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The Burden of Care and its Health Impacts on Older Caregivers: A Scoping Review

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Caregivers play a vital role in supporting older persons in all societies. They often experience substantial burden that may in turn puts their own health at risk. This scoping review aims to examine existing empirical literature related to caregiving burden and its potential impact on health of older adults who provide informal caregiving to their family member(s). A scoping review of four databases and grey literature sources was conducted. Inclusion criteria were: primary studies on informal caregiving by an older person aged 50 years and above, published from 2008 until 2018, in English language. From a total of 4894 titles, 233 abstracts were screened, and 19 articles were included. Mean age of older caregiver ranges from 65.6 to 80.5 years old. Older females were more likely to engage in caregiving roles. Caregiver objective burden was most commonly evaluated and reported to be moderate to high level. In association with caregiver burden, the older informal caregiver found to have poor physical and mental health. Depression is commonly reported among older caregivers. There is a serious lack of prospective studies investigating the long term consequences of caregiving for an older person who is a caregiver. Older caregivers were found to have higher burden and poor health outcomes while assuming the role of caregiving. Caregiver assessment should be tailored for older caregivers so that appropriate intervention intended to avert or mitigate caregiver burden and related caregiver distress can be provided when necessary.

Keywords: older adults; caregiver; burden; mental health; physical health

I. INTRODUCTION

Globally, the ageing population is estimated to grow as a result of increased life expectancy. Data from the United Nations indicated that in 2017, there were 962 million people aged 60 or over, making up 13% of the global population. (United Nations, Department of Economic and Social Affairs 2017). As the population ages, the number of individuals expected to live with chronic disease will rise, thus there is a simultaneous expanding need for care and support from both formal and informal caregivers. However, in many societies, an older person depends on their children or family members to provide care and support, and to assist them when they can no longer function independently. The effect of such demand would inevitably increases the proportion of elderly population involved in providing unpaid and informal care for an older family member (Larkin, Henwood, and Milne 2019).

The healthcare policy trends in many countries favour or promote community orientated or in-home-based care instead of institutions so that the care-recipients can remain in their homes. The feasibility of home-based informal care relies heavily on family members to provide caregiving. A key issue to informal care is the impact on informal caregivers who bear much of the responsibility in caregiving, in which the burden placed on them could lead to fulminating stress and deleterious effect on their health. The burden of caregiving encompasses a complex and multidimensional impact including psychological, emotional, physical, sociological, and economic domains

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(Roth *et al.*, 2015; Schulz *et al.*, 2012). Across studies, informal caregiving consistently found to be correlated with various negative impacts on informal caregivers' health outcomes either physical or mental health (Vitaliano *et al.*, 2003; Potier *et al.*, 2018). The negative impacts may be even larger for caregivers who are themselves older adults and possibly experience functional limitation due to biological changes from ageing that affect their psychological and social health.

Existing reviews have focused predominantly on examining the impact of caregiving on caregivers of older persons with dementia (Greenwood *et al.*, 2018), being frail (Ringer *et al.*, 2017) and with dysphagia (Namasivayam-MacDonald and Shune, 2018) Little is known about the burden of caregiving on the health of older adults who are informal caregivers themselves. This review aims to investigate and describe what is known about the burden of care and its impact on health of older adults who assume the role of informal caregivers for their family member(s).

II. MATERIALS AND METHOD

A. Search Strategy

This scoping review was conducted following an established and widely adopted methodological framework (Arksey and O'Malley, 2005). The five- step outlined by the framework include 1) Identifying the research questions, 2) Identifying relevant studies, 3) Study selection, 4) Charting the data, and 5) Collating, summarizing and reporting the results. Scoping reviews are useful approach for synthesizing research evidence for informed policy making by examining key concepts, identifying gaps and nature of evidence; determining the value and potential scope and cost of undertaking a full systematic review; and summarizing and disseminating research findings (Levac *et al.*, 2010).

B. Framework Stage 1 to 5

This review was guided by the following research question in stage 1: "What is the impact of caregiving on burden and health outcomes of an older person who is an informal caregiver to a family member?

