376 respondents, all aged 80–84 years at baseline.

Description of the Study

Procedure and Sample

SWILSOO is a two-cohort longitudinal research study of octogenarians conducted by an interdisciplinary team directed by C. J. Lalive d'Epinay (principal investigator) and Dario Spini (assistant director) (Lalive d'Epinay et al. 2008), at the Center for Interdisciplinary Gerontology, University of Geneva. The research program started in 1992 and ended in 2008; the fieldwork took place from 1994 to 2004. The study was funded by several grants from Divisions I and IV of the Swiss National Science Foundation (No 5004-58534/58536, 1253-8261). A set of new analyses based on data from SWILSOO are currently developed in the framework of the Swiss National Centre of Competence in Research LIVES – Overcoming Vulnerability: Life Course Perspectives (www.lives-nccr.ch).

The first cohort (born in 1910–1914) was drawn from a cross-sectional study on the aging population (65+ years) conducted in 1994 (Lalive d'Epinay et al. 2000) and was followed for 10 years (1994–2004); the second cohort (born in 1915–1919) was followed for 5 years (1999–2004). The periodicity of the interview waves varied from 12 to 18 months, resulting in a total of nine waves for the first cohort and five waves for the second. The main objective of the study is to describe the heterogeneity of the elders' life trajectories and situations at a very advanced age. The first sample consisted of 340 respondents, the second of 377; all of the participants were aged 80–84 years and living at home at baseline. In total, 2890 interviews were completed. The SWILSOO data are archived and available at the Data and Research Information Services:http://forscenter.ch/en/data-and-research-information-services/.

The sample of the two cohorts was stratified by region (Canton of Geneva and Canton of Valais) and by gender. The two cantons were chosen to increase the heterogeneity of situations; Geneva is primarily urban, and Valais, located in the Alps, is semirural. The Canton of Geneva forms part of one of the main metropolitan regions in Switzerland; it has a high population density (1590 inhabitants/km^2 in 1990), a large proportion of foreign residents (notably because of the presence of international organizations), an essentially tertiary economy, and a sizeable public sector. In contrast, the Canton of Valais has a lower population density (84 inhabitants/km^2 in 1990). Its heritage is one of farming, mountain life, and Catholicism, and it currently has a rapidly expanding tertiary sector, notably in the tourist sector.

A major strength of SWILSOO is the random selection of respondents based on the cantonal register for Geneva and the municipalities' registers in Valais, which enabled the follow-up of a sample that was also heterogeneous in terms of socioeconomic background. Among the cohorts, in Valais, slightly less than half of the men (47%) and three-quarters of the women (77%) completed only compulsory school; in Geneva, these proportions were 21% and 43%, respectively. The elders from Valais were mostly manual workers: farmers, workers, and tradesmen; only 37% were white-collar employees, in comparison with 62% in Geneva.

At the end of the fieldwork in 2004, there were 59 respondents left of the first cohort (which started in 1994) and 173 from the second (which started in 1999). To monitor attrition, the civil registries of both cantons were periodically checked to control deaths, removals, and dropouts among the participants. This process allowed analyses of mortality predictors (Guilley et al. 2005; Spini et al. 2001). Analyses of attrition in terms of different variables (gender, geographical area, social status, income, education, and religion) showed that only the geographical area was significantly related to the risk of dropout; there were twice as many dropouts in Geneva as in Valais. Health did not impact dropouts. This result may be explained by the proxy procedure implemented since the start of SWILSOO, which resulted in

394 interviews (14%) conducted by proxy (mainly spouses, offspring or other family members, and eventually professionals in nursing homes) for 194 respondents who could have been lost otherwise (Lalive d'Epinay et al. 2008; see also Ghisletta and Spini 2004).

Questionnaire

The questionnaires used in wave 1 were longer than those used in the following waves, notably because they included biographical questions and questions about socioeconomic background. Since the second wave, four forms of standardized questionnaires have been used, depending on the respondent's type of residence (private home vs. institution, mainly nursing homes) and the reporting person (self vs. proxy). The questionnaires used with proxies were shorter and logically did not include self-reported measures.

