

# Health issues and informal caregiving in Europe and Italy

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## Abstract

Informal caregivers are the unpaid persons who take care of a not self-sufficient family member, due to old age or chronic illness or disability. As in all the European countries, the demand for informal cares is further increased as a result of the ageing societies and the social and political fallout of informal caregiving is a very current and important issue. We have overviewed some international scientific literature, with the aim of understanding the key research objectives to be firstly pursued to address this problem. In particular, we focused on the psycho-physical health differences in informal caregivers, subjected to long lasting load and prolonged stress, as compared to non caregiver persons. We also underlined the relationship between caregiver health differences and stress, gender type, kind of the care recipient (autism) and social and political situation in Europe and Italy. The collected data indicate the necessity to prevent caregiver psychological and physical health by appropriate laws, especially supporting women, often most involved in care activities.

## Key words

- caregiver
- health
- stress
- gender differences and inequalities
- autism
- social policies

## INTRODUCTION

The defining characteristics of informal caregivers (CG) typically include all the providers of unpaid long-term care of a not self-sufficient family member with disability or chronic illness. CG differ from formal caregivers as the latter are paid care providers providing care in one's home or in a care setting. In this review only informal caregivers will be considered.

Psychological and physical health differences have been found between CG and non-CG and the most significant were observed in specific CG groups, such as those for dementia or mental illness or disability patients. Several findings suggest that women suffer a greater burden of care compared to men, also in the presence of the same pathological condition of the care recipient. Moreover, women have a greater perception and react differently to psychological distress than men.

This review reports the main updated results on caregivers' health and the relationship with stress, autism, gender and support services in Europe and in Italy, with the aim to inform and stimulate the scientific community to further investigate this challenging research area, addressing the national policies to the relevance of supporting the caregivers.

## CAREGIVING AND HEALTH

In the last two decades, many studies on the relationship between psycho-physical health and caregiving

have been reported. In 2003, the results of two meta-analysis [1, 2] showed that CG have poorer physical health than non-CG, as indicated by the subjective perceived health as well as by some objective measures, like hormonal and antibody stress responses.

An additional meta-analysis by Pinquart and Sorensen [3] showed that, among family CG, a number of predictive factors are related to a worse physical health such as: severity of behavior problems and cognitive impairment of the care recipient, intensity of care provided, co-residence, kind of kinship, higher burden and depression, higher age, lower socio-economic status and scarce levels of informal support.

Caregiving can also result in chronic stress, which may influence physical and mental health, being depression one of the common negative effects [4]. Accordingly, an Irish population-based study by Gallagher and Hannigan [5] reported the higher prevalence rates of depression in parents caring for children with developmental disabilities, as compared to parents of typically developing children, where the increased risk of depression was explained by the child behavior problems. Data from the same Irish survey also showed that the increased child problems were predictive of obesity in parents [6]. In addition, Gallagher [7] demonstrated that the antibody response to vaccination is negatively influenced, mostly depending on the behavioral characteristics of the child, while Yamaoka [8] showed that half of parents, taking

care of children with disabilities, reported psychological distress and mental health problems.

Recently published data, obtained from the Welsh Health Survey 2013, confirmed that most informal CG have a poor quality of life, in that they experienced physical health limits, bodily pains and sadness, regardless of having or not a chronic disease [9]. In addition, a Spanish population-based study by Gonzalez-de Paz [10] reported some associations between informal care and depression, lower social support and higher stress. Sleep disturbances are also prevalent and associated with negative physical, medical and functional outcomes in informal CG [11].

The risk of Coronary Heart Disease (CHD) and stroke is significantly increased in spousal CG, after the diagnosis of cancer in their partner [12] and impaired cardiovagal baroreflex has been associated with long-term caregiving [13]. Indeed a high number of weekly hours of informal caregiving is associated with higher risk of cardiovascular disease, irrespectively of time spent to work [14]. Moreover, in studies on CG of dementia patients, it was observed a more elevated cardiovascular risk associated with increased levels of inflammation biomarkers [15] and higher morning cortisol levels [16], with predisposition to negative health consequences.

Importantly, Lacey [17] has recently published a large UK Household Longitudinal Study reporting that informal caregiving is associated with less favorable lipid profiles that may be the cause of increased health risk. In particular, both men and women CG had higher total cholesterol levels than non-CG and, among women, those providing intensive care also had higher triglyceride levels and lower high density lipoprotein cholesterol levels.

