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Original Research

Do mental and physical health trajectories change around transitions into sandwich care? Results from the UK household longitudinal study

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ABSTRACT

Objectives: Sandwich carers provide care to ageing parents or older relatives while simultaneously raising dependent children. There has been little focus on how mental and physical health trajectories change around becoming a sandwich carer - a gap this study aims to fill.

Study design: Prospective longitudinal study.

Methods: We used 10 waves of data from the UK Household Longitudinal Study (2009–2020) - a high-quality longitudinal data.

Sandwich carers were parents who lived with children under age 16 and took up unpaid care of a family member in the older generation. Sandwich carers were matched with parents who did not take up any adult care (i.e., non-sandwiched parents) with similar characteristics. We then employed piecewise growth curve modelling to model the trajectories in mental and physical health before, during and after becoming a sandwich carer and comparing these with non-sandwiched parents.

Results: Among parents, the uptake of caring for a family member was associated with a deterioration in mental health, especially for those who spent more than 20 h per week caring for a family member. The deterioration persisted for several years. Those who cared intensively also experienced greater physical health declines during the transition. We did not see evidence of gender difference in the above associations.

Conclusions: It is essential for society to recognise the unique needs and challenges of sandwich carers and provide them with the necessary support systems, resources, and community networks to ensure their health is maintained. Targeted support is required for sandwich carers who care intensively.

1. Introduction

The rise in longevity, combined with delayed and reduced fertility rates, has led to the emergence of what is commonly termed the 'sandwiched generation' – individuals demographically positioned between children and the older generation.¹ Many of these individuals, known as 'sandwich carers,' provide unpaid care to ageing parents or older relatives while simultaneously raising their dependent children.² In the UK, around 2 % of the population provides "sandwich care," balancing responsibilities for both children under 16 and older adults in need of support.³ Sandwich carers play a vital role in supporting society by helping to alleviate pressure on formal health and social care services. Investigating the impact of sandwich care on individuals' well-being is crucial to shaping policies that can better support this group and enhance overall social welfare.⁴

Care for older adults might be an emotionally taxing endeavour⁵ which is often linked to increased stress levels.⁶ For parents, providing childcare has been extensively studied and associated with reduced employment opportunities⁷ and negative impacts on both physical and mental health, particularly among women.⁸ For sandwich carers, the dual responsibilities of caring for both older adults and looking after children compound these challenges, potentially leading to role strain as individuals attempt to navigate competing demands.⁹

Research on the health effects of sandwich care has primarily been cross-sectional (Supplement 1). The few existing longitudinal studies have produced varied findings. For instance, studies from the China Health and Retirement Longitudinal Study (CHARLS)^{10,11} and Taiwan Longitudinal Study on Aging¹² suggested that individuals caring for both grandchildren and older adults reported higher life satisfaction compared to non-carers. Conversely, a longitudinal study of Israeli

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employees found that those caring for both children and an older generation experienced an increase in depressive symptoms.¹³ These disparities might be due to cultural differences in sandwich care practices and carers' employment status, and whether caring for grandchildren or own children.

The intensity of care plays a pivotal role in determining its health impacts,¹³ with studies indicating that those providing extensive hours of care are more susceptible to adverse effects on psychological well-being.¹⁴ Gender also plays a role in the sandwich care experience, with women being more likely than men to engage in sandwich care¹⁵ and often care for longer durations and at higher intensities, potentially leading to greater harmful health effects for women than for men.¹⁶ Longitudinal evidence from the Survey of Health, Ageing and Retirement in Europe (SHARE) suggested that simultaneously providing care to both younger and older family generations at age 50+ negatively impacts women's psychological health and well-being but not for men.¹⁷

To inform effective support for sandwich carers, it is crucial to investigate the health changes associated with the transition into sandwich care. Understanding when health begins to be affected—whether changes occur before or soon after the transition—and how long these effects may persist can provide valuable insights for designing targeted support strategies and minimising long-term health impacts. We aim to address this gap by investigating how and how quickly the mental and physical health of parents raising dependent children is influenced when they become sandwich carers in the UK. Additionally, we will explore whether these health changes vary based on gender and the intensity of care provided.

