



Original Article

Caregiving within and beyond the family is associated with lower mortality for the caregiver: A prospective study



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ARTICLE INFO

Article history:

Initial receipt 9 May 2016

Final revision received 30 November 2016

Keywords:

Grandparental care

Grandmother hypothesis

Mortality

Longevity

Human cooperation

Demographic transition

ABSTRACT

Grandparenting has been proposed as an ultimate evolutionary mechanism that has contributed to the increase in human life expectancy (see the grandmother hypothesis). The neural and hormonal system – originally rooted in parenting and thus grandparenting – that is activated in the process of caregiving has been suggested as a potential proximate mechanism that promotes engagement in prosocial behavior towards kin and non-kin alike. Evidence and theory suggest that activating this caregiving system positively impacts health and may reduce the mortality of the helper. Although some studies have found grandparental care to have beneficial effects on grandparents' health outcomes, most studies have focused on the detrimental health consequences of providing custodial care for grandchildren. Little is known about how non-custodial grandparental and other forms of caregiving relate to mortality hazards for the care provider. Using an evolutionary framework, we examined whether caregiving within and beyond the family is related to mortality in older adults. Survival analyses based on data from the Berlin Aging Study revealed that mortality hazards for grandparents who provided non-custodial childcare were 37% lower than for grandparents who did not provide childcare and for non-grandparents. These associations held after controlling for physical health, age, socioeconomic status and various characteristics of the children and grandchildren. Furthermore, the effect of caregiving extended to non-grandparents and to childless older adults who helped beyond their families. Potential ultimate and proximate mechanisms underlying these effects are discussed.

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1. Introduction

Although human life expectancy has increased substantially in the 20th century (United Nations, 2013), human longevity is not a new phenomenon (Hawkes, 2004). Prosocial behavior, specifically grandmothering, has been proposed as an ultimate evolutionary mechanism that has contributed to the increase in human lifespan expectancy (Kim, McQueen, Coxworth, & Hawkes, 2014). Prosocial behavior may have originally evolved within the family and subsequently extended to a general caregiving system (Brown, Brown, & Preston, 2011). The neural and hormonal system that is activated in the process of caregiving represents a proximate mechanism that may reduce human mortality. Indeed, there is growing evidence that grandparenting is beneficial for

grandparental health in contemporary societies. For example, the provision of childcare has been shown to have a positive effect on grandparents' cognitive functioning (Arpino & Bordone, 2014), subjective well-being (Mahne & Huxhold, 2015), and risk of depression (Grundy et al., 2012). Yet grandparental caregiving can also deplete grandparents' material and psychological resources and impair their health. These detrimental effects are most pronounced when grandparents provide custodial childcare (Chen & Liu, 2012; Ross & Aday, 2006). A nonlinear relationship has therefore been proposed between the level of care and grandparental well-being (Coall & Hertwig, 2010): just as no contact with grandchildren can impair grandparental physical and emotional health (Drew & Silverstein, 2007), so can intense levels of caregiving. The extent to which the potential health benefits or harms of grandparental care affect not only the health but, ultimately, the mortality of contemporary grandparents has not been systematically studied within an evolutionary framework. To bridge this gap, the present study takes an evolutionary approach exploring whether caregiving within and beyond the family affects the mortality of older helpers.

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Note that by caregiving we mean non-custodial grandparental caregiving. By helping and prosocial behavior beyond the family, we mean provision of regular but not extensive care to members of the helper's social network.

1.1. Why grandparental caregiving may be associated with mortality

Life history theory seeks to understand human behavior in specific environments by examining how the timing of distinct life phases and investment patterns (e.g., reproduction, grandparental investment and senescence) has been shaped by evolutionary forces. Within this framework, the grandmother hypothesis proposes that post-reproductive women who help to raise their grandchildren enhance their own inclusive fitness by improving the reproductive success of their children (Hawkes, O'Connell, & Blurton Jones, 1997; Hawkes, O'Connell, Jones, Alvarez, & Charnov, 1998; Sear & Coall, 2011). Grandparenting, especially grandmothering, is thus seen as conferring a selective advantage that drives human longevity (Kim et al., 2014). Using a mathematical model, Kim and colleagues simulated how human post-menopausal longevity could have evolved. By providing childcare, post-reproductive women aided the survival and reproduction of their descendants, thus increasing the probability that their genes would be transmitted to future generations. This, in turn, created a selective advantage for helping behavior and cooperation in both elderly women and men (but see Rogers, 1993 and Kachel, Premo, & Hublin, 2010 for conflicting findings). As post-reproductive women still have functional physiological systems (except fertility), it is hypothesized that grandmothering slowed down somatic aging in humans across multiple generations (Hawkes & Coxworth, 2013). Assuming that caregiving offered a selective advantage in humans' evolutionary past and that contemporary humans carry the genes for helping behavior, to what extent may the act of caregiving contribute proximately to survival today? Does the mortality of grandparents who provide care for their grandchildren differ from that of those who do not? Finally, does helping behavior towards non-kin also promote survival, and – if so, to what extent? This last question is particularly important considering of the growing numbers of childless older adults in industrialized societies.

