Chapter 15
The Pain, Emotion and Cognition Nexus in Older Persons and in Dementia

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Abstract With the rapid ageing of the worlds' population, it becomes increasingly important to recognise and understand the complex nexus between pain, mood and cognition in this specific age group. A particular focus should be on any age-related differences in pain prevalence and the impacts of pain on mood and cognitive functions as this will influence assessment and treatment options. Pain prevalence increases with advancing age predominantly due to the rise in degenerative musculoskeletal disorders, such as osteoarthritis. However, the atypical presentation of pain in many medical conditions (i.e. cardiac, gastrointestinal, malignancy, post-surgical pain) has also shown to increase with age. Conversely, the prevalence of psychopathology (depression, anxiety) decreases in older cohorts except when comorbid with persistent pain, where similar rates are seen across the entire adult lifespan. The lack of age differences in psychopathology in those with persistent pain might suggest that older persons are more vulnerable to the negative impact of pain on mood. The cognitive mediators of pain (beliefs, attitudes) also show some clear age differences, and older age may moderate the impacts of pain on cognitive functioning and performance. The special nexus of pain and emotion in persons with dementia has also attracted increased interest in recent years. It remains unclear whether the pain experience itself is altered by dementia, but findings do emphasise some differences in the types of behavioural and psychological impacts of pain in persons with dementia.

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15.1 Epidemiology of Pain, Mood Disturbance and Cognitive Difficulties in Older Persons

15.1.1 Prevalence of Pain Across the Adult Lifespan

There is a consistently demonstrated age-related increase in the prevalence of chronic pain at least until the age of 70, although the nature and type of pain may differ from younger adults. In particular, pain due to degenerative diseases, cancer and neuropathic conditions such as diabetic neuropathy, post-herpetic neuralgia and post-stroke are much more common (Helme and Gibson 2001; Miranda et al. 2012). Prevalence rates of chronic pain vary widely between studies (from 7 to 80 %) and depend upon a number of methodological factors. These include the time interval sampled (days, weeks, months, lifetime), the time in pain during this interval (pain always, most days, weekly or any pain during the period), how severe the pain needs to be for inclusion (mild, moderate, severe, bothersome, activity limiting) as well as the assessment technique (telephone, interview, questionnaire). Despite the differences in absolute prevalence, a consensus view across almost all studies suggests a progressive increase in pain prevalence throughout early adulthood (7–20 %) with a peak prevalence during late middle age (50–65 years; 20–80 %) followed by a plateau (65–85 years; 20–70 %) or decline in very advanced age (85+ years; 25–60 %) (Gibson and Lussier 2012; Abdulla et al. 2013 for review).

The high pain prevalence seen in older segments of the community has important implications for resourcing pain management services. Nonetheless, not all persistent pain will be bothersome or of high impact or require active treatment. The elderly with mild aches and pain often will not seek treatment and will manage pain symptoms without professional help. Perhaps it is better, therefore, to focus on pain that is considered as 'clinically relevant' or 'clinically significant'. Within this context, studies have shown that approximately 14 % of adults over 60 years suffer from moderate-severe or 'clinically significant' pain, defined as continuous, needing professional treatment and occurring on most days throughout the past 3 months (Breivik et al. 2006; Smith et al. 2001). Adults over 75 years were found to be four times more likely to suffer from a significant pain problem when compared to younger adults. On the basis of these studies, it appears that pain requiring clinical assistance also shows a major age-related increase in prevalence, albeit at much lower rates than for pain of any type.

Chronic pain is thought to be even more common in residential care facilities and nursing homes. Several studies demonstrate an exceptionally high prevalence of pain in residential aged care facilities, with as many as 58–83 % of residents suffering from some form of persistent pain complaint (Abdulla et al. 2013; Takai et al. 2010). Approximately 15 % of nursing home residents were reported to have 'clinically significant' pain of moderate or severe intensity, and 3.7 % had

excruciating pain on at least 1 day in the previous week (Teno et al. 2004). These estimates come from the minimum data set from all nursing homes in the USA, representing almost 2.2 million residents.