2. Methods

2.1. Data

We employed data from the UK Household Longitudinal Study (UKHLS). The UKHLS comprised approximately 40,000 households. Since 2009, all adults aged 16 and above in each household have been invited to annual interviews.¹⁸ We pooled information from waves 1 to 10 (2009–2020). Due to the impact of the COVID-19 pandemic on adult care and child care, data from subsequent waves were excluded. Response rates remained high with 68.2% of eligible adults providing a full interview at wave 10.¹⁹

2.2. Sample

We restricted our analysis to parents living with a child under age 16 (at any interview wave)¹⁹ and compared parents who took up unpaid caring for an older generation (i.e., sandwich carers) with parents who never took up adult caring during the survey (i.e., non-sandwiched parents). Across the ten waves of data, there were 4552 sandwich carers and 17,964 non-sandwiched parents (ratio is about 1:4). As we are interested in the changes of health trajectories around transitions into sandwich care, we excluded those without observations of parenthood at least once before and once after becoming a sandwich carer. This reduced the sample size of sandwich carers to 2632. After excluding those with missing data in the health outcomes (main source of missing data) and other covariates, the final sample size for sandwich carers was 2082 for GHQ and 2223 for the SF-12. We then included matched non-sandwiched parents ($N = 1952$ for GHQ; $N = 2078$ for SF-12) who had observations of parenthood at least once before and once after the matched sandwich care onset age. We excluded non-sandwiched parents without any older relatives (Supplement 2).

2.3. Measures

2.3.1. Sandwich care status and hours

We investigated care status and weekly care hours separately. At each wave, participants were asked if they look after or give special help

to someone sick, disabled or elderly inside or outside the household as well as their relationship to the care recipient. Those providing care to an older generation within or outside the household were counted as sandwich carers, and those who did not provide adult care were counted as non-sandwiched parents. The total weekly hours spent caring for all adult recipients were asked annually (<5, 5–9, 10–19, 20–34, 35–49, 50–99, or 100+ hours). We used the average adult care hours across all sandwich care waves to show an overall picture of caring hours (sensitivity analysis using care hours at the time of transition showed similar results). Based on the distribution of data, we combined those who cared for 20+ hours per week.

2.3.2. Mental and physical health

The 12-item General Health Questionnaire (GHQ-12)²⁰ is a validated measure of psychological distress,²¹ with little evidence of re-test effects.²² At each wave, participants rated the extent to which they had recently experienced concentration problems, sleep concerns, and difficulty in decision-making. The total summed score ranged from 0 (least distressed) to 36 (most distressed) and was retained as a continuous score.

The 12-item Short Form Survey (SF-12) measures general health and functioning,²³ with high retest reliability and good predictive validity.²⁴ It includes a Mental Component Summary (MCS), assessing depression, anxiety, social activity, and carelessness, and a Physical Component Summary (PCS) assessing general health, mobility, body pain, and role limitations due to physical health problems.²⁵ We analysed the MCS and PCS as two separate continuous outcomes, each with a range of 0 (low functioning) to 100 (high functioning).

2.3.3. Covariates

Covariates included age, gender, ethnicity, educational qualification, employment hours, occupational social class, quintiles of household income, partnership status, number of children, and urbanicity. These covariates were taken from baseline (i.e., the first wave when they report living with a child under age 16). We also included the number of waves in parenthood before becoming sandwich carers (Supplement 3).

2.4. Statistical methods

2.4.1. Propensity score matching

We used propensity score matching (PSM) to match sandwich carers to non-sandwiched parents with similar baseline sociodemographic characteristics to reduce unequal selection bias in becoming sandwich carers.²⁶ We performed a 1:1 nearest neighbour matching (Stata command: `kmatch`) without replacement (i.e. each non-sandwiched parent is only paired with one sandwich carer) for the PSM, and with exact matching on gender, education, and age at baseline. Variables included in PSM were listed in the Covariates section above. We did not match on baseline health, instead, the baseline health difference between the two groups was shown as the intercept difference of the health trajectory. This is because health is the outcome that we are interested in.

2.4.2. Health trajectories around transitions into sandwich care

We then predicted the health trajectories for sandwich carers and matching non-sandwiched parents using multilevel modelling with household ID as a cluster. Health outcomes were the (linear) dependent variables and age centred on the first uptake of sandwich care was the (categorical) independent variable. Sandwich carers' age of onset of sandwich caring was applied to their matched non-sandwiched parents. Trajectories were then shown in figures using average marginal effects, by sandwich care status and adult care hours.