In stage 2, the search strategy for this review was developed with assistance from the university librarian and comprised of four main concepts: "Informal Caregivers", "Older adults" or "older persons" or "elderly" "Burden", and "Health Outcomes". Based on these concepts, MESH terms and keywords were identified. Given the nature of a scoping review, the search strategy following the research question was broad (Armstrong *et al.*, 2011). We conducted keyword searches on four databases including PubMed, Ovid, MEDLINE, and CINAHL for English-language articles published from between 2008 to 2018. A total of 4895 unique records were located. In addition, Google Scholar was also utilised to identify and retrieve additional articles by applying the same search string such as "informal caregiver"; "elder"; and "burden" for relevant titles and abstracts.

Stage 3 involved study selection based on a preset eligibility and exclusion criteria. Study selection consisted of title screening, abstract screening, and full-text screening using a priori criteria. Inclusion criteria were focusing on (1) older persons above 55 years old as informal caregivers to individuals; (2) burden of the caregiver and health outcomes; (3) community-based samples; and (4) primary study employing quantitative methods

In this review, "Informal Caregiver" was defined as an older person who provide unpaid or not formally hired to provide caregiving services to family care recipients (includes a parent, child, partner, spouse or other family members). There was no restriction on the duration of caregiving sample size, and type of care-recipients.

Although the United Nations defines an older person as individual of 60 years old and above, (United Nations 2012), this review used the age of 50 years and older as the appropriate age cut off. This approach was undertaken considering the differences in the age definition of older people in low- and middle-income countries. Both subjective and objective caregiving burden were included.

Health outcomes relating to caregiving such as physical illness, psychological, or mental health (include anxiety, stress, depression, and fear, or any related outcomes) experienced by caregivers were included in the review. We excluded: 1) Invalid study type (not primary research; abstracts); 2) unpublished dissertations; 3) reviews/summaries of primary studies; 4) conference proceedings, and 5) Studies without caregiver burden and health outcome.

The title and abstract of each citation were independently screened by two reviewers. Reviewers met throughout the screening process to resolve conflicts and discuss any uncertainties related to study selection.

After the first round of screening, the full text of the selected articles was read to decide whether they should be included in the scoping review. A total of 48 studies were examined, the final record of 19 articles were selected to include in this scoping review (Figure 1). All included papers were published in peer-reviewed journals.

In stage 4, charting the data, relevant information from the included articles was collected. We extracted general information: author(s), year of publication, study location, sample characteristics of the caregiver, caregiving burden and health outcome measure.

The final stage involved collating, summarizing, and reporting the results. Table 1 summarizes the extraction results.

III. RESULT

A systematic search of four databases retrieved 4895 titles. Google scholar search yielded 4570 articles; the first 300 were screened following reviewers' consensus with reference to (Haddaway *et al.*, 2015). From these 4570 articles, 2458 were excluded for a variety of reasons. Often the studies did not focus on informal caregiving and age of the caregivers less than 50 years old. Furthermore, various studies were excluded as they did not estimate the impact of caregiving burden on the health of caregivers. Eventually, 48 articles were selected for full-text review. From these 48 articles, 29 were excluded in the full-text review round. The main reason for exclusion at this stage was that the study did not estimate health impacts. Based on the aforementioned criteria, 19 articles met all inclusion criteria and were included in this scoping review. Figure 1 depicts the flowchart of screening phases.

A. General Study Characteristic

The literature search reported on a health outcome(s) of caregiver psychological in older caregivers on caregiving burden are shown in Appendix 1. From 19 included articles, most studies had observational cross-sectional study design (n=16). All the studies were survey- or interview-based. The articles were published in a variety of journals relating to gerontology and psychology. The articles published were carried out in the United States (*n =8*). Others were conducted in Africa (*n=2*); Asia (*n=5*); Europe (*n=3*); and Australia (*n=3*). Research on older caregiver's health outcome showing an upward trend. Two studies were published between 2008 and 2010 and seven between 2011 and 2015. The remaining ten studies were published between 2016 and 2018.

Of the 19 studies, the sample size varied from 92 to 5795 participants. The studies with a larger sample size utilized national surveys data (Xu *et al.*, 2017; G. Kim *et al.*, 2017). Study aims were generally broad focused on general exploration of older caregiver's health outcomes towards caregiving burden. On the other hand, two studies were gender specific (Shu *et al.*, 2017; Yalcin *et al.*, 2018).