Trained interviewers administered the questionnaires during face-to-face interviews held in a place chosen by the respondent (in most cases, the respondents' homes). The basic structure of the questionnaire included questions about living circumstances (e.g., nature of domicile: private vs. institution, apartment/house, number of rooms, means of transportation), financial situation (e.g., assets, income, nonmonetary resources, insurance coverage and social benefits), health (e.g., illnesses, physical pain, functional health, sensory capacities, depressive symptoms, illnesses and accidents since the last interview; periods of confinement to bed; falls; hospitalizations; consumption of care; medical checkups; dental care; medication; alcohol and tobacco consumption; physical activities and exercise; functional status of cohabitants), institutional network (e.g., the nature and frequency of care received), family and friendship network (e.g., the family size and composition, proximity of offspring and siblings, existence of a close friend, frequency of exchanges, the nature and frequency of the support provided and received, neighborhood relationships), activities, social and cultural life (e.g., the nature and frequency of activities, media use, participation in associations, religious activity), and psychosocial dimensions (e.g., self-rated health, life satisfaction, social and temporal health comparisons, beliefs and values, perception of important changes since the last interview, cognitive functioning). In addition to the wave-after-wave interviews using a close-ended questionnaire, 74 in-depth interviews were conducted to collect narratives of the lives of the very old.

Research Highlights

Fragilization and Frailty

The aim of SWILSOO was to describe and compare life trajectories in very old age. The research focused on the trajectories of fragilization and on frailty (Lalive d'Epinay and Spini 2008; Spini et al. 2007a). Fragilization was defined as a universal process of losses in various functions and systems as a result of senescence, while frailty was defined as a state of vulnerability to various stressors that limits the capacity to recover previous levels of functionality and adaptability after exposure to a stressor.

Three health statuses were also operationalized: (1) ADL-dependent: a person unable to perform at least one of five activities of daily living (washing, dressing/undressing, eating, rising from/going to bed, moving inside home) without assistance; (2) ADL-independent but frail: with frailty defined as suffering from deficiencies in at least two of the following five domains: sensory capacities, mobility, memory, energy, and physical ailments; (3) Robust: no ADL incapacities and deficiency in no more than one of the five domains mentioned above. The results for the dynamics of health states showed that frailty is the health status that affects the majority of very old people (80–94 years old); for most of them, frailty was a long-lasting stage of their last years. The results also showed that progression from frailty to independence may occur (in approximately one case out of five), but is quite short-lived, and that most individuals who became dependent had gone through a period of frailty. Moreover, long-term ADL-dependence is not a normative conclusive stage of long lives. Women and people in lower social categories –notably manual workers – are at a higher risk of ADL dependency; however, it was not the primary health status, even

at the end of the longitudinal follow-up period. Finally, the analysis of health trajectories also showed that continuity in the status of robustness or frailty is the most frequently observed trajectory (Guilley and Lalive d'Epinay 2008, pp. 29–36; Guilley et al. 2008).

Family and Social Relationships

The research mainly focuses on the support elders receive from their networks. However, preserving the ability to give (or to exchange) is a crucial developmental resource across the life course, including old age (Antonucci and Jackson 1990). Studying the evolving structure of services that the elders provide and receive from their family revealed that, not surprisingly, ADL dependency drastically altered the capacity to provide services. At the same time, frail elders continued to provide support to their family members at the same level that robust elders did (with some adaptations in the nature of the services provided). This result highlights the subjective importance in very old age of preserving a positive, exchange-oriented status within the family for as long as possible (Guilley and Lalive d'Epinay 2008, pp. 85–92). The reverse longitudinal association between social relationships and health has also been investigated. The results showed that having at least one surviving sibling and paying regular visits to family members and friends has a positive impact on remaining independent (Guilley and Lalive d'Epinay 2008, pp. 93–102). Finally, the study by Ghisletta, Bickel, and Lövden (2006) showed that increased media and leisure activity engagement slowed the decline in perceptual speed, but not in verbal fluency or performance, whereas cognitive performance was not associated with changes in activity engagement.