Finally, a definitive finding about the association between caregiving and increased risk for mortality is lacking and even if the study by Schulz and Beach [18] suggested that being a strained spouse CG is an independent risk factor for mortality, other five subsequent studies have found reduced mortality and extended longevity for CG, as compared with non-caregiving controls [19]. The controversial results may be explained by the limitations of the different study designs such as: high heterogeneity of the sample, lack of well controlled population-based studies, size and selection of sample, potential confounds, selective measurements of negative predictive factors without considering the positive ones (i.e. individual and formal resources), lack of rigorous methods for distinguishing stress from the CG status.

In the next future, it will be necessary to identify new biological markers associated with CG health and how do they vary during the time and at the individual level, looking not only for associations but possibly for cause-effect relationships between caregiving and health outcomes.

## CAREGIVING AND STRESS

The term stress is often used to refer both to stressors and to stress response. Stress is a process that consists of stressors (i.e. challenging events), mediators (i.e. con-

structs that enable us to evaluate the nature of a threat and the emotional and behavioral responses elicited by threats) and the stress response (i.e. physical and emotional responses elicited by a stressor). Caregiving may generate chronic stress in situations such as long lasting care, severe illness or disability of the care recipient, lack of the necessary informal and formal support and high levels of unpredictability, uncontrollability and vigilance. Caregiving can produce also secondary stress, such as in work and familiar or social relationships. Therefore, caregiving may be used as a model for studying the health effects of chronic stress [20].

Periods of stress are accompanied by increased activation of the hypothalamus-pituitary-adrenal (HPA) axis and increased production of cortisol: the initial responses of the brain, body and behavior are protective and hormones, cytokines and other mediators, such as neurotransmitters, are used to survive and adapt to the challenge. However, repeated stressful experiences have deleterious effects, in part because the very same mechanisms that help to protect in the short-term are either mismanaged or overused. The existence of glucocorticoid receptors on the surfaces of multiple populations of immunocompetent cells [21] as well as evidence for the production of glucocorticoids in primary lymphoid tissue [22], provides the means by which aberrant levels of adrenal hormones, associated with chronic stress or vulnerability to stress, might exert a negative influence on immune function [23].

Many studies have reported that some physiological abnormalities are associated with caregiving chronic stress. Thus, a greater inflammatory activity and blunted glucocorticoid anti-inflammatory signaling were observed in monocytes of chronically stressed CG [24]. Inflammation may be one possible mechanism induced by caregiving stress to increase vulnerability to inflammation-related diseases, such as Coronary Heart Disease (CHD) [25]. Moreover, in CG of dementia patients, it was observed that the low grade and chronic hypercoagulable state, associated with stress, may be predictor of pro-thrombotic and cardiovascular risks [26] and, in chronically stressed mothers of autism spectrum disorder (ASD) children, it has been shown a reduced number of circulating hematopoietic progenitors, which is considered a predictor biomarker of subclinical atherosclerosis and future cardiovascular events [27].

A milestone study of Epel and Blackburn [28] showed that perceived life stress and the number of years, spent as a caregiver, were significantly associated with determinants of accelerated cell aging (i.e. higher oxidative stress, shorter telomere length and lower telomerase activity), in peripheral blood mononuclear cells (PMBC) from healthy premenopausal women. In particular, caregiving mothers with the highest levels of perceived stress have shorter telomeres, on average by the equivalent of at least one decade of additional aging, as compared to low stressed or not caregiving mothers. Accordingly, Damjanovic [29] demonstrated that chronic stress is associated with altered T cell function, accelerated immune cell aging and excessive telomere loss not compensated by telomerase activity, in PMBC of CG of Alzheimer patients as compared to controls.

It is important to underline here that family caregivers of people with dementia are one of the best examples of the tall of caregiving, if we consider that about 40% of them suffers from depression compared to 5-17% of non-caregivers of similar ages. Rates of depression increase with the severity of cognitive impairment of the person with dementia [30]. Recently, a systematic review by Allen [31] evaluated a broad range of data examining biological and cognitive markers of chronic stress, in CG of dementia patients. In CG versus non-CG controls, the reported results indicated increasing cortisol in a majority of studies, a mixed evidence for differences in epinephrine, norepinephrine and other cardiovascular markers, high level of heterogeneity in immune system measures and poorer cognitive functions. Thus, caregiving of dementia patients has been generally associated with a greater hypothalamus-pituitary-adrenal (HPA) axis activity, as indicated by the elevated cortisol levels during the diurnal cycle of cortisol secretion. Noteworthy, chronic exposure to stress hormones, like cortisol, during the lifetime, may have an impact on brain structures involved in cognition and mental health [32] and also with psychopathology, including depression [33] and irritable bowel syndrome [34]. Accordingly, it was observed that CG of patients with a chronic disease have a higher prevalence of the stress-related gastrointestinal irritable bowel syndrome associated with depression, anxiety and poor quality of life [35].