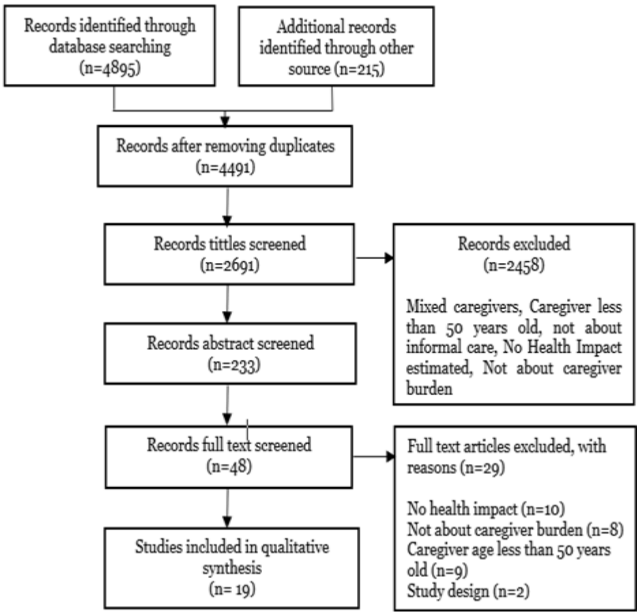

Figure 1 : Flowchart of screening phases

1. Older Caregiver Characteristics

Most studies defining characteristic of informal caregivers as a family member who provide informal care (McGee *et al.*, 2008; Kim *et al.*, 2017; Butterworth *et al.*, 2010; Chen, Chen, and Chu 2015;), unpaid care (Cuthbert *et al.*, 2017) and/or primary care provider (Shu *et al.*, 2017; Lambert *et* *al*., 2017) to disables. Other studies deliberately defined as someone who helped persons requiring ADL or IADL assistance. Some other studies simply defined informal caregiver as the co-residing spouse (G. Kim *et al*., 2017) or grandparents (Yalcin *et al*., 2018; Samuel *et al*., 2017) providing informal care.

The length of caregiver role and duration of caregiving involves in the older population are characterized by a lack of homogeneity was embellished in the review. For instance, (Butterworth *et al*., 2010) study defining informal caregiving provide care at least 5 hours a week whilst (Chow and Ho, 2012) defined a minimum of 4 hours a week. (G. Kim *et al*., 2017) specified caregivers who had been in their role for at least 12 months before selection into the study. In relation, the majority of studies measured the duration of caregiving based on the number of hours they provide care per week (Shu *et al*., 2017; Lambert *et al*., 2017) to disables. Other studies deliberately defined as someone who helped persons requiring ADL or IADL assistance. Some other studies simply defined informal caregiver as the co-residing spouse (G. Kim *et al*., 2017) or grandparents (Yalcin *et al*., 2018; Samuel *et al*., 2017) providing informal care.

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The subject of the study was the older caregiver with mean age ranging from 65.6 to 80.5 years old. For gender role, older females were found to be more likely engaged in a caregiving role. In most studies of caregiving to adult care-recipients, older caregivers were mostly spouse. Concerning the care recipient, they were a disabled individual (n=7), spouse (n=2), older people (n =3), grandchildren (n=6) and individuals with cancer (n =1).

2. Prevalence of older caregiver

Seven studies provided data about the prevalence of an older person as a caregiver. Prevalence rates varied from 11% to 35%.

B. Impact of Caregiving – Burden

We found that the measurement of impact of caregiver burden varied among older informal caregivers. Diverse measures were reported for evaluating burden. For instance, various assessment tools and measurements used to estimate of caregiving burden. The associated studies estimated measures of objective burden, subjective burden and positive aspects of caregiving were observed.

The objective burden of informal caregiving in the articles explicitly referred to time spent on caregiving, duration of the caregiving role, type of care, number of care-recipient, the status of caregiving and caregiving tasks that are performed. Also, carrying task divided into personal caregiving care (ADL/IADL) or pre-specified task e.g –household task; financial; and clinic follow up (Ice *et al*., 2012; Ahn *et al*., 2012). The length of time spent on caregiving mostly measured in the articles as attributed an indication of the intensity of the caregiving.