To statistically test the changes in health trajectory around the transition into sandwich care, we employed piecewise growth curve modelling (level 1: observations, level 2: individuals, level 3: households). The health trajectory was partitioned into three segments: years -1 to 0 represent the years of transition into sandwich care, years -9 to

–1 represent the years before the transition, and 0–8 years represent the years after the transition. We then tested interactions between sandwich care status and slope changes during the sandwich care transition to assess whether the changes differed between sandwich carers and non-sandwiched parents.¹⁴ Among sandwich carers, we also tested interactions between care hours and slope changes during the transition.

2.4.3. Gender differences

To assess whether these associations vary by gender, we included a three-way interaction between care status/care hour, slope changes, and gender in the piecewise growth curve modelling. For the purpose of testing gender differences, we removed gender from the PSM to allow variation between sandwich carers and non-sandwiched parents on gender.

3. Results

3.1. Sandwich care characteristics

Sandwich carers and matched non-sandwiched parents showed similar baseline characteristics suggesting a good balance after PSM (Supplement 4). Sandwich carers were on average 36.8 years old, and 67 % were women. Most sandwich carers (82 %) were caring for their parents and about three-quarters spent less than 10 h per week caring for older relatives (Table 1). 67 % of sandwich carers were women and women cared more intensively than men. 15 % of women sandwich carers cared for 20+ hours per week compared to 4 % of men sandwich carers.

3.2. Sandwich care and GHQ

In Fig. 1A and Supplement 6, predicted average levels of GHQ with 95 % confidence intervals are shown for every year up to eight years before and eight years after becoming a sandwich carer, comparing sandwich carers and matched non-sandwiched parents. Transitions into sandwich care occurred between year –1 and year 0. Higher GHQ scores represent higher levels of psychological distress. Sandwich carers had an initially higher level of (intercept) psychological distress than non-sandwiched parents. Focusing on the transition, the uptake of sandwich care was associated with an increase in psychological distress, while non-sandwiched parents did not show any change in psychological distress during the same period. Piecewise modelling shows that parents' psychological distress increased by 0.5 more points (95 % CI:

0.3–0.8) upon becoming a sandwich carer relative to non-sandwiched parents (Table 2). In Fig. 1B, we stratified sandwich carers by weekly hours of caring (Only results for caring for <5 and 20+ hours were shown in Fig. 1B. Full results were shown in Supplement 7). Psychological distress increased across all levels of weekly hours of caring, but those caring for 20+ hours per week experienced the most increase in distress (i.e., increased by 0.8 more points relative to non-sandwiched parents, 95 % CI: 0.2–1.4, Table 2). The increase in psychological distress persisted for several years. Notably, those caring for 20+ hours per week started to experience an increase in distress even 1 year prior (at year –2) to the transition into sandwich care.

3.3. Sandwich care and SF-12

The trajectories of SF-12 MCS are presented in Fig. 2 and Supplement 6. Higher MCS scores mean better levels of mental health functioning. Consistent with the above results for psychological distress, sandwich carers had an initially lower level of mental health functioning than non-sandwiched parents. During the transition, sandwich carers experienced a greater decline in mental health functioning than non-sandwiched parents (Fig. 2A), with a 0.5-point difference (95%CI: 0.9 to –0.05, Table 2) between the two groups at the point of transition. Again, those caring for 20+ hours per week had the most decrease in mental health functioning (Fig. 2B–Supplement 7) when transitioning into sandwich care, and the decrease was also observed 1 year prior to the transition.

In terms of the influence on physical functioning (Fig. 3A), there was no difference between sandwich carers and matched non-sandwiched parents (Supplement 6). However, when stratifying by caring intensity, those caring for 20+ hours per week still show a faster decline in physical functioning when becoming a sandwich carer than non-sandwiched parents (–0.9 points difference relative to non-sandwiched parents, 95 % CI: 1.7 -0.0) and those who care less intensively (Fig. 3B–Supplement 7). The physical functioning of those caring for 20+ hours per week continued to decline at a faster speed until 2 years after the transition.

3.4. Effect modifier

Gender did not modify the association between sandwich care status/care hours and mental or physical health (Supplement 8).

Table 1

Caring characteristics of sandwich carers.