15.1.2 Prevalence of Mood Disturbance as a Function of Age

Depression is an important psychopathological condition that can interact with pain and cognitive functioning. In common with the trends noted for pain prevalence, the likelihood of a major depressive disorder and the level of depressive symptoms have been reported to peak in late middle age and decline thereafter (Gibson 1997; Beyer 2007). It is estimated that approx. 1–4 % of older persons living in the community (Charney et al. 2003), 5–12 % of older patients in primary care settings (Lyness et al. 2002) and up to 25 % of those in residential aged care (Smalbrugge et al. 2005) have a diagnosed major depressive disorder. When compared to the elderly, the reported rates of clinically diagnosed major depression are more than double in most studies of late middle-aged adults (45–60 years) (Mojtabai and Olfson 2004; Jorm 2000). Reasons for the age-related decrease in depression are multifactorial and include decreased emotional responsiveness, age-associated alterations in salient risk factors and possible changes in the phenomenology and measurement of depressive symptoms (Jorm 2000; Beyer 2007). For instance, depressive symptom severity may be inflated in older persons because many of the somatic-based symptoms, such as feelings of fatigue, sleep problems and memory complaints, and could be endorsed due to the increased frequency of comorbid medical problems rather than psychopathology, per se. The type of depressive symptoms endorsed by older adults has also been shown to differ, with decreased reports of anhedonia or sadness, being less likely to hold negative views about themselves and the future but more likely to contemplate death, report helplessness and endorse somatic features (Brodaty et al. 2005; Beyer 2007; Husain et al. 2005). These findings underscore the different symptomatology of depression in older age and the potential increased difficulty in diagnosing this condition.

Anxiety disorders are also reported to decrease in frequency with advancing age (Wolitzky-Taylor et al. 2010) and this is consistent with a general decrease in the reporting of negative emotional states by older persons (Gibson 1997). In representative community-dwelling samples, the prevalence of clinically diagnosed anxiety has been reported at 5.5 % for older adults, compared to 8.3 % in middle-aged populations (Flint 1994; Regier et al. 1998). As might be expected, the prevalence of psychometric measured symptoms of anxiety is considerably higher than estimates based on clinical diagnosis, occurring in approx. 15 % of healthy older adults (Mehta et al. 2003), but these rates are still 25–30 % lower than in middle-aged cohorts. The prevalence estimates jump significantly in samples with comorbid medical illnesses, most of which are more common in older adults. For instance,

anxiety symptoms in patients with cancer, cardiac issues, chronic obstructive airway disease or diabetes occur in 36–85 % of cases (Wolitzky-Taylor et al. 2010). It is, therefore, somewhat difficult to reconcile the consistently reported age-related decline in anxiety disorders with the higher burden of disease and associated anxiety. Clearly anxiety disorders are still quite common in the elderly, even in the absence of medical comorbidity, and any age-related decrease is of relatively modest proportions.

15.1.3 Prevalence of Cognitive Impairment and Dementia

Dementia can result from more than 100 different disease states, including Alzheimer's disease, vascular dementia, Lewy body dementia, frontotemporal dementia, Creutzfeldt-Jakob disease and a range of less common metabolic, infectious and neurodegenerative disorders. Dementia of any type is diagnosed in 1.5 % of adults aged 65–70 years and rates approximately double for each additional 5 years of life, affecting 22.2 % of those aged 85–89 years and 44.8 % of those aged 90–95 years (Ritchie and Kildea 1995). More than 35 million people worldwide are estimated to have dementia (WHO 2012), and this number is expected to increase exponentially with the rapid demographic shift towards an ageing population. Alzheimer's disease is the most common type of dementia, accounting for 65–75 % of cases, followed by vascular dementia (5–10 %), Lewy body dementias (7 %) and assorted others (10 %) (Small et al. 1997). Most dementias are neurodegenerative, showing progressive deterioration in cognitive, emotional and behavioural dysfunction over time and a typical life expectancy of approximately 10 years from time of first diagnosis. When considering the impacts of dementia, it is always important to recognise the stage of disease as the severity of symptoms varies widely across the time course of illness.

In recent years there has been a greater recognition of cognitive impairments seen in pre-clinical stages of dementia. Modern characterisations of Mild Cognitive Impairment (MCI) include a spectrum of impairments in both memory and non-memory cognitive domains (Roberts and Knopman 2013). Prevalence estimates range between 16 and 20 % in most studies of representative population-based samples and show a strong age-related increase in MCI from age 60 onwards. Some studies report much higher prevalence estimates and this is thought to reflect peculiarities in the specific sample, including multiethnic cohorts, clinic-based studies and large urban centres (Roberts and Knopman 2013). Several risk factors have been identified for MCI including age, sex, education, vascular and cardiovascular outcomes, diet and lifestyle factors, neuropsychiatric conditions and abnormalities in structural neuroimaging and spectroscopy (Campbell et al. 2013; Roberts and Knopman 2013). There is a demonstrated increased risk of progression to clinically diagnosed dementia in persons with MCI. Most studies report that 20–40 % of those with MCI progress to dementia (Campbell et al. 2013; Roberts and Knopman 2013). However, approximately 20 % of those with MCI will revert back to normal cognitive functioning at subsequent evaluation, suggesting a more complex relationship between these entities.