The Interface Between Formal and Informal Support

How does the interface between formal and informal support work and evolve in very old age, a context associated with an increased need for help and a declining number of potential caregivers (because of the decrease in contemporaneous family members and close friends)? Various theoretical models have been devised. Three were tested in relation to instrumental help. The increase in formal support is associated with: (1a) an increase in or (1b) the stability of informal support (complementarity); (2) a relative decline in informal aid (adjustment of the informal network); and (3) the disappearance of informal help (radical substitution). The analyses were based on the changes reported during the nine waves of interviews with the community dwellers from the first cohort. Complementary support was observed in 72% of the interviews (1a: 47%; 1b: 24%), the adjustment of informal support in 21%, and radical substitution in only 7%. The concern that welfare state support through formal services may crowd out support from relatives and friends in the context of a post-industrialized country such as Switzerland is thus unfounded (Guilley and Lalive d'Epinay 2008, pp. 103–112). The results from SWILSOO are in line with the crowding in process described by Künemund and Rein (1999), that is, the generous welfare systems that provide resources for elderly people increase rather undermine solidarity.

Disruptive Events and Their Impact

From the second wave on, the interviews with the respondents were introduced in the following way: *Since our last meeting* (recording the date, if necessary), *have there been any major changes in your life?*. This strategy had the practical goal of establishing the connection between the last and current interviews, but it also had the scientific goal of scrutinizing the individual's awareness of changes in the course of his/her life and the relationship between subjectively perceived changes and the range of objective changes that occurred between successive waves.

At the end of the 5-year follow-up, 80% of the survivors mentioned changes, with a mean of three changes; after 10 years, 88% mentioned changes, with a mean of six changes. The main domains of change were health and family, which accounted for over 80% of the mentions. When another person was involved in the change, he/she was almost always a close relative and, in one out of every two cases, the event was bereavement (Guilley and Lalive d'Epinay 2008, pp. 47–64).

In very old age, bereavement for a beloved one refers mainly to siblings (40%) and close friends (50%). A precondition for measuring the specific impact of a death on the survivor is to ensure that the bereavement is not the product of any other type of change, particularly health problems, that could have occurred during the same time span. Here, three categories of sequences were compared: the bereavement sequences with no mention of any other important changes, the health trouble changes sequences (with no bereavement), and the no-change sequences. Two temporal spans were considered: short term, when the event occurred between two waves of interviews, in which case the impact was measured at the second wave, and middle term, when the impact was measured at the third wave. Comparing the bereavement sequences to the no-change sequences revealed a slight and short-term impact on functional impairments and a very significant and long-lasting increase in depressive symptoms. Depending on the status of the person who died (e.g., a family member or a close friend), the adverse impact of the loss on the psychological health of the bereaved displays a distinctive process. The death of a family member stimulates a tightening of ties within the family that seems to buffer the negative impact on well-being. No such regulation comes into play with the loss of a friend. As a result, the bereaved suffers from a greater increase in depressive symptoms, with also a delayed disruptive effect on his/her sense of closeness (Lalive d'Epinay et al. 2003; Cavalli et al. 2009).

Community Dweller Elders and Nursing Home Residents

In Switzerland in the year 2000, only 19% of elders aged 80+ were living in a nursing home (22% among women, 12% among men; statistics from the Swiss Federal Statistical Office), as a result of a "remaining at home" social policy. SWILSOO's longitudinal design allows comparisons of the trajectories of the elders who moved into a nursing home with those of the elders who remained in their private home.

The interaction of two sets of factors led individuals to move into a nursing home. On one hand, accelerated fragilization resulting in severe frailty, often with ADL dependency, was a crucial factor associated with relocation. On the other hand, an increasing feeling of loneliness also favored a move to a nursing home. Such feelings were not necessarily related to social and family isolation but more to the awareness of a rapidly increasing imbalance between the care (medical, instrumental) the elder requires, the growing risks encountered in everyday life at home, and the insufficiency of the care that both informal and formal networks are able to provide.

Comparing the evolution of indicators between the wave before and the one after the move (the time span between the two waves was 12–18 months) into a nursing home shows that this period is very critical in terms of health and well-being and is marked with losses and risks in various domains. After the transition, a stabilization is observed, with a lower risk of accidents than during the last years at home, for example.