In terms of subjective burden, caregiver perceived the impact of the objective burden related to caregiving. Ten burden assessment tools were used in the studies. The assessment used for caregiver burden in the articles were summarised in Table 1.

With regard to objective burden, in several studies older caregiver reported moderate to high burden and duration for caregiving hours ranged from 12-20 hours per day (Herrera *et al*., 2013; Xu *et al*., 2017) to 6-89 hours per week (Shu *et al*., 2017; Tang *et al*., 2016; Yalcin *et al*., 2018). The caregiving role length reported from 69.44 ± 56.23 months (Yalcin *et al*., 2018) to 5.79 ± 5.94 years (Shu *et al*., 2017). Older men reported higher perceived burdensome for an informal caregiver (Ice *et al*., 2012).

The prevalence of caregiver burden among older caregiver varied from 17.4% to 20% (G. Kim *et al*., 2017; Loi *et al*., 2016). About subjective burden, studies reported low burden, about 8.2 % to 11.2% of older caregiver experienced pressured by adult children and perceived negative effect on caregiving.

Several studies reported being female and married were significant predictors for high caregiver burden (Butterworth *et al.*, 2010; McGee *et al.*, 2008; Ice *et al.*, 2012; Herrera *et al.*, 2013). In addition, caregivers with low education, poorer economic status, physical disability, and low self-rated health (G. Kim *et al.*, 2017; Lambert *et al.*, 2017; Shu *et al.*, 2017). Moreover, caregivers with higher caregiving hours, household responsibility and multiple caregiving role experienced significantly greater burden (Monin, Levy, and Pietrzak 2014; Chow and Ho 2012). Caregivers who provided substantial help in personal and physical care to care recipients were more likely to experience caregiver strain.

Table 1. Measure of Caregiving Burden

Burden Measure	Description (frequency, *n*)
Objective	Time spent of caregiving (*n=11*) Duration of caregiving role (*n=8*) Type of care (caregiving task) (*n=7*) Number of care recipient (*n=4)* Status of caregiver (custodial, co-residence,) (*n=3*)
Subjective	Relative stress scale (*n=1*) Rate of burden (*n=1*) Limitation of daily activities (*n=1*) Emotional/Physical caregiving strain (*n=1*) Caregiver Burden Scale (*n=1*) Barthel index (*n=1*) Care recipient diagnosis (*n=1*) Perceived burden (*n=2*) Impact of Caregiving Scale (*n=1*)

C. Impact of Caregiving Burden and Health Outcomes

Studies operationalized 'health outcome' in a variety of ways and can be divided into three major domains, including general health; psychological(mental); and physical health.

The tool most employed for evaluating the physical health was the 12- and 36-Item Short-Form Health Survey (Chen *et al.*, 2015; Chow and Ho, 2012; Butterworth *et al.*, 2010; Yalcin *et al.*, 2018; Shu *et al.*, 2017). Of the 16 studies measured physical health on the caregiver, four used physical activity questionnaire (Loi *et al.*, 2015; Lambert *et al.*, 2017; Shu *et al.*, 2017; Cuthbert *et al.*, 2017) and another four used the self-rated health measure (McGee *et al.*, 2008; G. Kim *et al.*, 2017; Samuel *et al.*, 2017; Lambert *et al.*, 2017).

A few studies reported that older informal caregivers have poorer physical health when compared with various samples of non-caregivers (McGee *et al.*, 2008; Butterworth *et al.*, 2010; Ice *et al.*, 2012; Ku *et al.*, 2013; Herrera *et al.*, 2013). Longer caregiving hours, multiple caregiver roles and long-term caregiver were important factors for deterioration of physical health. Referring to gender, older female caregivers rated their physical health lower than older male caregivers (Cuthbert *et al.*, 2017). Samuel and colleagues reported care-recipient health status has a negative impact on older caregiver's health (Samuel *et al.*, 2017).

