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Informal caregiving and metabolic markers in the UK Household Longitudinal Study

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ABSTRACT

Objectives: Informal caregiving is associated with poorer mental and physical health. Little research has yet focused on objectively measured health risk factors, such as metabolic markers. The aim of this study was to investigate whether informal caregiving was associated with markers of metabolism in a large, representative UK longitudinal study. We also investigated whether more intensive caregiving, as indicated by more caregiving hours, was associated with a less favourable metabolic profile.

Study design/outcome measures: Using data on 9408 participants aged 16+ from the UK Household Longitudinal Study, we explored the relationship between caregiving and metabolic markers (blood pressure, total and high density lipoprotein cholesterol, glycated haemoglobin and triglycerides). We additionally investigated the importance of caregiving intensity (number of hours spent caregiving per week). Associations between caregiving/caregiving intensity and metabolic markers were tested using gender-stratified linear regression models adjusted for age, household income, education, social class, chronic illness, number of dependent children in the household, body mass index and partnership status.

Results: Men who were informal caregivers had higher total cholesterol levels than non-caregivers (3.25% higher, 95% CI: 0.07, 6.53). Women caregivers also had higher total cholesterol levels and women providing intensive care (over 20 h per week) had higher triglyceride levels (19.91% higher, 95% CI: 7.22, 34.10) and lower levels of high density lipoprotein cholesterol (8.46% lower, 95% CI: 14.51, 1.99); however, associations for women were attenuated in our final models.

Conclusions: Informal caregiving is associated with less favourable lipid profiles. This may be one mechanism through which informal caregiving is associated with increased disease risk. The health of informal caregivers should be a priority for public health.

1. Introduction

Informal caregiving is arguably the most important component of social care in the United Kingdom (UK) and many other Western countries. There are currently seven million informal caregivers in the UK (approximately 10% of the population) and in the United States (US) around one-fifth of adults are informal caregivers [1,2]. The importance of informal caregiving is set to increase over time in response to rising life expectancy, advances in medical treatment and survivorship, and decreasing funding for adult social care [3].

It is relatively well established that informal caregivers report poorer psychological and physical health, on average, compared to non-caregivers [4,5]. However there is a predominance of cross-sectional studies and a focus on specific subsamples, such as middle- or older-aged caregivers [6–8] and caregivers to specific patient groups, such as those diagnosed with dementia or cancer [9–11]. There are a number of reasons why caregiving might be related to poorer health. These mechanisms include psychological distress, a reduction in social support, loss of self-identity, physical strain and exhaustion, conflict between caregiving activities and other responsibilities such as work and parenting, financial burden and a change in the nature of the caregiver-care recipient relationship, particularly when caring for someone with dementia [12–16]. Informal caregiving may also be related to a host of health and disease outcomes through a physiological stress mechanism, for example mediated via hypothalamic-pituitary-adrenal (HPA) axis dysregulation. Indeed previous studies have shown that caregivers have higher salivary cortisol levels compared to non-caregivers [17]. Cortisol binds to glucocorticoid receptors on adipose tissue in visceral fat which can increase adiposity, and informal caregiving has been related to a higher body mass index [14]. An increase in cytokine release can result

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from increased visceral adipose tissue, resulting in changes in glucose and lipid metabolism and consequently the development of insulin resistance [18]. It is therefore plausible that informal caregivers might have less healthy metabolic profiles relative to non-caregivers. However no longitudinal population studies have yet investigated this.

The relationship between informal caregiving and health might depend on the gender of the caregiver. It is well known that women are more likely to be informal caregivers across the life course, with the exception of older age [19]. Women caregivers tend to report poorer health than male caregivers [4]. This is likely because women caregivers tend to engage in more intense caregiving activities, for example by providing more time investment and more intimate caregiving activities (e.g. personal care), and women are also more likely to be the primary caregiver [20]. Women who are caregiving are also more likely than men caregivers to give up paid employment or to reduce working hours in response to their caregiver responsibilities [21]. The association between caregiving and health is also likely to be modified by the intensity of caregiving engagement. For instance, there is evidence from the ONS Longitudinal Study that caregivers providing more than twenty hours of caregiving peer week have worse health outcomes than caregivers providing 'light caregiving' [22]. Currently, longitudinal studies investigating caregiving and metabolic markers have yet to account for potential modification by gender and caregiving intensity when investigating associations with health.

The purpose of this study was to investigate whether informal caregivers had poorer metabolic profiles compared to non-caregivers in a large UK longitudinal study. We also investigated whether associations between caregiving and metabolic markers were stronger for caregivers doing more intensive caregiving and if associations between caregiving and metabolic markers were stronger for women compared to men.