More recent data by Picard [36, 37] demonstrated that an association exists between daily mood, chronic caregiving stress and mitochondrial functional capacity, suggesting that mitochondrial health may represent a step in the pathway between psychological stress and health outcomes.

Interestingly, Vitaliano [38], for the first time, investigated the causal connections between caregiving and psychological distress in female twins. The main advantage of analyzing twins, discordant for a given exposure, but sharing the same developmental history and the same genetic background, consists in disaggregating the confounding factors. In this study, the measurements of the mental health functioning, as anxiety, perceived stress and depression, confirmed the typical finding that caregiving is modestly, but significantly, associated with psychological distress at the individual level. At the phenotypic level, the association between caregiving and distress is confounded by both common environment and shared genetics, in the case of anxiety and depression, while only common environment is a confounding factor in the case of perceived stress. These data suggest two focal points: i) distress is a function of both exposure to stressors (caregiving) and vulnerable phenotypes (genetics and environment) that increase the risk of distress, and ii) genetics and common environment are relevant to understanding the connection between caregiving and distress. However, this study includes many limitations and, despite 50 years of research, we still need to find optimal ways to identify those CG with higher risk for psychological distress. It is important to underline that CG have also the capacity to demonstrate resilience, displaying high levels of psychological well-being despite high

caregiving burden. At this regard, many studies tried to identify factors that facilitate CG resilience and Joling [39] found that being a male, caring for a female, not co-residing with the care recipient and a low caregiving burden were positively related to CG resilience.

## CAREGIVING AND AUTISM SPECTRUM DISORDER

Commonly, the CG of people with autism spectrum disorder (ASD) are also their parents. The interest of research in studying this group of CG lies in the fact that this population is not contending with age-associated decline of the endocrine and immune systems. Moreover, ASD and most developmental disabilities are present at birth and, as they last a lifetime, may cause a higher burden of care. In addition, many factors related to the care recipient, such as young age, severity of symptoms, lack of psychosocial autonomy, aggressive behaviors and emotional and communication difficulties, make these CG at higher risk of mental and physical health problems in comparison to other groups of CG [40-45]. All these characteristics may generate a prolonged stress in parents, which are middle-aged and working, with serious consequences even on their social life.

For what concerns the relationship between chronic stress and health outcomes in CG of people with ASD, a study by Ruiz- Robledillo [46] demonstrated a higher electrodermal response to acute stressors in a laboratory setting, suggesting that worse health was related to a malfunction of the physiological adaptive response to the stress. Accordingly, the same authors found that those CG, with a higher cardiovascular response to acute stressors, presented more severe somatic symptoms [47]. Moreover, in parents of ASD children, it has been shown a dysregulation of the stress-induced immune and hormonal responses, i.e. immunoglobulin A and salivary cortisol respectively, which are considered predictors of health problems [48]. Lovell [49] demonstrated also the presence of elevated levels of the pro-inflammatory biomarkers IL-6 and C-reactive protein, independently of the diurnal cortisol secretion. Thus, high inflammatory responses may generate a greater risk for diseases, even in the absence of a dysregulation of the HPA axis. The observed acute stress responses can have a positive significance in coping with stress but could also lead to negative effects on health. According to literature [50, 51], these effects will depend on the intensity and the duration of the stressor: it is likely that the most adaptive reaction to acute stress is a fast one, that subsides rapidly.

Significant predictor factors of ASD parenting stress are the severity of child impairment and parenting self-efficacy, but not gender, while the competence of parenting a child in challenging situations may reduce stress [52]. Recently, Lindsey [53] overviewed the potentially protective factors against distress that should be emphasized when working with families of a child with ASD. Noteworthy, informal social support partially mediated the negative impact of burden on the quality of life, suggesting the importance of informal support networks for the CG of persons with ASD [54]. How-

ever, formal support is important too, in that the non-supported CG presented higher somatic symptoms and a lower cortisol awakening response than the supported ones [55]. Moreover, as social support may influence blood pressure responses, it may be considered a key determinant of cardiovascular health [56].