15.2 Age Differences in Pain Report, Psychological Impacts and Pain-Related Cognitive Aspects

15.2.1 Changes to Clinical Pain Report in Older Age

Uncontrolled studies of clinical pain report in older adults reveal that pain may be much less frequent and severe in a variety of somatic and visceral medical complaints, including myocardial ischemia, pneumonia, appendicitis, peptic ulcer, post-operative pain and cancer (Pickering 2005). For instance, the classic presentation of myocardial pain in the chest, left arm and jaw is much less common in older adults, with 35–42 % of adults over the age of 65 years experiencing apparently silent or painless heart attack (Hwang et al. 2009). The severity of chest pain is also less after controlling for severity of myocardial ischemia (Rittger et al. 2010). A retrospective review of more than 1,500 cases of various types of malignancy revealed a similar magnitude of age difference in the incidence of pain between younger adults and older adults (55 % vs. 26 % with pain) (Cherng et al. 1991) and a decline in reported pain severity (Caraceni and Portenoy 1999). In the post-operative recovery period, older adults have been shown to display a 10–20 % reduction in pain intensity for each additional decade of life after 60 years, even after controlling for the extent of operative tissue damage (Morrison et al. 1998; Thomas et al. 1998). The prevalence of radiographic osteoarthritis steadily increases until at least 90 years of age and undoubtedly contributes too much of the pain seen in older cohorts. However, the report of arthritic pain severity does not show the same ageing trend. After accounting for disease severity, the intensity of arthritic pain has been reported to decrease (Parker et al. 1998), increase (Chiou et al. 2009) or remain unchanged with advancing age (Gagliese and Melzack 1997). Given that the studies cited above are essentially uncontrolled clinical case reports, it is impossible to determine whether any observed decline in pain reflects actual age differences in the pain experience or differences in disease severity and/or the willingness to report pain as a symptom. Nonetheless, based on the available evidence, it does appear that advancing age is often associated with reduced severity of pain and a reduced frequency of pain as a presenting symptom, and this has important implications for clinical diagnosis and management. There are a variety of potential reasons as to why atypical pain presentations are more common in older persons, including the presence of comorbidity and altered beliefs about pain and age-related changes in physiological functions, including within the nociceptive system itself.

15.2.2 Pain-Related Mood Disturbance and Psychopathology

The comorbidity of chronic pain and depression has been well studied in the general adult population. Estimates of co-prevalence vary widely between different studies and depend on the method of assessment (clinical interview, psychometric assessment), the population studied (community, institutionalised, pain clinic samples) and the definition of depression used. For instance, depression can be used to denote

a symptom, a mood state or a psychiatric disorder. Further complicating the picture, several of symptoms of depression overlap with chronic pain (sleep disturbances, fatigue, changes in appetite), and this could potentially inflate the prevalence of depression in this population. Several studies show that up to 70 % of patients attending a pain clinic meet the cut-off score for mild depression when using psychometric assessment (Banks and Kerns 1996). Nonetheless, even when using strict clinical diagnostic criteria, between 32 and 54 % of patients with chronic pain meet the DSM-IV criteria for major depressive disorder (Banks and Kerns 1996). The occurrence of comorbid pain and depressive symptoms is known to be less common in community samples affecting between 19 and 35 % of persons with chronic pain (Miller and Cano 2009; Rosemann et al. 2007).