Two widespread preconceptions are (1) that nursing home residents have a low level of exchanges (visits, phone calls, etc.) with their family and (2) that living in a nursing home affects morale and well-being. Neither the first nor the second was observed in this study. During the transition and the first period in the nursing home, the residents benefitted from a higher level of interactions with family members than they had at home; after the first year in a residence, there was no significant difference in the level of interaction or in well-being between residents and community dwellers (Cavalli et al. 2007; Cavalli 2012; Lalive d'Epinay and Cavalli 2013).

The Paradox of Well-Being in Later Life

Older individuals have many strategies for maintaining their well-being at a relatively high level despite objective health losses (Spini et al. 2007b). This phenomenon, usually described as the well-being paradox (Kunzmann et al. 2000), shows that despite an accumulation of losses during older age, individuals maintain a relatively stable and positive level of well-being. This paradox has been observed in numerous studies and is typically considered a robust finding.

Research from Girardin Keciour and Spini (2006) considered the specific health transitions that individuals experience and how these transitions were related to well-being. At the mean level, the paradox of well-being again emerged; while the number of incapacities increased across waves and with advancing age, the level of well-being was relatively stable and did not vary with age or time at the intraindividual level. However, when individual transitions from different states of health (independent, frail, and dependent) were considered, a different result was observed. Those who experienced a trajectory that included independence (stable independence, independence to frailty, or frailty to independence, 54% of trajectories) showed relatively high levels of well-being. Those who were frail at two successive waves (33% of trajectories) showed moderate levels of well-being. Interestingly, those who experienced a period of dependence (stable dependence or frailty to dependence, 13% of trajectories) showed low levels of well-being. Notably, 72% of the observed health trajectories remained in the same state (stable independence, frailty, or dependence) across two waves. Thus, stability and high levels of well-being occur because a majority of aging individuals experience a relatively stable and positive health trajectory, even in old-old age (Guilley and Lalive d'Epinay 2008). Moreover, when health has deteriorated, the levels of well-being are relatively lower. Thus, the paradox of well-being may not be as paradoxical as previously suggested.

Cross-References

- Australian Longitudinal Study of aging (ALSA)
- Berlin Aging Studies (BASE and BASE-II)
- China Health and Retirement Longitudinal Study (CHARLS)
- Interdisciplinary Longitudinal Study on Adult Development and Aging (ILSE)
- Irish Longitudinal Study on Ageing (TILDA)

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Sydney Centenarian Study

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Definition

This entry discusses the history, protocol, methodology, and initial outcomes of the Sydney Centenarian Study, a longitudinal study of cognitive and physical function of people aged 95 years or more. Difficulties of research involving very elderly participants are discussed as well as future directions for the project.

Introduction

The global centenarian population is rapidly increasing (Richmond 2008), which has raised concerns about the burden this demographic change might have on health-care systems. At the same time, there is growing enthusiasm about the attainability of exceptional old age as well as longer productivity in the workforce and a focus on the role of modifiable, environmental factors in aging. As part of a growing wave of research into the very old, the *Sydney Centenarian Study* (SCS) was launched in 2007 at The University of New South Wales (UNSW), Australia. The SCS was developed to explore the genetic and environmental factors that contribute to successful aging among the very old with a particular focus on brain health. It included both centenarians (i.e., those 100 years of age or more) and "near-centenarians" (i.e., those 95–99 years old), henceforth referred to collectively as "centenarians."

Theoretical Orientations

Successful Aging

Individuals who have survived to extreme ages, particularly those who have not developed dementia and who remain functionally independent, provide an excellent model of successful brain aging. This unique population may potentially yield insights into protective factors for brain health which are applicable for younger individuals.

Differential Aging

The "oldest old" could be expected to exhibit different characteristics to the "younger old." Further, differences have been demonstrated between male and female centenarians (Hazra et al. 2015)

as well as significant cohort effects (Cho et al. 2012). The SCS allowed for the examination of differences between centenarians and the comparison of centenarians to younger populations.

Cognitive Aging

There is poor understanding about what represents "normal" cognition among the very old. It is known that dementia is not inevitable for centenarians (Perls 2004); however, impairments are common, and assessment is often hindered by sensory impairments and general frailty. Defining a "cognitive phenotype" and developing normative data for this age group will assist future researchers to disentangle pathology from natural aging processes.