For what concern parenting needs, ASD parents are more likely to report adverse family impact and difficulty in using services as compared to CG of children with others developmental disabilities [57]. Most of them need respite care services, which result associated with decreased stress [58]. Very interestingly, a recent editorial, published in the *Journal of Autism Spectrum Disorder*, has focused on parenting and caregiving for people with ASD [59]. The key themes, addressed over a hundred of manuscripts, include: intervention and training, mental health issues related to parent and family stress, measurement and assessment and parent-child transactional processes.

There are research areas that need to be further explored in the future. Among them, we can enlist: gender specific health outcomes in the presence of ASD-associated parental distress, understanding caregiving cultural differences in a world with increasing mobility and migration, more studies on fathers of ASD children, since most published studies have been targeting mothers, more investigations on females with ASD, focusing on differences in their behavioral phenotypes compared to males, caregiving extended to siblings of ASD persons and resilience stress-protective factors.

### CAREGIVING AND GENDER SPECIFIC DIFFERENCES

There are two factors to be considered in analyzing individual differences: sex and gender. Sex refers to the biological differences between males and females, whereas gender refers to the different roles (gender role and gender identity) that men and women may have during their lifetime.

It is a fact that women, all over the world, are more involved in care tasks than men and this can generate health differences both intra-gender and between women and men.

A meta-analysis by Pinquart and Sorensen [60] reported that gender differences in depression and physical health among CG are indeed larger than those found in the general adult population, being in part explained by gender differences in caregiving stressors. In particular, higher levels of stressors and lower levels of social resources, among females versus males, accounted for elevated gender differences, supporting the stress and coping theories [61] to explain the observed disparities. Del-Pino Casado [62] showed that, both in a Mediterranean environment characterized by a high familism and in countries with low familism, females reported more subjective burden than males, suggesting that this gender difference is a shared characteristic among different cultures. Results support also that kinship (spouses versus offspring) moderates the relationship between gender and subjective burden, suggesting that gender and kinship are placed before subjective burden. Contrary to the countries with low familism, in

those with high familism no gender difference was observed in objective burden (intensity of care and patient needs), suggesting that objective burden varies among different cultural environments.

Mothers, but not fathers, of children with Asperger Syndrome and High-Functioning Autism, reported impaired health-related quality of life (HRQL) and presented worse maternal well-being related to hyperactivity and conduct problems in the child [63].

Interestingly, an interaction effect between child diagnosis and gender was observed: mothers of children with autism scored higher than fathers in parental stress, while no such difference was found in the groups of parents of children with Down syndrome and typically developing children [64]. At this regard, Foody [65], in an exploratory study, compared some indicators of chronic stress between mother-father dyads of ASD children. Mothers reported significantly higher levels of parenting responsibility, parental distress, anxiety and depression than fathers, while fathers had significantly higher blood pressure (BP) and heart rate variability (HRV) than mothers. No significant differences were observed between mothers and fathers in relation to systolic or diastolic blood pressure-dipping during sleep, or levels of cortisol secretion and alpha amylase. Thus, the risk of HPA-axis dysregulation may be extended to fathers as well as mothers.

In men, particularly in African American men providing caregiving to their wives, caregiving strain is significantly associated with higher estimated stroke risk than in women, indicating race and sex differences in stroke risk [66]. Moreover, older males caring for spouses with more severe dementia, are at greater risk than females for increased thrombosis and inflammation associated with cardiovascular disease, and this could be the result of having more disturbed sleep [67].

However, it is important to underline that gender differences in the cardiovascular response have shown mixed results to date: one study, conducted on CG of people with dementia, showed a higher BP response to an acute laboratory stressor in women than in men [68], while another one, conducted on CG of people with ASD, showed higher BP and higher HRV in males versus females [65]. Thus, conclusive data are still lacking.

It has also been observed a relationship between gender and social support needs, suggesting that women need social support more than men. In fact, a study concerning ASD parents [69] reported that mothers have a higher number of important support needs and a higher proportion of those that are unmet, than did fathers. Recently, demographics, HRQL and social support data, obtained from the 2009 Behavioral Risk Factors Surveillance System (BRFSS) in US, were used to analyze CG mental health differences between males and females [70]: females reported significantly more mentally and physically unhealthy days than males, but no differences in general health or life satisfaction; men reported that rarely or never received social support but, despite this, the effect of social support on their HRQL was stronger than in women. Yet, females experienced more social stigma and higher burden than males [71]. In a Spanish study, males and females differed in the

kind of support received and in the effect on their HRQL: more women used respite care and counseling services, while more men used paid assistance, home help, and other forms of instrumental help [72].