On the other hand, (Shu *et al.*, 2017) reported no effect of caregiving on the physical health of older caregiver (PCS score = 50.7; IR (17.1)) and (Ahn *et al.*, 2012) reported older caregiver notably more physically healthier with caregiving role (Coefficient = 0.336; *p* for trend 0.031). (Cuthbert *et al.*, 2017) reported physical health of older caregiver was not significantly correlated with caregiving hours (r = –0.108), in fact, physical component score (mean score= 50.02, SD =9.2) was higher than the general population. For mental health-related outcome, 13 measurements were specified to assess mental health status of the older caregiver in 18 studies. The measurements used for evaluating mental health were the Center for Epidemiological Studies Depression (CES-D) (*n =4*); Geriatric Depression Scale (*n=3*); 12/36-Item Short-Form Health Survey (*n=3*); Patient Health Questionnaire (*n=3*); and Perceived Stress Scale (*n=3*).

Many studies in the review, were more likely to report symptoms of depression, stress, and anxiety. Specific to depression, prevalence among older caregiver range 14 % to 56 % (Herrera *et al.*, 2013; Butterworth *et al.*, 2010; Chow and Ho, 2012). Otherwise, 25% of older caregiver reported depression with anxiety (Butterworth *et al.*, 2010). Greater caregiving hours spent (β = 0.190, p < .0001), emotional strain ($\chi 2$=10.86, p=.001), and long term caregiving role (RR= 0.97, *p*<0.01) were all factors associated with depression (Ku *et al.*, 2013; Loi *et al.*, 2016; Monin *et al.*, 2014).

Wives tended to report more persistent depression symptoms over time compared with husbands (Kim *et al.*, 2017). On the other hand, caregiving hour duration had a significantly negative association with depressive symptoms among older grandparent (Samuel *et al.*, 2017; Tang *et al.*, 2016).

Synthesis of studies showed that caregiving was associated with an increased risk of significantly higher levels of perceived stress (Ice *et al.*, 2012; Lambert *et al.*, 2017) than non-caregivers with a moderate or high level of burden.

Older grandparent reported psychological distress (IRR= 1.3 (95%CI 1.2–1.5); p<.001) due to the perceived negative of caregiving (Tang *et al.*, 2016). This study also noted older male caregiver was associated with anxiety symptoms with an odds ratio (OR) of 2.32 (95% CI 1.39–3.87) although no effect on physical health was noted.

IV. DISCUSSION

This review found that health-related outcomes and caregiving burden were assessed for older informal caregivers. This review complements previous reviews measuring the impact of the burden of informal caregiver's health but not specifically on an older person (Pinquart and Sorensen, 2007; Bom *et al.*, 2018). The current evidence suggests that studies of caregiving impact often limited to homogenous subgroups of care recipients or those with specified disease (Pinquart and Sörensen, 2011; Gilbertson *et al.*, 2019). Despite the heterogeneity, there is notable similarity in characteristics of studies across all studies.

First, different studies, varied in their methods for defining who qualifies as an informal caregiver. Other definitions include caregivers who is an unpaid caregiver, or care provider of specified ADL/IADL to nonspecific care-recipients. Filial piety, traditional expectation and socially normative that reflect kinship has existed throughout the history of most cultures, affect who provides care and how caregiving responsibilities divided within a family or community (Kim *et al.*, 2015). Caregiving at an older age is particularly challenging because compared with younger adults, older caregivers are struggling with declining health. Having many cares demands and self -needed care can be detrimental to the well-being of older caregivers. On a positive note, caregiving assessment in older caregiver able to capture the wide-range evaluation of informal caregiver characteristic and impact of caregiving provided includes of spousal caregiving or grandparents.

Second, this review provides evidence that burden resulting from the caregiving is associated with negative and positive aspects of physical and mental health of caregivers as compared to non-caregivers at the same age. the objective burden has stronger association when caregiving is not a choice, the older caregiver often into the role without warning and training, they tend to have negative feelings about caregiving. On the other hand, we found that older caregivers who experienced positive aspects of caregiving rated their mental health higher than those not reporting positive aspects as observed previous study (Fekete *et al.*, 2017). Grandparenting caregiving tended to describe the positive aspect of caregiving.

Third, the level of burden among older caregivers was moderate to high and concordant with several previous studies (Family Caregiver Alliance 2016). When comparing factors of poor physical health in the review, their results are largely consistent with the previous studies. The informal caregiver has been implicated with higher risk of poor health for those with caregiving role of more than 20 hours per week (Legg *et al.*, 2013). In a similar finding on the early research stated that burden on caregiving, the time spent in caregiving or the care recipient characteristic, tend to lead to overall higher burden ((Pinquart and Sörensen, 2003).

