RESEARCH ON PHYSIOLOGICAL AND PHYSICAL CONCOMITANTS OF CAREGIVING: WHERE DO WE GO FROM HERE?[1,2]

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ABSTRACT

This article discusses the current state of research on the physiological and physical concomitants of caregiving. We offer recommendations about theoretical, empirical, and treatment issues that researchers should consider in future investigations. Important theoretical issues include specifying acute and chronic stress in caregiving research. Empirical issues include sample selection, home versus clinic assessments, the use of experimental probes, moderating and mediating variables, and measurement issues (problems with self-report of health, medical records, physical exams, and lab assessments). Finally, we note that investigators should use this newfound knowledge to target interventions to specific subsets of vulnerable caregivers. In this way, basic research into caregiving, as a model of chronic human stress, can provide more focused approaches to benefit both caregivers and patients.

(**Ann Behav Med** 1997, *19*(2):117–123)

INTRODUCTION

Chronic stress can be defined as repeated, long-term exposure to continuous experiences perceived to be stressful. One example of a chronic stressor is caring for a spouse diagnosed with Alzheimer's disease (AD) or related dementias (1). Few life events can prepare one for watching a spouse die from AD. AD involves progressive intellectual impairment. As such, AD patients become increasingly dependent on caregivers (CGs). The loss and prolonged distress (up to 15 years) inherent in caring for a spouse with AD can combine with individual vulnerabilities to jeopardize homeostasis in some CGs (2,3) and increase disease risk. Clearly, CGs are an important group in which to study health problems.

In the last decade, two comprehensive reviews of research on CG morbidities have been published. Schulz, Visintainer, and Williamson (4) discussed 34 studies that examined the physical/mental morbidities of CGs of dementia victims. At that time, only eleven studies had examined physical health and only one had used a physiological marker (5). Most of the eleven studies of CG physical health used self-reports of health, including single subjective items that rated health from "fair" to "poor" and more objective reports of illnesses, medication, and service use. Some researchers observed that CGs were similar to age- and sex-matched controls (COs) (6), whereas others found that CGs rated their health as poorer than matched COs (7). In 1995, Schulz, O'Brien, Bookwala, and Fleissner (8) reviewed 40 additional studies of CG morbidities. They observed that several researchers (2,9,10) did not find differences between CGs and COs in self-reports of chronic illnesses or in medication use, whereas others (6,7,11) found that CGs reported more illnesses and/or greater use of medications than did COs. Schulz et al. (8) also observed that a number of researchers (2,7,12) reported that CGs used more medical services than did COs, whereas others (6,13) did not observe such differences.

Since 1990, several additional studies have examined relationships between caregiving and physiological outcomes. However, physiological studies still only account for a small proportion of research on CG health (8). Recent areas of study include: immune functioning (2,14–19), neuroendocrine functioning (18,20,21), cardiovascular functioning (10,12,22,23), and metabolic functioning (24–26). Although recent research on CG physiology should improve our understanding of physical health mechanisms better than self-report measures, a number of issues still remain regarding the study of associations among caregiving, physiology, and health. These include future theoretical issues to consider in CG research, guidelines for design (sampling, probes) and assessment, and finally interventions that might be guided by such theoretical/empirical knowledge.

[1] Preparation of this manuscript was supported in part by the National Institutes of Mental Health, R01-MH43267, R01-MH46015, R01-MH52247; the National Institute on Aging, R01-AG10750, R01-AG09292, R01-AG13305; the National Institutes of Health, Clinical Research Center, M01-RR00037; the National Heart, Lung, and Blood Institute, N01-HC85079-85086; and grants R37-MH42096, R01-MH50538, P01-AG11585.

[2] Special thanks are given to five formal caregivers for nurturing the research presented in this issue: Drs. Enid Light, Marcia Ory, Jane Pearson, and Ronald Abeles of the National Institutes of Mental Health and the National Institute on Aging, and the Office of the Director, Dr. Norman Anderson.