Caregiving can be considered as a social determinant of health inequalities and in particular of gender inequality, being women the most exposed (see next paragraph). A review by Morgan [73] reports that the palliative family caregiving for older adults is mostly given by women and the fact that women experience a greater degree of mental and physical strain than males, is linked to societal expectation that women would provide care at the end of life of their relatives. Moreover, women provide care while managing their other responsibilities, including full-time employment, and this highly impacts on inequalities [74].

A review by Sharma [75] highlights some issues regarding gender differences in caregiving of elderly or mental illness patients. The authors state that, although a large body of evidences indicates that women suffer more than men from the negative consequences of providing care, several other trends indicate that gender differences have not been consistently or conclusively documented and their magnitude and significance are also uncertain. Thus, further analyses will be necessary to search for specific gender health differences.

### CAREGIVING AND SOCIO-POLITICAL SITUATION IN EUROPE AND ITALY

In Europe (EU), informal caregiving contributes to over three-quarters of all long term care provided and about 6% of population, aged 50 or over, provide care to an older relative [76].

In all EU countries, the demand for informal care is high and will further increase because of the ageing population, as an ageing society results in heavy pressures on families and also on welfare state regimes.

Social and health policies vary significantly across the EU. Most countries still do not have a process that systematically identifies informal CG or that assesses their needs. Some countries evaluate the needs and supports of informal CG, while others are at an early stage in developing support services.

Frericks [77] compared care policies towards older care-needy people in the welfare states of the Netherlands, Germany and Denmark. Results showed that CG have been formalized to some degree in all the three countries and the care recipient can choose a family member as the care provider to be supported by the welfare state. However, the legal situation and the quality and level of social rights (i.e. eligibility for being paid, social security rights related to unemployment, pensions and sickness, right to leave regular employment, care leave) differ considerably among the three countries, with consequences that may expose CG to social risks.

As reported in the review by Hiel [78], providing informal care may influence aspects of life such as personal development, opportunities to enjoy leisure time and to have a social life. All these effects depend on conditions under which care is given, rather than care itself, and are modulated mainly by the cultural envi-

ronment. At this regard, the Mediterranean countries form a distinct cluster versus the North European countries, in that the care is almost entirely delegated to the family, mainly to women, due to a traditional gender stereotype and division of work.

The predominant female distribution of caregiving has to be considered a determinant of health inequalities, above all in the Mediterranean countries. To answer this problem, in 2006 Spain has recognized the obligation of the state to provide support to CG by the Dependency Law. The post-law analysis of the health inequalities trends showed different tendencies according to gender and share of responsibility: among women, those who could not share the responsibility of care with others remain the weakest subjects who least benefit from the supports provided by the law [79].

Various forms and levels of support have been implemented across the EU to facilitate the role of informal CG. Financial support is the most common type of support provided, followed by respite care and training [80]. Ultimately, there is an increasing interest in EU on web-based interventions [81] and telehealth technology for in-home caregiving support [82].

Very recently, by the SHARE research program, Calco-Perxas [83] studied the effects on CG of the different health supporting policies, among twelve EU countries. Results showed that the most effective policies were providing free time, helping to deal emotionally with caregiving and giving skills to improve the care situation and cope with it.

Further research is necessary to find and monitor information on family CG, in order to realize adequate support policies and evaluate their impact across the EU.

Among EU countries, Italy is one of the few without a national law that legally recognizes and supports CG. Since 2014, only the Region Emilia-Romagna has adopted a law (the number 2 of March 28, 2014), which recognizes and sustains family CG as a resource of the integrated social, social-health and health systems of the National Health Service. This law identifies the family CG as the person who takes care, in the ambit of the Individual Care Project, of a not self-sufficient family member, for a long lasting time, voluntarily and without being paid. In addition to economic contributions, the law provides for agreements with insurance companies and with the employers, for any accidents relative to the care activity and for flexibility in working hours, respectively. Moreover, psychological support is offered through local health services, such as the necessary help in emergency situations. At the national level, Italy has recently given an initial recognition to this figure, with an amendment inserted in the budget 2018, and has set up a fund of 20 million Euros/year for three years to enhance and support the activity of caregiving (L. December 27, 2017, n. 205, art 1 comma 254-255-256). The current XVIII legislature has resumed the amendment, presenting six Bills that are now in discussion at the XI Senate Commission. "The Bills (DDL S. 55, DDL S. 281, DDL S. 555, DDL S. 698, DDL S. 853 and DDL S. 890) are examined in order to come to an agreement on a single text that dictates

the rules for obtaining rights but above all places the appropriate financial resources.