2. Methods

2.1. Data

This study used a large, nationally-representative panel study – the UK Household Longitudinal Study (UKHLS). The UKHLS is a longitudinal study of 40,000 UK households, initiated in 2009, incorporating the British Household Panel Study (BHPS) which began in 1991. The UKHLS has a stratified, clustered, equal probability sample. Further information on the sampling design can be found in Lynn [23]. Adults aged 16+ in the household are interviewed every year, with each wave of data collection taking two years to complete. To date there are six waves of data available. The response rates for each wave are high; 81.8% of eligible individuals provided a full interview at wave one, 72.4% were re-interviewed at wave two and 78.8% at wave 3.

A health assessment was conducted across waves 2 and 3 (2010–2012) in the homes of a sub-sample of UKHLS participants aged 16+ who resided in England, Wales or Scotland (Great Britain) and who had conducted a full interview at the previous wave in English. The wave 2 component included the general population UKHLS sample (26,961 participants were eligible after excluding 1857 not resident in Great Britain, 2274 who didn't provide a full interview at the previous wave, 122 whose interview was in Welsh not English and 5299 who were not in the selected primary sampling unit). 15,591 of the eligible 26,961 participants (58.6%) participated in the health assessment (262 participants were not eligible due to pregnancy, illness or death, 2590 were not contactable and 7626 refused) [24]. The wave 3 component included the BHPS sample (8914 participants were eligible after excluding 1897 not resident in Great Britain, 514 who didn't provide a full interview at the previous wave and 39 whose interview was in Welsh). 5053 of the eligible 8914 participants (56.7%) were participated in the health assessment (50 were not eligible due to pregnancy, illness or death, 2052 were not contactable and 1728 refused) [25].

The health assessment included physical measurements, the collection of blood samples and a short questionnaire. All analytic variables, with the exception of metabolic markers and smoking status which were only available at wave 2/3, were used at the survey prior to the health assessment (wave 1 for the UKHLS sample component and wave 2 for the BHPS sample component). This study therefore uses data from waves 1–3 (2009–2012). Informed consent was obtained from all participants for all waves. Ethical approval for the UKHLS was obtained from the University of Essex Ethics Committee. This study conforms to the principles embodied in the Declaration of Helsinki.

2.2. Measures

2.2.1. Caregiving and caregiving intensity

Participants were asked two main questions regarding informal care provision: 'is there anyone living with you who is sick, disabled or elderly whom you look after or give special help to (for example, a sick, disabled or elderly relative/husband/wife/friend etc.)?' and 'do you provide some regular service or help for any sick, disabled or elderly person not living with you?' Participants who answered 'yes' to either question were classified as an informal caregiver. Caregivers were subsequently asked about the number of hours per week they spent on caregiving activities. This was categorised as not caregiving, < 5 h, 5–19 h or 20 + h per week. These categories were based on the possible response options and the existing caregiving literature.

2.2.2. Metabolic markers

Six metabolic markers were measured at the health assessment at waves 2 and 3. Firstly, blood pressure (systolic and diastolic) was measured three times by the study nurse using an Omron HEM 907 sphygmomanometer. The mean of the three measurements was used. Participants who were taking anti-hypertensive medications (n = 3799) had their systolic blood pressures (SBP) increased by 10 mmHg and their diastolic blood pressures (DBP) increased by 5 mmHg as recommended [26]. Valid blood pressure measurements were available for 16,846 participants. Non fasting blood samples were taken from participants, enabling the assessment of total and high density lipoprotein (HDL) cholesterol, triglycerides and glycated haemoglobin (HbA1c). Total cholesterol was available for 12,895, HDL cholesterol for 12,876, triglycerides for 12,898 participants. Also 12,162 participants had a valid HbA1c value. In total, 19,147 participants had at least one of the six metabolic measures used in this study.

2.2.3. Covariates

Covariates included gender and age, banded as 16–44 years, 45–64 years and 65+ years. We additionally included a number of indicators of socioeconomic position. The National Statistics Socio-economic Classification (NS-SEC) three-category social class classification was used, with the three categories representing 'management and professional', 'intermediate', or 'routine, never worked or long-term unemployed'. The highest qualification achieved was used as a measure of educational attainment. This variable was categorised as no qualifications, GCSE or equivalent, A-level or equivalent, or higher qualification or degree. Net equivalised household income per month was included and categorised into quintiles. In order to account for potential health selection into caregiving we included information on whether the caregiver had a longstanding physical or mental impairment, illness or disability. We additionally included information on partnership status (single, married and living with spouse, separated/divorced, widowed or cohabiting), the number of dependent children aged 18 or under in the household, smoking status (never smoked, ex-smoker or current smoker) and body mass index (BMI, weight(kg)/height(m)^2).

2.3. Missing data

UKHLS participants who had complete data on each metabolic outcome, caregiving and all covariates were included in the analytic