Care characteristics	GHQ outcome sample					SF-12 outcome sample							
	Sandwich caring fathers (N = 683; 33 % ^a)		Sandwich caring mothers (N = 1399; 67 % ^a)		Total (N = 2082)	Sandwich caring fathers (N = 722; 32 % ^b)		Sandwich caring mothers (N = 1501; 68 % ^b)		Total (N = 2223)			
	N	%	N	%	N	%	N	%	N	%			
Weekly hours spent caring for older people^c													
<5 h	466		68	661	47	1127	54	487	67	718	48	1205	54
5–9 h	116		17	319	23	435	21	121	17	334	22	455	20
10–19 h	69		10	202	14	271	13	76	11	223	15	299	13
20–34 h	20		3	123	9	143	7	23	3	125	8	148	7
35–49 h	3		0	32	2	35	2	5	1	34	2	39	2
50+ hours	9		1	62	4	71	3	10	1	67	4	77	3
Care recipient^d													
Parent	593		87	1111	79	1704	82	624	86	1204	80	1828	82
Grandparent	79		12	270	19	349	17	82	11	274	18	356	16
Uncle/Aunt	42		6	99	7	141	7	46	6	106	7	152	7

All care characteristics were generated using the information across all sandwich care waves. All information presented relates to individuals rather than observations. GHQ = General Health Questionnaire. SF-12 = 12-item Short Form Survey.

^a Percentage is calculated as N/total N = 2082.

^b Percentage is calculated as N/total N = 2223.

^c Full response categories were shown for information but were collapsed to <5, 5–9, 10–19, and 20+ hours per week for analyses.

^d The % of care recipient do not sum to 100 as some sandwich carers are caring for multiple people.

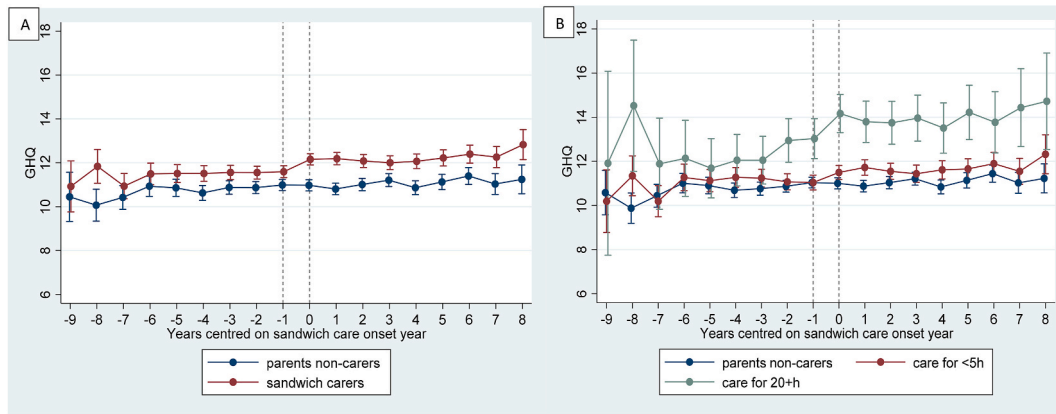


Fig. 1. Predicted levels of GHQ with 95 % confidence intervals before and after becoming a sandwich carer by care status (A) and care hours (B), comparing sandwich carers and matched parent non-carers.

Table 2
Results of interactions between sandwich care and slope change.

		Care × transition slope change ^a	p	Lower 95 % CI	Upper 95 % CI	Care × post-transition slope change ^a	p	Lower 95 % CI	Upper 95 % CI
GHQ	Sandwich carers	0•5	<0•0001	0•3	0•8	-0•5	<0•0001	-0•8	-0•2
	Sandwich carers MCS	-0•5	0•029	-0•9	-0•05	0•5	0•057	-0•01	1•0
	Sandwich carers PCS	-0•1	0•53	-0•5	0•2	0•1	0•69	-0•3	0•5
		Care hours × transition slope change ^b	p	Lower 95 % CI	Upper 95 % CI	Care hours × post-transition slope change ^b	p	Lower 95 % CI	Upper 95 % CI
GHQ	5-9 h/w	0•1	0•54	-0•3	0•6	-0•3	0•33	-0•8	0•3
	10-19 h/w	-0•1	0•67	-0•7	0•4	0•2	0•49	-0•4	0•9
	20+ h/w	0•8	0•0050	0•2	1•4	-0•9	0•0090	-1•6	-0•2
SF-12 MCS	5-9 h/w	-0•4	0•35	-1•2	0•4	0•6	0•20	-0•3	1•5
	10-19 h/w	-0•1	0•90	-1•0	0•9	-0•1	0•80	-1•2	0•9
SF-12 PCS	20+ h/w	-1•4	0•0050	-2•4	-0•4	1•6	0•0040	0•5	2•8
	5-9 h/w	0•5	0•15	-0•2	1•2	-0•7	0•081	-1•4	0•1
PCS	10-19 h/w	-0•1	0•85	-0•9	0•7	-0•2	0•72	-1•1	0•7
	20+ h/w	-0•9	0•046	-1•7	0•0	0•8	0•12	-0•2	1•7