In Italy, the number of family CG who regularly take care of elderly, sick and disabled, not self-sufficient relatives in a familiar context is estimated to be over three million of people (about the 8% of the population) (ISTAT 2011). Most of the CG are women (63% up to 75%), 45-64 aged. For their social rights the legal reference is only the law 104/1992 or regional provisions. Thus, Italy is in a backward position compared to EU countries, i.e. France, Spain, Great Britain, Poland, Romania and Greece, which actually provide specific protections for CG such as welfare holidays, economic benefits and social security funding.

For what concern the Italian contribution to research, there are still few groups working in this area. In agreement with the international literature, Fianco [84] observed that a higher care burden is associated to a lower wellbeing, in CG of people with neuromotor and cognitive disorders. Most of the total burden is represented by the subjective and perceived one, which can be mitigated supporting personal and relational resources.

A pilot study by Servello [85] aimed to evaluate the physical health and psychological stress in a group of CG of dementia patients. Results showed an enhancement of some pathological alterations in CG as compared to non-CG, such as decreased ejection fraction, cognitive impairment and depressed mood. However, the limitation of this study was the numerical scarcity of the sample.

Noteworthy, in 2015 the UP-TECH research group was born, with the aim to support CG of Alzheimer's disease patients in Italy [86]. In 2017, based on the promising preliminary results of this group, the first randomized controlled Swedish trial has been developed. This ongoing trial aims to evaluate the effects on burden of new technologies (information and communication technology), among informal CG of people with dementia, by reducing the time spent in supervision [87].

Moreover, also the Italian National Agency for Regional Health Services (AGENAS) has taken seriously the issue of caregiving in Italy by establishing a working group on the family CG. The AGENAS working group has produced numerous documents about the enhancement and support of the family CG [88-92], that not only give a definition of the Italian CG and their relative activities, but also suggest the formal support services that must be provided, by taking advantage of the UP-TECH project results.

## CONCLUSION

The aim of this review is to provide an overview of the current state of knowledge about informal family caregivers.

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Caregiving may be definitively a positive asset for both people directly involved and for the society. At the same time, it is important to question whether the activity of caregiving may cause health problems in CG and what the consequences might be for those who do not receive the necessary support from informal networks and institutional services.

Some representative scientific literature, on this research area, has been discussed: it is probably partial, but in any case it sheds future light on the problems to be faced. In fact, many suggestions can be deduced for addressing future research. First, the issue concerning CG health prevention, not consistently considered by the actual policies, that needs to be further researched, starting from the available data about CG health outcomes. Second, a greater number of longitudinal prospective studies on larger and well controlled samples need to be set up, in order to find biological markers specific for CG health. Third, the available studies on CG stress have only partially demonstrated a cause-effect relationship between chronic stress and physiological dysregulation at the individual level, as well as the time-frame of these effects. Similarly, basic research, demonstrating cause-effect relationships between stress-related physiological responses and health outcomes, should be supported and stimulated. Attempting to delineate sequential causal relationship in the pathway from CG chronic stress to illness, among all the critical variables, will be an interesting challenge for future research. Fourth, we need to more thoroughly understand the true nature of the gender differences observed in caregiving, in order to inform social and health policies regarding the correct interventions that can reduce gender inequalities. Fifth, it is a future challenge to study the social and health effects of caregiving on men, since more men are now involved in caregiving, compared to the past, also taking into account that women have been so far over-represented in the samples. Finally, there is a great research interest on caregiving of people with ASD, due to the extent of specific care problems and unique difficulties that are associated with high parental stress in subjects that are young- or middle-aged and that often have to combine care activities with a high work burden, as they are in the initial or mid-career.

## Conflict of interest statement

There are no potential conflicts of interest or any financial or personal relationships with other people or organizations that could inappropriately bias conduct and findings of this study.

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