Fourth, older women informal caregiver, spousal and wives reported more mental health and physical health problems; but men caregivers had worse physiological risk although some reported better physical health. Previous caregiver studies indicate that women contributed greater time and spent more time on informal caregiving, compared to men (Morris, 2001; Gallicchio *et al.*, 2002). According to Beach *et al.* (2000) in a narrative review found higher levels of subjective burden in women as informal caregivers, as well as higher levels of the emotional impact of caregiving like depression and anxiety. By saying that, the physical and psychological components of caregiving role have fallen disproportionately on a female. Therefore, women endure the majority of the physical, emotional, social and financial impact of caregiving. These inequalities may expose elderly women to higher levels of stressors and burden with an additional role as caregiver, which may contribute to their considerably poorer health outcomes compared with older men.

Fifth, this scoping review has found that older caregivers with higher burden were more likely to report poorer mental health. Similar findings noted in another study as high strain caregivers reported more problems with mental health outcome (Roth *et al.*, 2015). Caregiver characteristic and objective burden were important predictors of depression among older caregiver. These finding echoed by other review (Trivedi *et al.*, 2014).

Finally, the complexity of the evaluation of the effects of caregiving and health outcome is reflected in the use of different type of measure or instruments. Indeed, the variety of tools and measure to assess the caregiving effects, lead to various and heterogeneity of outcomes in the studies. There is a serious lack of prospective studies that investigate the potential long-term effects of caregiving among older persons. Further research is required to develop integrated and standardized caregiving focused measurement that would be able to generate and appraise this complexity across different countries and cultures.

There is no distinguished and clear-cut measure related to caregiving impact and outcome. Higher burden is associated with poorer health outcome among older informal caregiver. Any change in the balance of care provider and recipient of informal care has the potential to put substantial strain on caregiver's health outcome. Many factors have the potential to throw off this balance, for instance, the caregiver characteristic, sociodemographic and caregiving profile.

A. Limitation

This There were several limitations in this study. First, majority of the studies used cross-sectional data that causal relationship between caregiving burden and older caregiver's health outcome cannot be established. Second, a quality assessment of the article reviews included in the scoping review was not performed as this would be beyond the aim of a scoping review. Third, measurements were based on self-reports and interview. Self-reporting is subjected to recall bias. Fourth, measurement for mental health and subjective burden may differ from one study to another, and nonuniformity of assessment and definition make direct comparison of results challenging. For the review, the exclusion of non-English language and years of articles limits the scope of the findings. Notably, the review described in the narrative results thus limited the detailed comparison such in a meta-analysis.

B. Implication

The review aims to investigate the extent of burden and health impact on an older person who assumes the role of a caregiver in late life. To have better informed policy for ageing populations, specific research into marginalized and vulnerable population is required to identify what specific requirements needed for these populations. The assessment on the need of caregivers especially elderly population will help in the formulation of the policy related to the elderly. Health systems will need to detect, reduce risk factors and its impact due to informal caregiving role.

V. CONCLUSION

In conclusion, caregiving is an important public health and social issue. Efforts to support caregivers should include strategies that provide physical assistance, social support and health promotion activities relating to good mental health and wellbeing among the ageing population. The current review recognizing the impacts of caregiving specifically on older caregivers and may help to address the needs of not only the persons that require ongoing care but also the caregivers who may require support in future.