In terms of characterising any age differences in the relationship between mood disturbance and persistent pain, definitive research is currently lacking, although the majority of studies show no significant differences in the levels of self-reported depressive symptoms, anxiety or general mood disturbance (Gibson 2005). Most studies describe a 5–15 % reduction in the number of endorsed depressive symptoms in older adults, but this magnitude of difference fails to reach statistical significance unless the sample size is very large (Riley et al. 2000). Similarly, the rates of clinically diagnosed depression and anxiety in patients with chronic pain remain relatively constant age the adult lifespan (Gibson 2005; Wijeratne et al. 2001). The lack of ageing effect on comorbid mood disorders in persons with pain is perhaps surprising given the general literature demonstrating a decreased likelihood of depression, anxiety, anger and negative mood in older adults (see above, Gibson 1997). Given the disparate findings on ageing differences in mood disturbance between those with and without pain, one could postulate that persistent pain must have an increased negative influence on mood with advanced age in order to overwhelm the typically observed age-related reduction in self-rated mood symptoms seen in persons without pain. Further studies are required in order to clarify this apparent disparity and to identify the reasons why pain-related mood disturbance does not show the same pattern of attenuation seen in the general older population.

15.2.3 Pain-Related Cognitive Aspects

Cognitive beliefs, appraisals, attitudes and the meaning attributed to pain symptoms are known to be important mediators in shaping the experience of pain as well as the emotional and functional impacts. A growing body of evidence demonstrates that these cognitive attributes might differ as a function of age. It has been argued that older people see pain as a normal companion of older age and often misattribute pain symptoms to the normal ageing process (Gibson 2005; Molton and Terrill 2014). In a large epidemiological survey, more than 80 % of older adults agreed ‘somewhat’ or ‘strongly’ with the notion that ‘one has to expect more pain as you get older’ (Gibson 2005). The misattribution of pain symptoms to ageing instead of

disease or injury is likely to have profound implications for the response to mild aches and pain, with older persons being less threatened by pain, less distressed and less likely to seek treatment (Gibson 2005). This seems less obvious when pain is severe and older adults are just as likely to seek active medical treatment (Leventhal and Prohaska 1986). Others agree that pain is something to be expected and accepted in advanced age (Weiner and Rudy 2002; Molton and Terrill 2014), although there have also been some exceptions to this view (Gagliese and Melzack 1997) and the severity of pain may be an important consideration. It is also quite likely that older adults hold all of these different beliefs in varying degrees. They may believe that some pain is 'to be expected' in ageing but that pain is also worthy of medical treatment. This multifactorial basis of pain beliefs is supported by data from a study in which 40 % of older individuals said it was 'definitely true' that having more aches and pains was to be expected with ageing, but 94 % stated that it was also important that someone with aches and pains should always talk to a doctor about treating them (Sarkisian et al. 2002).

Clinical anecdote has long described older adults as being more stoic in their reports of pain and more recent studies using specialised questionnaires have confirmed this view (Yong et al. 2003). Pain-free community-dwelling older adults and older patients attending a multidisciplinary pain clinic report significantly higher levels of stoic reticence (no good complaining, just get on with it) when compared to younger adults and an increased reluctance to label sensations as being painful (Yong et al. 2003). Pain attitudes like stoicism are likely to lead to an underreporting of pain by older adults and a reduction in pain-related emotional disturbance (Yong 2006).

Catastrophising, an exaggerated negative appraisal of the pain experience, is known to be a maladaptive pain appraisal and is strongly related to increased depression, anxiety, disability and pain in young adult cohorts with chronic pain. Middle-aged (51–65 years) and older adults (66–85 years) with rheumatoid arthritis have been reported to use more catastrophising than younger adults when pain is mild but not if severe (Watkins et al. 1999). Other studies using pain clinic samples have failed to replicate this finding of an age difference in this negative pain appraisal (Gibson 2005). Moreover, the demonstrated relationship between higher levels of catastrophising and increased depressive symptoms appears to hold regardless of age (Wood et al. 2013). Self-efficacy, or the perceived ability to successfully take some action in order to control or reduce pain, also does not appear to change as a function of age (Gibson 2005). These findings highlight the relative stability of some cognitive appraisals and attitudes towards pain across the age spectrum and highlight the often enduring nature of the relationship between cognitive aspects of pain and the consequent emotional disabilities that may result.