Study Objectives

The SCS was launched in 2007 with the following stated aims: (i) to determine the cognitive profile of exceptionally old individuals; (ii) to relate cognition in this age group to brain imaging parameters; (iii) to examine centenarians from neuropsychiatric, medical, nutritional, and lifestyle perspectives; (iv) to determine the incidence of dementia in centenarians; and (v) to examine health-care needs and level of functional autonomy among centenarians.

Study Overview

A cohort of men and women aged 95 years and above were recruited from seven local government areas in the East and Inner West regions of Sydney. Participants underwent an initial cognitive, medical, and psychiatric assessment in their own homes and were invited to undergo an MRI scan and provide a blood sample. They were also asked to provide a detailed medical and nutritional history and an overview of their current and past levels of physical, mental, and social activities. Participants completed a brief follow-up assessment 6 months, 12 months, and 18 months after baseline to assess rates of incident dementia and monitor changes in cognition, physical health, and functional independence.

Recruitment and Study Timeline

The SCS was conceived in 2006 by Professor Perminder Sachdev (neuropsychiatrist). It was initially led by Dr. Charlene Levitan (psychologist) and funded by a research grant from the National Health and Medical Research Council (NHMRC). Recruitment began in 2007, predominantly via a targeted mail out to Sydney residents aged 95 years or above living in the targeted geographical regions. Addresses were obtained from both the Australian Electoral Commission (AEC) and Medicare Australia (all Australian citizens are registered with the AEC and Medicare, and noncitizen permanent residents are registered with the universal Medicare). A second mail out was conducted in 2010. This recruitment method was supplemented by other strategies to make the sample as complete as possible: local media campaigns, approaching directors of aged care facilities, attending community senior citizen groups, advertising through local surgeries, and approaching participants from another longitudinal study, the Sydney Memory and Ageing Study (Sachdev et al. 2010). Between 2007 and 2013, 345 participants completed a baseline assessment (Wave 1). Two hundred and thirty-two participants completed a 6-month follow-up assessment (Wave 2), 174 completed a 12-month follow-up assessment (Wave 3), and 124 of the cohort went on to complete a fourth assessment (Wave 4) 18 months after their baseline assessment. Blood samples were taken from ~70% of the cohort, while 8% underwent an MRI scan. A further 54 individuals aged 95 or more who lived outside the immediate catchment area were recruited to give blood samples. Twenty eight of these additional participants had MRI scans bringing the number of participants with brain scans to 57. A new wave of recruitment is planned for 2016 with the aim of increasing the sample to 600 participants. However, since the second wave of recruitment is 9 years after the first, there may be cohort effects which will be taken into consideration in the analysis. Lifestyle and neuropsychological data for the existing sample is undergoing review and is expected to be released in 2016.

Sample

The SCS sample included 345 individuals (247 females, 98 males) aged between 95 and 106 years with a mean age of 97.4 at baseline. Inclusion of "near-centenarians" (i.e., those aged 95–99) allowed for a much larger sample to be developed; at baseline, 88% of the sample was near-centenarians, while 12% were aged 100 years or more. Approximately one quarter (27%) of the sample was from a non-English-speaking background. Half of the sample was recruited via the targeted mail out, with other strategies contributing the remaining 50% (Sachdev et al. 2013). Participants were not screened for cognitive, physical, or sensory impairment; all individuals who met the age requirement and agreed to participate were included. When an individual was unable to provide consent, their next of kin were approached. Each participant was asked to give details of a family member or friend to act as their "Informant," i.e., someone with whom they had regular contact and could answer questions about their cognitive and physical function.

Assessment Protocol

Baseline assessment comprised three separate home visits, typically spaced 1–2 weeks apart (Sachdev et al. 2013). The initial visit captured demographics, medical history, family medical history, current medications, fall history, subjective cognitive complaints, a brief cognitive screen – the Addenbrooke Cognitive Examination Revised (ACE-R), which includes the Mini-Mental State Examination (Mathuranath et al. 2000) – and a dietary questionnaire. A brief medical exam was also conducted which included height and weight measurements, blood pressure, lateral stability, visual acuity, grip strength, and lung function. The second visit comprised a comprehensive neuropsychological battery including tests of memory, processing speed, visuospatial functioning, language, executive function, and premorbid function. The final visit included measures of autobiographical memory, mood and anxiety, satisfaction with life, social integration, and physical and mental activity. Diet, physical activity, and mental activity questionnaires captured both current lifestyle as well as lifestyle behaviors at various stages in their lives (e.g., between the ages of 40 and 50).