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Appendix 1

Description of Included Studies and Reported Caregiving Outcomes

Author, Study Design, Country	**Age of Caregivers, Number of caregivers (n)**	**Care recipient disease/ impairment**	**Measuring tools**	**Caregiver characteristic**	**Type of burden**	**Health Outcome**
Giyeon Kim *et al.* (2018), Cross-Sectional, USA	55 years old and older n=5795	Family member or friend with long-term illness or disabled	• Self-Rated Health • The Kessler Psychological Distress Scale (K6)	Caregivers mostly female (69%); mean age 66.3 (SD 8.55); 76.7 % of participants of single caregiving role and 70.5 % with multiple caregiver role caregiving over 3 months duration	Objective	Reduce self-rated health with multiple caregiver roles; higher psychological distress among caregivers with any type of role
B.M. Yalcin *et al.* (2018) Cross-Sectional Turkey	Women, 65 years and older, n=282	Grandchildren	• The Beck Depression Inventory (BDI) • SF-12 • EQ-5D-5 visual analog scale	Mean age 66.19 (SD 6.8); Mean time spent caring grandchildren 87.64 ± 57.5 hours a week providing care	Objective	Better quality of life and general health perceptions: less depression among caregivers
Shu *et al.* (2017) Cross-Sectional Australia	Men, 70 years and older, n=193	Long-term illness or disabled	• Goldberg Anxiety Scale • Geriatric Depression Scale • Short Form 12 Health Survey • Physical Activity Scale for Elderly (PASE)	11% older men caregivers, which 87% caregiving to spouse.	Subjective	Higher level anxiety among male caregiver than non-caregiver
Cuthbert C. A. *et al* (2017) Cross-Sectional Canada	60 years and older, n=130	Breast, prostate, colorectal cancer	• Center Epidemiologic Studies - Depression (CES-D) • SF-36 • State-Trait Anxiety Inventory (STAI)	Mean age 70.0 (SD 6.6); Mean total caregiving role among male 30.09 (S.D. 46.1) months and female 33.6 (S.D. 46.03) months; Mean caregiving hours per week among male 15.96 (S.D. 18.03) hours and female 24.67 (S.D. 30.12) hours.	Objective	Higher depression and sleep quality among caregivers Better physical component score in male caregiver
Lambert SD *et al.* (2017) Cross-Sectional, Ghana, India, Russia	50 years and older, Ghana n=143; India, n=490; Russia, n=270	Primary person providing care to an adult in their household	• Perceived Stress Scale • World Mental Health Survey • Self-rated Health • Impact of Caregiving Scale	Main caregivers were spouses and adult children. 57.1% (Ghana), 53.0% (India) and 69.0% (Russia) female caregivers. 47.1% (Ghana), 42.5% (India) and 61.6% (Russia) caregivers aged above 60 years old. 80.7% (Ghana), 40.8% (India) and 69.5% (Russia) caregiving duration more than 6 months.	Subjective Objective	↑ stress with a medium or high level of burden of caregiving.
Ling Xu *et al.* (2017) Cross-sectional USA	60 years and older, n=2775	grandchildren	• Patient Health Questionnaire (PHQ-9) • Quality of Life	Mean age 72.5 (SD 8.16), Spent 11.96 hours a week for caregiving	Objective	Higher depression with higher duration spent. Caregiving time not affect quality of life
Samuel *et al.* (2017) Cross-Sectional USA	55 years and older, n=391	grandchildren /great-grandchildren	• Caregiving Impact • Health Status	Caregivers mostly female (86.2%), mean age 71.1 (SD 8.4) Mean duration of caregiving 12.62 (S.D. 8.82) years	Objective Subjective	Caregivers of grandchildren with psychiatric /behavioural problems more reported negative impact on general health and leisure.