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THEORETICAL ISSUES TO CONSIDER IN CG RESEARCH

CG researchers typically theorize the stress of caregiving as chronic because CGs face many years of continuous exposure to the daily demands of caregiving. However, over the disease trajectory, the intensity/frequency of a CG's acute stressors/hassles may vary widely (e.g. financial, etc.) (27). Many spouse CGs may also lose their primary confidante (the AD victim) to the disease. Acute and chronic stressors together may yield unusually aversive circumstances. In the animal literature, rats subjected to chronic stress (e.g. restraint) have some increase in stress hormones (e.g. corticosteroids) and also show increased ACTH response to infusion of corticotropin releasing factors (CRF) or an acute superimposed restraint (e.g. ether anesthesia) as compared to non-restrained animals (28,29). This suggests that the hypothalamic–pituitary adrenal (HPA) axis becomes sensitized by chronic stress to yield an amplified response to new stressors. In humans, it may be fruitful to identify those CGs who are exposed to particularly severe singular stressors or to an assimilation of additional acute stressors (e.g. financial, etc.), since these may be the CGs at particular risk for physiological changes that may ultimately lead to organ damage. Such physiological changes might be in the HPA axis, sympathoadrenalmedullary (SAM) axis, and/or in other physiological systems (e.g. immune), with resultant implications in hypertension, heart disease, infections, or perhaps greater risk for malignancies.

EMPIRICAL DESIGN ISSUES TO CONSIDER IN CG RESEARCH

Sample Selection

Schulz et al. (4) have discussed the bias present in samples that only include married CGs (such CGs have better resources and tend to be in better health than single CGs). Researchers need to sample enough CG spouses and CG children to compare them on the type and magnitude of their health risks as well as on the predictors of such risk factors. Clearly, the older age of spouse CGs will influence their physiology (e.g. immunosenescence), a factor not as relevant in child caregivers. Researchers also need to sample more lower socioeconomic status (SES) CGs because low SES is also a risk factor for illness (30). CG status may interact with SES such that low SES CGs are at especially high risk of illness.

Researchers should document how the demographic distributions of their samples of CGs and COs differ from the population of CGs and COs in their geographic region. For example, what types of CGs and COs were disqualified from or refused to participate in the study? Schulz et al. (4) have suggested that low- to moderately-distressed caregivers and those who are extremely distressed are likely to be underrepresented in studies that use media announcements for recruitment. The low-distressed group may not self-identify as CGs, and the extremely distressed group may feel too overwhelmed to participate in caregiving studies. One study compared dementia CGs who required home interviews with those who were willing to travel to a university hospital for assessment; all subjects had been offered free taxi service (31). Those CGs who were interviewed at home were more depressed than those who were assessed at the university; in addition, the former provided more hours of care per day and their spouse or parent was more impaired. Thus, research projects that do not allow for at-home assessments of CGs may underestimate depression and its physiological correlates.

In-Home Versus Clinic Assessment

Researchers need to assess physiological measures *in situ* in order to obtain better ecological validity. Caregiver studies that exclusively use clinical settings might obscure detection of physiological impairment. Blood pressure (BP) differences between high/low hostile persons are consistently greater in their homes (using ambulatory BP measures) than in clinics (32). More importantly for CGs, home environment ambulatory BPs are greater than clinic/work BPs (22). Similarly, in this issue, King and Brassington (33) show a trend for ambulatory BP differences to occur between exercise-treated and control CGs in the presence of their care-receivers (patients), but not in situations where the care-receiver is not present.

Experimental Probes

Researchers need to consider physiological and psychological probes to determine whether a caregiver is indeed in a "state of stress." For example, it may be that the chronic stresses of caregiving initially cause some HPA or SAM changes, but if there is an adaptation to these such that when basal values are finally sampled, there are no apparent differences between CGs and COs. However, if one perturbs the physiological or psychological system (e.g. perturb the HPA axis by infusing CRF or perturb the cardiovascular system by imposing postural or cold pressor stress), one may observe an accentuated response, which has the effect of revealing a "hyperarousable" physiological system. Esterling et al. (16) used cytokine-stimulated natural killer cell activity (NKA) and observed hypothesized differences in CGs and COs that were not seen in basal levels. Vitaliano et al. (10) used an expressed emotion task to stress CGs and COs in a laboratory setting. Resting BP levels were similar in hypertensive (HTN) CGs and hypertensive COs; however, HTN CGs reacted significantly more to the task than HTN COs. In fact, the reactivity of HTN COs was similar to that of normotensive CGs and COs.

Moderating Variables

Researchers need to examine the physiological/health effects of interactions between stress exposure (CG status, patient variables), CG vulnerabilities (age, race, gender, disposition, health history); and CG resources (income, education, social supports, coping) and not just the physiological/health effects of CG status. For example, more severe cognitive/behavioral problems in a care-receiver may increase a CG's risk for health problems via increased exposure to chronic/acute stressors. Patient characteristics can be used to isolate subgroups of CGs with different exposures to stress and potentially different physical responses. Research in this issue illustrates the advantages of considering CG exposure (poorer patient functioning/higher CG demands) as a moderating variable in caregiver research (18,34,35).