Biannual follow-up assessments (6, 12, 18 months) were brief and confined to one session. They included the same cognitive screen (ACE-R), interval medical history, interval fall history, and an abbreviated medical exam. Questionnaires about diet, social activity, physical activity, and mental activity were repeated across all four assessments.

Informants were approached at each wave to gather information about participants. They were asked to confirm the participants' demographic details and medical history, as well as complete questionnaires about functional impairment, cognitive decline, and level of independence.

Diagnosing Dementia in Centenarians

The prevalence of dementia increases exponentially with age, with the oldest old population at the highest risk of developing dementia. The approaches for diagnosing dementia in centenarians vary widely as do the subsequent prevalence estimates (Gondo and Poon 2008). The challenges for diagnosing dementia in centenarians have been described elsewhere (Slavin et al. 2013) and include a lack of normative data, sensory and physical impairments affecting cognitive performance, as well as contentious definitions of "normal" in this population. This makes it difficult to define notions of "impairment" and "pathological decline" within this age group.

The essential elements of a dementia diagnosis (or major neurocognitive disorder), according to the DSM-5, include a decline from previous levels of cognitive performance to a level at which functional independence is compromised (American Psychiatric Association 2013). In the SCS, a diagnosis of dementia was given to those with both impaired cognition and function. Impaired cognition was defined as having a score less than or equal to 23 on the Mini-Mental State Examination

(MMSE). Impaired function was defined as having a score of greater than or equal to 3 on the Bayer Activities of Daily Living Scale (Hindmarch et al. 1998) that was adjusted so as to represent problems judged by informants as being due to cognitive rather than physical causes (Anderson et al. 2007). Cases in which there was concern about performance, discrepancy in results, or limited information were presented to a consensus panel for assessment. This panel consisted of a neuropsychiatrist, a psychogeriatrician, a neuropsychologist, and other research staff. An additional subgroup of participants was brought to the consensus panel to ensure the reliability of this approach.

At baseline, 120 (35%) participants were classified as having dementia, 208 (60%) were considered to not have dementia, and in 17 cases, there was not enough information to make a diagnosis.

Neuroimaging in the Sydney Centenarian Study

Neuroimaging studies involving exceptionally long-lived individuals are scarce but important for understanding the neuroanatomical basis of successful brain aging. Past studies of normal aging in "young" elderly have revealed that brain aging is heterogeneous and follows a "frontotemporal" pattern, i.e., brain loss with aging is greatest in the frontal and medial temporal lobes (Fjell et al. 2014). It is not known if this pattern of brain loss remains consistent as individuals approach 100 years of age.

A cross-sectional, non-demented cohort was drawn from the SCS and the Sydney Memory and Ageing Study (MAS) (Sachdev et al. 2010), and the profiles on structural magnetic resonance imaging (MRI) of the oldest old were compared with the younger old, by repeated measure analysis of covariance (ANCOVA) (Yang et al. 2016). The greatest loss of brain volume at advanced age was found in the medial temporal lobe (including the hippocampus) and parietal and occipital cortices, indicating that the "temporoposterior" regions of the brain are particularly vulnerable in exceptional longevity, even in those who aged successfully. This topographic distribution is distinct from the "frontotemporal" pattern in the younger elderly or the "temporoparietal" pattern typical of Alzheimer's disease (Fjell et al. 2014).

White matter hyperintensities (WMHs), considered as surrogates of small vessel disease of the brain, were found in almost all of the SCS participants. Relationship of age with WMHs was examined using the general linear model and was found to be stronger at older age, suggesting that the accumulation of WMHs accelerates with advancing age. Despite the high prevalence and the extensive accumulation of the WMHs, their pathogenesis, progression, and impact on cognitive and motor function in exceptional longevity remains poorly understood. The clinical implications, including issues of prevention and treatment, warrant further investigations.