The relationship between pain and cognitions appears to be bidirectional. The cognitive beliefs and attitudes discussed above emphasise their important role as mediators of pain and its impacts. However, unrelieved pain is also known to compromise cognitive functioning, and this might be of particular relevance when considering the older persons suffering from bothersome pain. A review of available

evidence on the relationship between chronic pain and cognitive functioning reveals deficits in attention, working memory, problems with mental flexibility, information processing, executive function, psychomotor speed and problem-solving abilities in both younger and older adults (Abeare et al. 2010; Weiner et al. 2006; Lee et al. 2010). Other cognitive domains such as IQ, calculation, planning ability, language and abstract thought remain relatively unaffected by the presence of pain (Hart et al. 2003; Oosterman et al. 2012). Both pain and its related psychosocial problems (depression, sleep disturbance, opioid use) may contribute to these observed deficits. The nature of these cognitive deficits has been interpreted to indicate a primary problem with attentional capacity and speed due to the fact that pain, by its very nature, competes for limited attentional resources. There have been relatively few studies to examine possible age differences in pain-related impacts on cognitive function, despite the fact that this may be one of the few potentially remedial contributors to cognitive impairment in older persons. In an early study, Brown et al. (2002) demonstrated that advancing age was independently associated with pain-related impairments in working memory, reasoning ability and information processing speed, although this finding was not replicated in a more recent study (Oosterman et al. 2011). Other studies have confirmed that cognitive performance is always worse in persons with chronic pain regardless of age (Söderfjell et al. 2006). However, Oosterman et al. (2013) recently showed that age may moderate the interaction between pain and cognitive function, with older adults showing a positive association between pain and executive functioning and no effect on memory or psychomotor speed, whereas in younger adults there was an inverse relationship between pain and all measured cognitive functions. An important implication of this work is that the often-seen negative impacts of pain on some aspects of cognitive performance may no longer be present in older adults and the direction of association is reversed such that higher self-reported levels of pain are seen in those with better executive function. Clearly, further work is needed to better characterise the exact nature of the relationship between pain and cognitive functions in older samples when compared to younger adult samples with pain. At present, there is growing evidence to show that unrelieved pain can have a strong impact on cognitive performance in both younger and older adults, particularly on aspects of attention, working memory and speed-related tasks. Advancing age may or may not moderate some of these effects. Further work is needed to resolve this issue.

15.3 The Special Case of Pain, Mood Disturbance and Cognition in People with Dementia

One area where the interaction between pain, emotion and cognition is of special relevance in older populations relates to persons with dementia. As noted earlier, age represents the most important risk factor for dementia, and the likely interplay between pain, psychological burdens and cognition is substantially more complex

in this group. There has been increased heuristic interest in this vulnerable population over recent years, and our understanding of the pain experience in persons with dementia is starting to grow.

15.3.1 Pain in Persons with Dementia

There is limited evidence to support the view that older persons with cognitive impairment or dementia have a lower prevalence of pain and make fewer spontaneous reports of pain than cognitively intact counterparts. A weak but significant negative relationship between pain report and cognitive impairment in nursing home residents has been found in early studies (Parmelee et al. 1993; Cohen-Mansfield and Marx 1993). Joint pain was reported by 45.2 % in cognitively intact adults versus 34.1 % in those with mild cognitive impairment and only 29.2 % in those with marked or severe cognitive impairment. Comparable figures for back pain were 46.0, 35.5 and 31.5 %, respectively, although pain at other sites including the neck, arms, legs, chest or gastrointestinal tract did not differ (Parmelee et al. 1993). More recent studies emphasise that the magnitude of difference is quite large. For instance, when using the minimum data set (a generalised proxy rating of pain), pain was detected in just 31.5 % of those with severe cognitive impairment, compared to 61 % of cognitively intact residents, despite both groups being equally afflicted with potentially painful disease (Proctor and Hirdes 2001). The apparent reduction in pain is not limited to mild aches and pain as the prevalence of substantial daily pain as rated by nursing staff (using the minimum data set) has also been reported at about half the rate in those with severe cognitive impairment (23.7 %) when compared to cognitively intact residents (40.4 %) (Wu et al. 2005). Subsequent work has confirmed this finding (Sawyer et al. 2007) even when using a different data set from the 2004 National Nursing Home Survey (Walid and Zaytseva 2009). The consistently lower prevalence of pain in those with cognitive impairment could suggest that pain is less of an issue in persons with dementia, but this conclusion may be premature and there are several notable limitations with the studies cited above.

Of fundamental importance is the impaired capacity for verbal communication in those with more severe cognitive impairment. This lack of verbal skills represents an obvious explanation to account for less frequently identified pain in those with dementia and physician-identified pain has been reported in 43 % of verbally communicative residents, but only 17 % of those who were verbally non-communicative (Sengstaken and King 1993). This suggests that verbal communication is still important for identifying pain even when making proxy-based ratings of pain. Some have also questioned whether the lack of staff training in non-verbal pain assessments, use of inappropriate assessment tools and the inability to identify salient pain-related behaviours is the actual reason why prevalence estimates of pain are reduced in those with dementia (Eritz and Hadjistavropoulos 2011; van Herk et al. 2009).