Previous research has also shown the advantage of considering the psychophysiological effects of interactions of vulnerability and resource variables. CGs who have high vulnerability to stressors and low resources have greater psychological distress 15–18 months after study entry than do those who have either low vulnerability or high vulnerability and high resources (36). Vulnerability variables and poor resources may increase an individual's risk for illness through increased psychological distress. In addition, CGs with poor social supports experience more age-related heart rate problems than do CGs with good social supports (23), hypertensive CGs have greater blood pressure reactivities while discussing the kinds of relationships they have with their spouses than do hypertensive COs and normotensive CGs and COs (10),

and men CGs have greater triglycerides and less high density lipoprotein cholesterol levels than do men COs (24). Also, men CGs have a greater prevalence of obesity than do CO men, and CG women gain more weight than do CO women over a 15–18 month period (25). Angry/hostile CGs have greater glucose levels than do angry/hostile COs and non-angry/non-hostile CGs and COs (3).

In this issue, interesting interactions are also shown between stress exposure and resources—CGs whose caregiving demands are heavy, yet receive little respite ("respite mismatched"), appear to have greater HPA axis arousal (elevated ACTH) than do non-mismatched CGs (18). In this regard, it is essential to specify CG stressors precisely, since not all demands of caregiving may operate in a consistent direction. For example, Shaw et al. (34) have demonstrated that high CG demands are associated with increased likelihood of developing one of several medical events. Alternatively (and unexpectedly), increased problem behaviors among AD spouses are associated with fewer, rather than greater medical morbidity. The possibility is presented that either CGs adapt better to problem behaviors than physical demands (perhaps they are simply unable to compensate for the latter), or there might be self-selection into the study of CGs who are particularly good at problem-solving.

Race and ethnicity may also increase a CG's vulnerability to health problems. Ethnic groups respond differently to caregiving (37–39). Hence, future research should examine African–American, Hispanic–American, and Asian–American CGs and COs. In general, African–Americans are at greater risk for obesity, hypertension, coronary heart disease (CHD), stroke, renal disease, and diabetes than are Caucasians (40–43), and they have higher insulin responses to glucose loading and net BMI and age effects (44) and higher rates of hostility (a variable associated with CHD) (45,46), smoking, and alcohol/calorie consumption (47) than do Caucasians. Unfortunately, few studies have examined the degree to which stress and vulnerability exacerbate illnesses in African–American CGs (48).

To our knowledge, no prospective studies have been published that have examined the health of CGs before and after becoming CGs. To estimate the relative risk of health problems given exposure to caregiving, the ideal study should examine populations of older adults and collect data on their physical and mental health status prior to some of them becoming CGs. Many pre–post morbidity markers could then be compared in individuals who become CGs to those who do not. Tapping into prospective population studies of middle-age/older adults would allow researchers to tease out caregiver–control differences (e.g. vulnerabilities, resources) that existed prior to caregiving. Premorbid variables are, however, more salient for offspring CGs than for spouses, because factors such as gender will determine who among several children will become the primary CG. One study of spousal CGs examined frequencies of depressive disorders in the years prior to caregiving as well as first-degree relatives' incidence of psychiatric disorder; these data were compared with individually-matched COs (49). The groups did not differ in either the frequency of depressive disorders in the years prior to caregiving or in first-degree relatives' incidence of psychiatric disorder, the most reliable predictors of subsequent depressive disorders. However, during the years they had provided care, 30% of spousal CGs had experienced a depressive disorder, compared to only 1% among matched COs in the same time period. Only two CGs who had become depressed during caregiving had met criteria for a depressive disorder prior to caregiving, and family history was not related to the identification of at-risk CGs. Thus, caregiving was linked to the onset of depressive disorders in older adults who had no prior evidence of vulnerability. More recently, Russo, Vitaliano, Brewer, Katon, and Becker (50) tested a diathesis–stress model of psychopathology by examining the rates of current and lifetime psychiatric disorders in 82 spouse CGs of AD victims and 86 demographically-matched COs. CGs and COs did not differ in the prevalence of depressive–anxiety disorders (32% versus 27%) before the onset of the care recipient's AD (or during a similar time period for the COs); however, CGs experienced more depressive–anxiety disorders (27%) after the onset of the patient's AD than COs during the same time period (10%). CGs with a psychiatric history prior to the onset of the patient's AD were more likely (73%) than CGs with no history (5%) to receive a diagnosis after the onset of AD. Moreover, CGs with a psychiatric history were more than twice as likely (73%) to experience a recurrence after the onset of AD than COs with a psychiatric history (30%). These findings indicate that psychiatric history (vulnerability) and caregiving (stress exposure) interact, resulting in differences in the prevalence of psychiatric disorders among CGs.