^a Reference group is parents non-carers.

^b Reference group is < 5h care per week. Analysis was conducted among sandwich carers only.

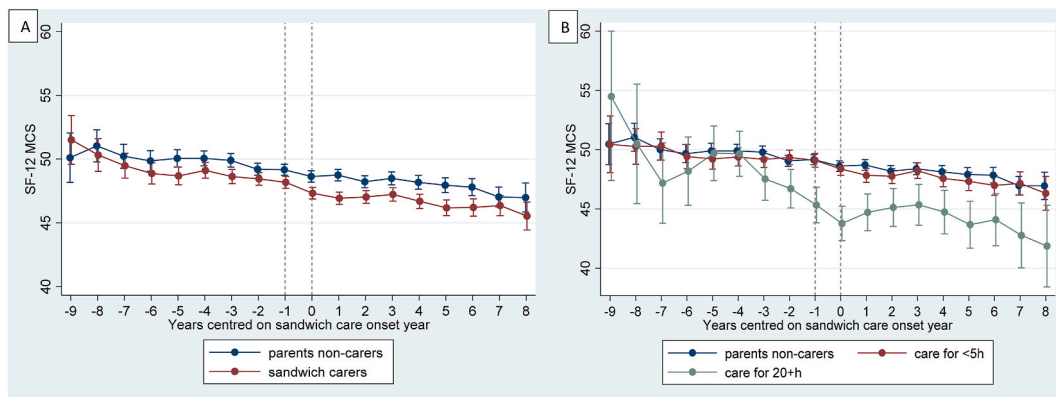


Fig. 2. Predicted levels of SF-12 MCS with 95 % confidence intervals before and after becoming a sandwich carer by care status (A) and care hours (B), comparing sandwich carers and matched parent non-carers.

4. Discussion

By assessing the health trajectories before, during and after the transition into sandwich carers in a nationally representative study of UK households, we found that the uptake of sandwich care was

associated with a deterioration in mental health. Those sandwiched parents who spent more than 20 h per week on adult care experienced more deterioration in mental health than those who cared for fewer hours, and they also experienced faster physical health declines during the transition, which was not seen for those who cared less intensively.

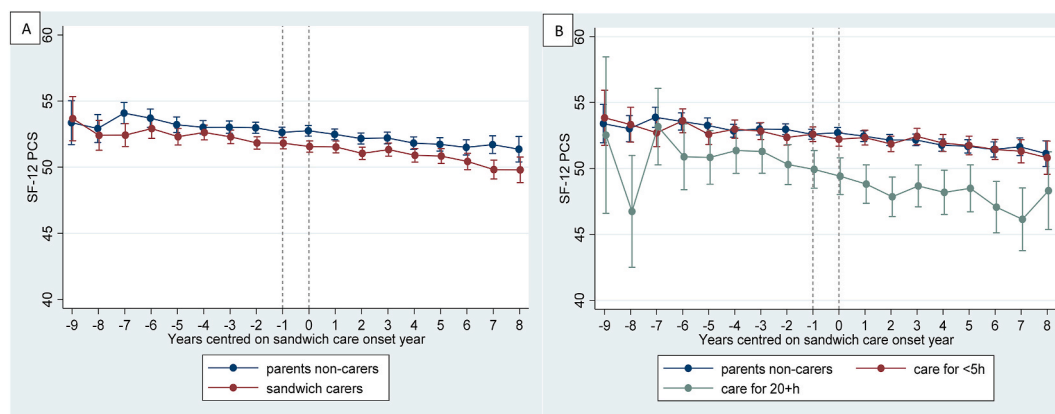


Fig. 3. Predicted levels of SF-12 PCS with 95 % confidence intervals before and after becoming a sandwich carer by care status (A) and care hours (B), comparing sandwich carers and matched parent non-carers.