In support of this contention, studies examining pain prevalence using only self-report measures show a different picture. Pain assessment with a 5-point verbal

descriptor scale revealed that 35.8 % of community-dwelling cognitively impaired persons reported pain of moderate or greater intensity compared to 35.9 % of cognitively intact older adults (Shega et al. 2010a). Self-reported pain in verbally communicative nursing home residents did not differ significantly between those with intact cognition (48.7 %), mild impairment (46.5 %) or severe impairment (42.9 %) (Leong and Nuo 2007). Pain was more likely to be acute in those with cognitive impairment, and this pain was always present rather than episodic. In contrast, another population-based study of community-dwelling adults aged 75+ years revealed that 42.7 % of persons with a clinical diagnosis of dementia reported any pain in the past month compared to 68.8 % of persons without dementia (Mäntyselkä et al. 2004). Daily pain that interfered with activity was noted in 18.7 % versus 36.1 %, respectively. Finally, one population-based study even reports a 23 % *increase* in pain prevalence in those with a clinical diagnosis of dementia living in the community or residential care (Patel et al. 2013). Thus, the literature using predominately self-reported pain shows either increased, decreased or no change in pain frequency in persons with dementia. It is difficult to reconcile this literature, but the presence of cognitive impairment or dementia may have less impact on pain prevalence when examined among residents capable of self-reporting pain.

Another way to explore the issue of dementia-related changes in pain is to use non-verbal behavioural and physiological markers as an assessment methodology. Studies monitoring facial expressions of pain reveal either a significantly increased response in those with dementia (Kunz et al. 2007, 2009) or no change (Lints-Martindale et al. 2007). Facial expressions were also shown to be greater in persons with dementia immediately following a uniform painful clinical procedure, such as venipuncture, injection or movement-exacerbated pain (Porter et al. 1996; Hadjistavropoulos et al. 2000, 2008; Hsu et al. 2007). Persons with dementia have also been shown to display enhanced nociceptive flexion withdrawal reflexes (RIII) in response to experimental pain (Kunz et al. 2007, 2009; Lautenbacher et al. 2007). Facial responses and withdrawal represent a more reflexive, automatic response which may be disinhibited in persons with cognitive impairment. Irrespective of the exact reasons, the increased facial expressions and reflexes in response to pain seen in persons with dementia provides a complete contrast to the findings presented when using proxy-rated pain scales. Although these measures probably represent different aspects of the pain experience to self-report, they do challenge any argument regarding a so-called reduction in pain sensitivity in persons with dementia.

It is difficult to directly compare studies on putative dementia-related differences in pain frequency and intensity. Any person capable of self-report will not be in the most advanced stage of dementia, whereas proxy ratings can still be made in these individuals. Therefore, the findings have a major confounding between the method of pain assessment (self-report, informant proxy ratings, physiological indices) and the severity of dementia. Whether the apparent lesser prevalence of pain in persons with severe dementia reflects an actual reduction in pain or is simply due to the increased difficulty in communicating their pain to others remains unknown. Further studies are needed to address this issue.

15.3.2 Behavioural and Emotional Impacts of Persistent Pain in Those with Dementia

Cognitively intact older adults with pain typically display greater levels of mood disturbance, higher levels of disability, social isolation, poorer cognition, sleep and quality of life (Gibson and Lussier 2012). Whether similar psychological and behavioural impacts are seen in those with dementia has only just started to be investigated. It is possible that the types of pain-related impacts may differ in a dementia-specific way. For instance, the observed reduction in discretionary activities, such as social interaction, home maintenance, hobbies and recreations (Gibson and Lussier 2012), may be of less relevance in those with advanced dementia. Instead, behavioural and psychological symptoms of dementia (BPSD), such as wandering, resistance to care, agitation and aggression, depression and anxiety, may be of greater importance (Husebo et al. 2011b).