Mediating Variables

The demonstration of mediation is an important challenge in scientific inquiry. In CG research it is incumbent that, once it is established that CGs are at greater risk for physiological impairment, a researcher explain why such increased risk exists. A mediator is a variable (Z) that eliminates the association of other variables (X and Y) when it is partialled out of their relationship. Recently, Vitaliano et al. (26) showed that the relationship between caregiving and insulin (CGs had significantly higher insulin levels than did COs) could be eliminated by controlling for perceived hassles. Perceived hassles were significantly related to both insulin levels and to caregiving (CGs were significantly higher than COs), hence it qualified as a mediator. Barring our ability to do experiments with CGs (randomizing and manipulating caregiving as an independent variable), the use of mediational statistical analyses is one of the best avenues for suggesting a link between psychological and physiological distress in CGs.

Time Is of the Essence

Researchers should study caregiver physiology over longer periods of time than are usually possible under the time constraints of funded studies (e.g. 3–5 years). Because physiological/health responses to the chronic stress of caregiving may take time to be observable, repeated physiological measures are needed over relatively long time periods. Indeed, some studies have already observed that CGs show continued physiological impairment over time, and cessation of caregiving does not necessarily terminate risk. Bereaved spousal caregivers continue to show immunological down-regulation (including impaired influenza vaccine responses), as well as elevated depressive symptoms for several years after bereavement (15,16,51,52). The persistence of depressive and anxiety symptoms among former CGs may fuel immunological alterations; in addition, such immunological changes may reflect broader and more enduring alterations in cardiac sympathetic reactivity and associated endocrine responses (21,53,54).

Recently, Vitaliano and Scanlan (55) found that the percent of CGs ($N = 46$) who were moderately hyperglycemic (using a glucose cutoff of $\geq$110 mg/dl) or who were $\geq$ the insulin median of the sample at study entrance (e.g. a value of 18 μU/ml) increased over time: At study entrance, 28% of the CGs were above the cutoff; by 15–18 months, 30% were above; and by 27–30 months, 39% exceeded the cutoffs, demonstrating increased risk for

diabetes. Hence, given the lag between exposure to chronic stressors and physiological response, it would be informative to study CGs even after their caregiving careers have ended (35). In this regard, Shaw et al. (34) observed that although CGs (stratified on various levels of caregiving demands) did not look different medically at entry into their study, there was a consistent divergence over a period of several years. Specifically, as time passed, CGs confronted with high activities of daily living demands ended up with more medical difficulties than did CGs not burdened in this manner. If the demands of caregiving affect preventive behaviors such as going to a physician, taking medications, or following a diet, the deleterious health effects of such behaviors may take years to unfold.

Because disease incidence/prevalence may be difficult to establish in short-term caregiving studies, researchers should also consider examining disease progression in CGs. In fact, Baum (56) has noted that examining how stress affects disease processes/progression is an important new frontier of behavioral medicine. As a start, researchers should consider whether CGs who have a cancer history or coronary heart disease (common diseases in older adults) have poorer physiological functioning and/or survival than do COs with such diseases. The combination of chronic stress and chronic disease may have synergistic effects on physiological variables relevant to health/survival (55).

Finally, researchers need to examine the degree to which physiological/health variables predict mental health/distress outcomes across time and not just the reverse. One would expect that as caregiving continues in vulnerable CGs, health may deteriorate and psychological distress will increase. In fact, it is known that persons who have illnesses and/or physiological problems have more psychobehavioral problems (57–61). Longitudinal designs can determine whether disease states/physiology explain subsequent variance in psychosocial variables more than the converse.

MEASUREMENT ISSUES IN CAREGIVER RESEARCH

Medical Records, Self-Reports, Physical Exams

Multiple approaches should be used to assess CG health. Medical records should be obtained to document illness/disease states. Medical records are important because, although self-rated health measures (single-item scales from "excellent" to "poor") are correlated with objective health measures ($r = .7$) (62,63), the two assessment procedures are not necessarily correlated with the same outcomes (64). For example, Vitaliano and Scanlan (55) showed that ICD-9-coded CHD is related to self-report of CHD (McNemar = 9.1, $p < .001$); however, the two are not equally correlated with five CHD-relevant physiological variables. ICD-coded CHD is correlated with lipids, $r = .17$, $p < .05$; BP, $r = .23$, $p < .005$; obesity, $r = .17$, $p < .05$; insulin, $r = .18$, $p < .05$; and glucose, $r = .31$, $p < .001$. In contrast, self-reported CHD is only related to glucose, $r = .22$, $p < .01$. Self-report referents may also vary with race and age—Caucasians and younger adults refer to their functioning level when they report their health status, whereas African–Americans and older adults refer to their actual health problems (65).