MRI Markers of Dementia

Examining the markers of pathological brain aging in the oldest old was another important aspect of neuroimaging in the SCS. Neuropathology is common in non-demented individuals at advanced age, and the conventional neuropathological markers are found to be weaker predictors of dementia in the oldest old than in the young (Savva et al. 2009). Data from SCS provided a unique opportunity to examine the association between structural MRI and clinical dementia. A wide range of MRI markers of neurodegeneration and vascular pathology were examined in the oldest old using logistic regression, with dementia being the outcome variable. Similar to neuropathology studies, our data showed that the association between MRI markers and clinical expression of dementia is not as well demonstrable in the oldest old as in younger old, in particular for vascular lesions. This suggests that while very old individuals do demonstrate considerable brain pathology, its presence is consistent with normal cognitive functioning. Factors underlying the brain reserve in this population need to be better understood to inform strategies for dementia prevention.

Blood Collection and Biochemistry

Peripheral blood samples were collected for biochemical analysis and DNA extraction for genetic analyses. Routine blood analyses performed include assessment of levels of lipids (total cholesterol, HDL- and LDL-cholesterol, and triglycerides), sodium, potassium, chloride, bicarbonate, homocysteine, urea, creatinine, estimated glomerular filtration rate, urate, glucose, C-reactive protein (CRP), and a full blood count. Blood samples (EDTA plasma, serum, buffy coat) have also been stored at −80 °C for future work. For a small subset, a blood sample in a PAXgene tube (PreAnalytiX GmbH, Switzerland) was also collected for RNA extraction.

A particular group of plasma proteins, the family of apolipoproteins, play a crucial role in lipid metabolism and are implicated in age-related cognitive decline, Alzheimer's disease and longevity (Song et al. 2012; Yu and Tan 2012; Shadyab and LaCroix 2015; Atzmon et al. 2006). Hence, it was of interest to determine levels of these plasma proteins in the very old to establish any potential links of these proteins to physical and cognitive health in this age group. Levels of seven apolipoproteins (A-I, A-II, B, C-III, E, H, and J) were measured in a subset of EDTA plasma samples ($N = 147$) using a multiplex immunoassay (WideScreenTM Human CVD Panel 1; Novagen, EMD Chemicals Inc, WI). The data indicated that plasma apolipoprotein levels, in particular apolipoprotein E, differed in the very old compared to "younger" old age groups (<95 years) and were associated with cognitive performance.

Genetics

Prior studies have demonstrated that longevity is influenced by genetic factors and its influence appears to strengthen at the upper limits of the lifespan (Newman and Murabito 2013; Sebastiani and Perls 2012). Therefore, studying the genetics of exceptional longevity may shed light on the genetic and biological factors that lead to successful aging.

DNA from SCS participants was extracted from donated blood samples using conventional methods by Genetics Repositories Australia. One of the genes most consistently associated with longevity across different studies is the apolipoprotein E (*APOE*) gene (Shadyab and LaCroix 2015), which is also linked to late-onset Alzheimer's disease. Genotyping of the *APOE* ε2/3/4 polymorphism was undertaken using TaqMan assays (Applied Biosystems Inc, Foster City, USA) for the two *APOE* SNPs rs7412 and rs429358. In the SCS subsample with *APOE* genotyping data available ($N = 280$), only 13.5% of participants carry at least one copy of the ε4 allele, which is the major risk factor for late-onset Alzheimer's disease. In addition, genome-wide genotyping has been performed using the Illumina Omni Express array (California, USA) at the University of Queensland Diamantina Institute, Brisbane, Australia. Currently, after quality control procedures, we have genome-wide genotyping data for 256 participants. This data has also been imputed to the 1 K genome panel. For a subsample of participants, genome-wide DNA methylation has been assessed using the Illumina 450 K array (California, USA). In the near future, whole genome sequencing is planned for a subsample of participants aged 100 years and over.

Gene expression changes have been reported across the lifespan; however, few studies have examined the transcriptome comprehensively in long-lived individuals. In the SCS, RNA has been extracted using the Qiagen PAXgene blood miRNA kit (PreAnalytix GmbH, Switzerland), and the transcriptome has been assessed using RNA sequencing for 24 participants.