1.2. What are the mechanisms and effects of caregiving beyond the family?

There is emerging evidence that helping others has beneficial health effects for the helper (Brown & Okun, 2014; Morrow-Howell, Hinterlong, Rozario, & Tang, 2003; Musick, Herzog, & House, 1999; Okun, Yeung, & Brown, 2013). Benefits of caregiving beyond the family would have important implications for at least two reasons. First, the average total fertility rate (TFR) in Europe, for instance, has dropped from 2.3 children per woman in 1970 to 1.6 in 2013, well below replacement level (Population Reference Bureau, 2015). Decreasing fertility rates and more disability-free years will ultimately lead to rising numbers of older adults who do not have grandchildren to care for, but who are willing and able to allocate their resources to the care of others. Second, with demographic change (e.g., divorce and mobility), more grandparents, especially paternal ones, will not be in regular contact with their grandchildren. Do these developments mean that the evolutionary effects of grandparenting on mortality will not survive into the future? Or do the benefits of grandparental caregiving extend well beyond the limits of the family?

Based on the neural circuitry involved in parenting (see Numan, 2006), it has been proposed that a generalized neural and hormonal caregiving system developed over human evolution (Brown et al., 2011). Prosocial behavior may have extended from parenting and grandparenting beyond the family through this caregiving system. Specifically, seeing another person in need may activate the neural caregiving circuitry, thus enabling prosocial behavior (Brown & Okun, 2014). This caregiving system is thought to be the ultimate

foundation of caregiving towards non-kin that – on a proximate level – operates through compassion and empathy. This would also be in line with the suggestion that empathy may have both a phylogenetic and ontogenetic basis in the emotional bond between parent and offspring (Preston & de Waal, 2002) but, when activated, extends beyond the family (Hrdy, 2009). These emotional pathways link helping behavior to regulatory physiological systems, which could be among the proximate mechanisms impacting health and mortality. Prosocial behavior towards non-family members may thus recruit the same neural circuitry as (grand)parenting does (Brown et al., 2011). This circuitry is also suggested to buffer negative consequences from stress-related health declines. For example, general helping within and beyond the family has been found to break the link between stress and mortality (Poulin, Brown, Dillard, & Smith, 2013): stress predicted mortality for non-helpers with a hazard ratio of 1.3, but did not predict mortality for helpers (hazard ratio = .96). Moreover, giving help among older adults has been shown to accelerate helpers' recovery from depressive symptoms after spousal loss (Brown, Brown, House, & Smith, 2008) and to reduce mortality (Brown, Nesse, Vinokur, & Smith, 2003). Taken together, these findings suggest that a neurobiological substrate of prosocial behavior that affects mortality is likely to be involved in caregiving towards both kin and non-kin (Brown et al., 2011; Porges, 2001; Porges, 2003; Porges & Carter, 2011).

Against this background, we first analyzed whether caregiving grandparents have lower mortality than non-caregiving grandparents and non-grandparents. We turned to older adults who cannot provide grandparental care because they have either no children or no grandchildren. The latter group can nevertheless help their children. In our dataset, this help was measured in terms of instrumental help (e.g., doing housework or fixing things). The former group can provide help within their social network beyond the nuclear family. In our dataset, this help was measured in terms of emotional and instrumental support (e.g., comforting others, doing housework, or fixing things). We thus also examined whether parents who give their children instrumental help have lower mortality than non-helping parents. Finally, we investigate whether childless older adults who provide emotional or instrumental support within their social network have lower mortality than those who do not. A large set of covariates was included in all analyses (see below).

2. Material and methods

2.1. Data

Data were drawn from the longitudinal Berlin Aging Study (Lindenberger, Smith, Mayer, & Baltes, 2010). BASE is a multidisciplinary investigation of the physical, cognitive and social characteristics of people aged 70 or older living in the former West-Berlin. The BASE dataset contains extensive information on a range of health and social conditions obtained from the participants (generation 1, G1) as well as information provided by G1 about all of their children (generation 2, G2) and grandchildren (generation 3, G3). The BASE sample was randomly selected from the West-Berlin registration office records. Those who agreed to participate completed interviews and medical tests at their homes, doctors' practices and hospitals. The assessments were repeated at approximately 2-year intervals between 1990 and 2009. Detailed descriptions of the variables and procedures used are available elsewhere (Lindenberger et al., 2010; see also <https://www.base-berlin.mpg.de/en>).

As is often the case in longitudinal study designs, most cases of missing data were due to participant attrition (mortality or moving away from Berlin). The latest update on mortality in 2009 reported that, of the initial 516 participants, 463 had died (89.7%), 33 were alive (6.4%), and 20 (3.9%) were unaccounted for.

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