In obtaining medical records, researchers should extract information on date/nature of diagnosis (or ICD-9 codes) (66), treatment/prognosis, current medications, activity regimen, lab and diagnostic test results [BP, heart rate (HR), lipids], and functional implications of illness. Researchers should also use quality control checklists to examine each medical record. Besides documenting treatment regimen (medications with dates) and symptoms (BP/HR with dates) to support diagnostic codes, the internal consistency/legibility of records should be recorded. From these categories, ratings of records can be made.

Although medical records are repositories of valuable information, they can contain recording, coding, and diagnostic errors and have other limitations. For example, whereas non-seekers of medical attention do not differ from seekers on the number and types of symptoms they experience (67), many individuals may not seek medical attention because of income and insurance coverage (68). In one study of infectious illness, the return rate for physician questionnaires was 54%, underscoring the difficulty in using physician diagnoses as a primary measure of respiratory infections (69). In such cases, self-report data can be very useful. A structured interview based on the Health Review (70) can provide a simple method for periodic assessment of infectious illness, particularly respiratory infections. Congruence between interview data and physician diagnoses showed excellent agreement concerning presence or absence of infection (69,71). Moreover, correspondence between influenza virus vaccine responses and illness episodes indicated that subjects who showed a clinically significant increase in antibody levels to the vaccine reported less than half as many respiratory infections in the subsequent year as subjects who did not show a significant response (69). In addition to using self-report measures, medical records can be supplemented by standardized physical exams based on a clearly defined protocol. Physical exams provide excellent ways to uncover problems that may not be either recognized by patient self-reports or in their medical records (72). In summary, a multimethod measurement approach should be used in CG research.

Physiological Markers

Researchers need to do transitional epidemiologic studies that involve the combination of laboratory and epidemiologic measures (73). Physiological markers can strengthen epidemiologic research (and vice-versa) and help researchers achieve the goal of advancing knowledge about health and disease among CGs. In planning such studies, CGs should be selected from the same time period, geographic location, and population as COs. In the last decade, researchers have used state-of-the-art laboratory methods to study CG physiology (5,20).

Researchers need to recognize that variability in physiological markers occurs because of intrapersonal and interpersonal physiological differences, as well as because of systematic and random error. Intrapersonal physiological variability includes cell variability (i.e. differences across organs and tissues), time-dependent variability (e.g. diurnal variation, aging, etc.), and sampling (random) error. Cell sampling variability can be alleviated by increasing the number of cells scored per person. Time-dependent variability can occur because hormonal secretions vary over several hours versus during the morning (74). Samples obtained over 24 hours versus 3 hours minimize short-term biological variations (75). In fact, 33 of 38 recent cortisol studies used 24-hour urinary cortisol as their measure, 2 studies (5%) used 48 hours, and 3 (7%) studies used $\geq$3 days (55). Rs of serial 24-hour urinary cortisol also suggest strong stability over short periods—$r = .75$ for samples ten days apart (76).

Although endocrine samples obtained over several days are highly desirable for purposes described above, recent research has also focused on the autonomic, neuroendocrine, and immunologic consequences of brief psychological stressors. Such stressors provide one model for the ways that daily events provoke physiological changes. Human responses to these brief psychological stressors are characterized by large and reliable individual differences in autonomic, neuroendocrine, and immune function

(10,53,77–79). Indeed, sympathetic tonus and responses to brief stressors may be one common mechanism underlying autonomic, endocrine, and immune reactions to both acute and chronic stressors (e.g. 20,53,54).

A second type of biologic variability is interpersonal variability. Differences in the variability of a physiological marker may exist in CGs and COs because other variables (e.g. vulnerabilities and resources) moderate relationships between that marker and CGs and COs. Our discussion above has focused on the need to partition such variability.