A large sample of nursing home residents in pain (78 % with cognitive impairment) was also shown to be 1.68–2.63 times more likely to have severe depression as based on psychometric assessment (Achterberg et al. 2010). A study of older adults with Alzheimer's disease (AD) revealed an increased number of depressive symptoms and a poorer quality of life in those with self-rated or proxy-rated pain, when compared to those without pain (Jensen-Dahm et al. 2012). Leong and Nuo (2007) report that the number of residents who were 'feeling depressed because of pain' was 32.4 % of cognitively intact persons and 53–55 % of those with mild or severe cognitive impairment. Another study has confirmed that those with more severe cognitive impairment have the strongest relationship between pain and depression (Kenefick 2004), and mood disturbance in those with dementia has been shown to be a very common accompaniment of persistent pain (Torvik et al. 2010). Other psychological impacts of pain in persons with dementia include increased levels of anxiety (Leong and Nuo 2007) and more frequent delusions and abnormal thought processes in those with comorbid pain (Tosato et al. 2012). These studies emphasise the importance of pain-related impacts on psychological functioning when attempting to characterise the multidimensional pain experience of persons with cognitive impairment or dementia (Gibson 2012). In aggregate, these studies consistently show that depression is a common impact of persistent pain in persons with cognitive impairment and that persons with both pain and dementia may actually increase the rates of comorbid depression in a synergistic fashion.

Self-reported disability has been found to be a very common sequela of persistent pain in those with severe cognitive impairment (60 %) when compared to cognitively intact older adults (47.4 %) (Leong and Nuo 2007). Older adults with cognitive impairment were also found to be 35 % more likely to have difficulty in performing basic daily self-care activities (eating, dressing, personal care), and this level of impact is comparable to those in pain but without cognitive impairment (Shega et al. 2010b). The levels of self-reported functional disability in instrumental activities of daily life (using telephone, cooking, shopping, travel, housework) was significantly greater in those with both pain and cognitive impairment (Shega et al.

2010b). Of interest, a path analysis of the relationship between pain and disability in persons with dementia revealed that increased depression entirely mediated this association (Cipher and Clifford 2004). Overall, it appears that the functional impacts of persistent pain commonly seen in older adults are as great, if not even greater, in persons with cognitive impairment in those that can self-report.

One potential area of impact unique to person with cognitive impairment relates to the occurrence of behavioural and psychological symptoms of dementia (BPSD). The presence of disruptive behaviours in persons with pain and dementia has long been noted (i.e. Cohen-Mansfield et al. 1990). Higher levels of agitation or aggression have consistently been shown to be associated with self-rated or proxy-rated pain (Husebo et al. 2011b; Pelletier and Landreville 2007), and this is most common in those with more severe cognitive impairment (Hodgson et al. 2014; Ahn and Horgas 2013). Pain is increasingly being recognised as an important potentially remedial causative factor for agitation and aggression (Husebo et al. 2011b), and a recent RCT of analgesics showed a significant reduction in the levels of agitation and aggression concomitant with reduced pain (Husebo et al. 2011a). With respect to other types of BPSD, pain was reported to be associated with a reduction in wandering (Ahn and Horgas 2013; Tosato et al. 2012), an increase in resistance to care (Tosato et al. 2012) and repetitive vocalisation (Cariaga et al. 1991). An overview of the current literature on the impacts of pain in persons with dementia emphasises some clear differences in the consequent behavioural and psychological impacts of pain in persons with dementia. It will be important to develop a more comprehensive understanding of these impacts and a better conceptual framework to guide future research into the likely sequela of pain in this highly dependent and vulnerable population.

15.4 Conclusion

The need to be fully informed about any age-related changes in pain and its impacts on mood and cognition is paramount, given the rapid ageing of the world's population, as this knowledge is required in order to select the most appropriate assessment and treatment approaches. Pain is very common in older adults, particularly in the joints, although there is also clear evidence for a greater proportion of atypical presentations in usually painful disease states, including a relative absence of pain symptoms. Evidence suggests that older persons are more accepting of mild aches and pains and have altered pain beliefs and attitudes, including increased stoicism. Pain itself can also have major effects on cognitive performance regardless of age, although unlike in younger adults, recent work suggests that the better executive functioning in older adults is related to greater self-reported pain. Mood disorders, such as depression and anxiety, decline in prevalence with advancing age except when comorbid with persistent pain. The differential effect in those with versus those without pain may suggest a greater impact of pain in older age. Older persons with dementia represent a special population of older adults with possible

alterations in the pain experience and with their own unique pain-related impacts on mood and behaviours. However, our current pool of knowledge in this area remains incomplete.

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