Inherent Difficulties of Centenarian Research

Research involving the very elderly poses significant methodological challenges.

Proof of Age

Determining the age of participants in centenarian research is critical. Self-reported date of birth is

not necessarily reliable, especially for participants with cognitive impairment. Birth certificates were sought for each participant, but given that year of birth for the cohort ranged from 1902 to 1918, before many countries maintained accurate records, convergent sources of information were also requested. These included marriage certificates, passports, driver's licenses, military certificates, baptismal certificates, birth certificates of children and siblings (if any), and other corroborating documents.

Establishing a Representative Sample

Recruitment for the SCS was restricted to areas of Sydney proximate to the research center for reasons of convenience, and attempts were made to recruit as comprehensively as possible within this geographical area. Centenarians living independently were contacted by mail, centenarians in aged care were often approached through staff, and media advertising was also employed. Despite these efforts, many centenarians in the area declined to participate or were too impaired to give consent, and their families were unwilling. Those who volunteered to participate and were able and willing to complete all assessment tasks, particularly the comprehensive neuropsychological battery, represent the higher functioning centenarians, representing a healthy volunteer bias. This makes the establishment of normative data difficult.

Assessing Cognition

Assessment of cognition in SCS participants was plagued by a number of difficulties. Sensory impairments were common. Some participants had limited or no vision, and the majority of participants had at least mild hearing difficulties. Test materials were adapted where possible (e.g., using large print, assisting participants to complete self-report questionnaires); however, many participants still had difficulties seeing or hearing the material, and thus valid data could not always be gathered. Interpretation of performance was made more difficult by the lack of normative data as the majority of tests have been developed for a younger demographic.

Managing Fatigue

Fatigue was commonly noted during assessments, even among those who appeared to be higher functioning and in relatively good health. Baseline assessment was split across three home visits so as not to overburden participants, although each session was still at least 1 h in length. Breaking sessions into smaller periods, providing regular breaks, and prioritizing the more crucial elements of the assessment were all important in obtaining maximum valid data.

Reliance on Informants

Given that a large proportion of the SCS sample exhibited cognitive impairment, data collected from informants (family members or close associates) was critical to obtaining an accurate profile of a participant's physical, cognitive, and functional abilities. However, informants were not always willing to answer questions or may have exhibited cognitive difficulties themselves, particularly when the spouse of a participant was the nominated informant. The objectiveness of friends and family members is also variable. For example a family member may be concerned that their relative will be placed in aged care if they are assessed as being impaired and thus overrate their functional capacity. Finding reliable informants who have regular contact with participants and then keeping them engaged throughout the study is a crucial aspect of centenarian research.

Future Directions

The SCS provides an exciting and unique opportunity to explore the oldest old population. As well as providing normative cognitive, functional, psychological, and physiological data for this group, the SCS endeavors to identify risk and protective factors for dementia and successful brain aging. It is hoped that the output of this project will inform models of aging, consequently informing service planning, health burden estimates, and care delivery strategies.

The longitudinal design of the study affords researchers the opportunity to track the emergence and progression of pathology and successful

aging across a number of measures. This enables various relationships to be explored and tested over time and at specific time points. Among other topics, the psychological landscape of centenarians, the inevitability of dementia, and the association between cognitive and physical frailty are of particular interest to the research group.

The inclusion of biomedical data enables the biomarkers of dementia to be examined and collated with clinical diagnostic data, providing greater accuracy while normative data is lacking. Similarly, genetic data have been collected for the majority of participants and are in the process of being analyzed in attempts to assess the genetic contributions to successful aging and dementia in the oldest old. Finally, brain imaging for a subset of participants, combined with the brain donor program, provides information on the gross and microscopic structure of the brain at the extreme end of the lifespan. Continued research will focus on these measures.

The SCS is a member of the International Consortium of Centenarian studies on Dementia (ICC-Dementia https://cheba.unsw.edu.au/group/icc-dementia), a collaboration which seeks to harmonize centenarian and near-centenarian studies across diverse ethno-racial and sociocultural groups, to describe the cognitive, functional, and psychological profiles of the oldest old. In addition, it is hoped that the SCS's involvement in this consortium will aid efforts to ascertain the age-standardized prevalence and incidence of dementia, internationally.

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