Between-laboratory variability can also affect CG/CO physiological differences. This variability has two sources, random and systematic. As usual, random error is based on sampling. Multiple aliquots from the same specimen run in the same assay batch provide data for the coefficient of variation (the standard deviation divided by the mean). Precision can be improved by increasing the number of aliquots. There are also many sources of error and bias within a laboratory (e.g. variations from batch to batch, change in reagents, new technicians, different controls, and interpretation of assays) [Hulka and Margolin (73) discuss assay variability].

It goes without saying that physiological measures should be obtained concurrently from CGs and non-CGs and should be handled/processed in the same way. Blood and urine samples from the same groups should be combined within each and all assays and interpretations conducted without knowledge of CG status. The assumption in transitional epidemiological research is that a physiological marker will be useful to the extent that it can predict disease occurrence (80). Some CG researchers have already begun to document the criterion validity of their physiological measures. CGs have poorer immune function and report more respiratory tract infections than non-caregivers (2). Further work shows that CGs display significant deficits relative to COs in both antibody and virus-specific T-cell responses to an influenza virus vaccine (81). Importantly, adults who show poorer responses to vaccines and other antigenic challenges also experience higher rates of clinical illness, including influenza virus infections; thus, consistent with self-reports, these vaccine data suggest that CGs are more vulnerable than their age-peers to influenza and, potentially, to other infectious agents (82–84).

Yet another study provides evidence that stress-related immunologic changes in CGs have important consequences for their health. CGs take an average of 24% longer than do COs to completely heal a small, standardized wound; convergent data obtained by two independent procedures demonstrated that CGs healed identical wounds more slowly than well-matched non-CGs (19). Consistent with these group differences in wound repair, CGs also produced less interleukin-1 beta, an important immunological mediator of wound healing. These stress-related differences in wound healing have now been replicated in an animal model, providing convergent evidence implicating stress as an important factor (85). Alterations in wound repair have significant clinical implications, particularly for surgical recovery.

In general, researchers should not expect a physiological marker to give the same results as a medical record/clinical rating. Physiological markers supplement the researchers' ability to determine whether there are physical concomitants/sequelae from psychological distress in CGs and to better understand health mechanisms. The major value of using both approaches is that one can compare the results and evaluate the reasons for the differences. This in itself may shed light on biopsychosocial pathways in CG health. Because these different measures assess different specific entities, they both aid our understanding of CG health.

INTERVENTIONS

Previous research has already identified potential exposure (e.g. patient demands), vulnerability (gender, hostility, preexisting HTN), resource (social supports), and distress (hassles, burden) variables that may either moderate or mediate relationships of caregiving with physiological impairment and illness. Given that a new era of physiological research will yield even more specific findings, the next step will be to determine whether simple cost-beneficial treatments can be designed to alleviate CG risk/impairment. Clearly, several CG researchers have already begun to design interventions to reduce burden, depression, and anger (86,87). It is unclear whether reductions in affective variables will reduce physiological impairment and illness risk in CGs. However, we believe the research strategies recommended in this paper will help to design the interventions needed to specifically target high-risk CGs. In fact, interventions will allow researchers to infer causal pathways because such designs involve randomization and manipulation. And, although such studies can not provide definitive proof that caregiving causes health problems, such studies can help to understand whether, for example, respite from caregiving, learning how to manage patient problem behaviors, and decreased hassles yield better physiological functioning (e.g. reduced insulin, increased NKA).

SUMMARY

In previous research, conflicts in the literature on CG physical morbidity may have occurred because of different definitions of health, health measures, CG/CO samples (CGs and COs may have varied in vulnerabilities and in resources), patient samples (cognitive/functional impairment), and the fact that some self-report measures of physical health may reflect primarily life satisfaction (64). We acknowledge that in the last decade much progress has been made in the study of CG health. We also recognize that research on the consequences of chronic stress is often difficult because of the problems involved in understanding the direction of causality (i.e. determining whether a stressor represents a cause or a consequence of mental and physical health problems). However, CGs of dementia patients are not responsible for the occurrence of their stressor. Thus, data collected across laboratories lend weight to the argument that chronic stressors can make contributions to affective disorders and may also alter caregivers' sympathetic, neuroendocrine, and immunological tonus. Accordingly, CGs provide a useful and important model for assessing the effects of a chronic stressor in older adults.

In this paper, we have outlined a number of ways that caregiver research can be improved. Much work still needs to be done to increase our understanding of the psychophysiological processes involved in caregiving. It is hoped our recommendations will be useful to researchers who wish to investigate this very important area of study. Further study of this area will not only address issues of concern to multiple scientific disciplines, but it will also help us design and target interventions for CGs at greatest risk for health problems.

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