Kim *et al.* (2017) Longitudinal USA	50 years and older, n=774	Spouse aged 50 years and older	• Center Epidemiologic Studies - Depression (CES-D)	Mean age male caregivers 69.68 (SD 9.03) and female caregivers 67.67 (SD 8.8); 49.55% male caregivers and 42.35% female caregiver's caregiving more than 14 hours per day.	Objective	↑ depression among wives as caregiver and caregiver with IAD / ADL limitation.
Tang *et al.* (2016) Cross-sectional USA	60 years and older, n=818	Grandchildren	• Patient Health Questionnaire (PHQ-9) • Hospital Anxiety & Depression Scale Anxiety • Perceived Stress Scale • Self-rated Health	35% are caregiver, mean age 69.4 (SD 6.3); mean of number grandchildren 4.6 (2.7); mean caregiving duration 11.9 (24.9) hours per day.	Objective Subjective	↑ depression on higher levels of caregiving burden, pressure from adult children, perceived the negative effect 40% of caregivers had fair self-rated health
S. M. Loi *et al.* (2016) Cross-Sectional Australia	55 years and older, n=202	Elderly aged 60 years and older	• Geriatric Depression Scale • Carer Health	Caregivers mostly women (74.3), spouse (84.7%), mean age 70.8 (SD 8.5), mean caregiving duration 79.6 (52.7) hours per week.	Objective	Higher depression with higher duration spent on caregiving and higher-level neuroticism.
M.C. Chen *et al.* (2015) Cross-sectional Taiwan	65 years and older, n=108	Disabled elderly	• Caregiver Burden Scale • Barthel Index • SF-36 • Rosenbaum's Self-Control Schedule	Caregivers mostly women (65.7), mean age 80.53 (SD 7.17) Average duration for caregiving was 17.50 ± 7.52 hr per day, 6.12 ± 1.02 days per week, and 5.79 ± 5.94 years.	Objective Subjective	Caregivers reported poor physical health and higher mental distress. Learned resourcefulness correlated positively with mental and physical health.
Monin *et al.* (2014) Cross-sectional USA	60 years and older, Veteran N=431	Person need personal care or help on a regular basis	• Patient Health Questionnaire-4 • Posttraumatic Stress Disorder Checklist • Brief Symptom Inventory-18 • Emotional/Physical caregiving strain (4-point scale)	24% of older veterans are caregivers. Mean hours per week providing care 18.9 (S.D 27.1)	Objective Subjective	↑ depression with higher emotional strain with more duration spent on caregiving. Combat exposure associated less emotional strain among caregivers
A. P. Herrera *et al.* (2013) Cross-sectional USA	70 years and older, n=92	Older adult	• Center Epidemiologic Studies - Depression (CES-D) • Katz Index of Activities of Daily Living • Lawton Instrumental ADL	Caregivers mostly women (71%), Mean age 76.5 (SD 6.5), Spent 11.96 hours a week for caregiving	Objective	↑ depression and low cognitive function with a caregiving role.
LJ Ku *et al.* (2013) Longitudinal Taiwan	50 years and older, n=742	Grandchildren	• Self-rated health • Life satisfaction scale • Center Epidemiologic Studies - Depression (CES-D)	20% older grandparent are caregivers, 43.5 % caregiving over 10 years	Objective	↑depression and low self-rated health with long term caregiver.

S. Ahn *et al.* (2012) Cross-sectional USA	60 years and older, n=183	Family member need care	• Self-reported mental health • Self-reported physical health	17% of older samples are caregivers; 68.3 % female caregivers.	Subjective	Better self-rated health among caregiver. Good financial, support and physical function positive correlate with better physical and mental health
G.H. Ice *et al.* (2012) Longitudinal Kenya	60 years and older, n=470	orphaned grandchild	• SF-36 • Luo Perceived Stress Scale (LPSS) • Biomarker- salivary cortisol & Blood Pressure (BP)	Caregivers mostly women (59%), Mean age 72.2 (SD 6.5)	Objective Subjective	Higher stress and low physical health on number household composition perceived burdensome in caregiving. Cortisol and BP not related with caregiving stress.
E.O.W. Chow *et al.* (2012) Cross-sectional Hong Kong	60 years and older, n=158	Spouse, age 55 years and older	• Chinese Geriatric Depression Scale • Chinese Purpose in Life (PIL) • Relative Stress Scale (RSS) • Personal Wellbeing Index – Adult (PWI)	Caregivers mostly women (61.4%), Mean age 75.61 (SD 6.8); Mean duration of care 14.56 (S.D 9.17) hours per day.	Objective Subjective	Higher anxiety and depression among caregivers with more number caregiving task, higher burden, financial stress, less social support and greater conflict.
P. Butterworth *et al.* (2010) Cross-sectional Australia	64-69 years old, n= 479	Disabled elderly	• Goldberg depression & anxiety scales • SF-12 • PATH survey	21.6 % older samples are caregivers, Caregivers mostly women (59%), Mean age 66.6 years old. 80.7 % caregiving role more than 2 years, 53.1% for more than 5 years. 42% provided more than 15 hours of care per week.	Objective	↓mental health and physical health among caregivers, greater financial stress
H. M. McGee *et al.* (2008) Cross-sectional Ireland	65 years and older, n=251	family need personal care or help	• Hospital Anxiety & Depression Scale • Self-rated health • Stanford Health Assessment	12 % older samples are caregivers, women caregiver (59%), Mean age 73.1 (SD 6.0)	Objective	Poorer self-rated health among caregiver