Previous analyses focusing on unpaid carers in the UK found that becoming a carer was associated with a decrease in mental health.¹⁴ We demonstrate that this is the case for sandwich carers as well and the effect size for sandwich carers in our study was stronger than the previous research focusing on any unpaid carers. The dual demand faced by sandwich carers may influence their mental health more than other carers. Furthermore, within sandwich carers, we found that a transition to intensive adult care (20+ hours per week) was linked to the greatest deterioration in not only mental health but also physical health. Those who care intensively may be the primary carer in the household and are more likely to provide personal care which is often more physically and mentally demanding than other types of unpaid care.²⁷

We found that those caring intensively started to experience a deterioration in mental and physical health one or two years prior to the transition into sandwich care. It is possible that there was a delay when the sandwich carers acknowledged that their activities went beyond the usual familial role and self-identified as sandwich carers (the sandwich care transition in our study).²⁸ Furthermore, it is likely that sandwich carers are confronted with the emotional challenges inherent in witnessing the deterioration of the care recipient's health - which can happen prior to the transition into sandwich care.²⁹ This emotional toll may contribute to feelings of distress and burden.

Our analyses showed that sandwich carers had initially lower levels of mental health than non-sandwiched parents before becoming sandwich carers. This potentially represents selection into sandwich carers who had poorer previous mental health. However, as we focused on the change in health trajectories around the sandwich care transition and tested slope changes, the initial differences should not influence our results of the trajectory changes.¹⁷

Previous research from the SHARE data found that the transition into sandwich carers after age 50 has a detrimental effect on women's but not men's psychological health and well-being.¹⁷ Contrary to our hypothesis, in the present study, we saw less evidence of gender difference in the association between becoming sandwich carers and mental and physical health. The average age of sandwich carers in our study was age 37, as we focused on sandwich carers with children under 16 at home. It is possible that the shifts in gender roles and expectations within families and societies may have occurred among the younger sandwich carers, leading to more balanced care responsibilities between men and women sandwich carers. It is also possible that our study was underpowered to detect differences due to the relatively small number of sandwich carers. However, there were more women (67 % of sandwich carers in our sample) potentially affected by becoming sandwich carers even though the effect of becoming a sandwich carer on health did not differ by gender.

We utilised a nationally representative household panel dataset from the UK and employed PSM to address potential biases arising from self-

selection into sandwich care roles. We delved into the health trajectories of parents spanning several years both before and after undertaking sandwich care roles. However, our study has certain limitations. Our dataset lacked information regarding the care history of parents prior to their inclusion in the survey, the motivations behind assuming unpaid care roles, or the specific health conditions of the care recipients, which means we are not able to say whether our results apply equally to sandwich carers. We did not have information on the exact hours devoted to childcare responsibilities or childcare activities. This may underestimate gender differences, as mothers tend to contribute not only more overall time to childcare but also engage in more multi-tasking.³⁰ Furthermore, there is a possibility that some individuals may not readily identify themselves as sandwich carers and the potential non-participation or attrition of sandwich carers who provide the most intensive care may introduce bias to our findings. There were slight differences between included and excluded sandwich carers; those excluded tended to be older, more likely to belong to an ethnic minority, have only one child, and come from households in the lowest income quintile (Supplement 5) - potentially bias the estimates toward the null value.

In summary, we found that the uptake of sandwich care was associated with a deterioration in mental health, and those who care intensively also experienced a deterioration in physical health. This effect can persist for several years. Our findings suggest a need for targeted mental health interventions and regular health monitoring for sandwich carers, particularly those providing intensive care. By identifying these risks early and providing broader support and respite care, policies can be designed to reduce stress among sandwich carers and enhance overall population health. Future research could investigate the role of social support networks, access to respite care, and workplace flexibility in buffering the health effects of sandwich care.

Author statements

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Ethical approval

Data collection for UKHLS is approved by The University of Essex Ethics Committee.

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Competing interests

The authors declare no competing interests.

Contributors

BX, RL, GDG and AM conceptualised and designed the study. BX analysed the data with input from RL. BX has directly accessed and verified the underlying data reported in this manuscript. All authors had full access to all data and accept responsibility to submit for publication. BX drafted the manuscript for publication. All authors approved the final draft and consented to the submission of the manuscript for publication.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.puhe.2024.12.001>.

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