SANDWICHED WOMEN: HEALTH BEHAVIOR, HEALTH, AND LIFE SATISFACTION

Marina A. Kartseva
Anatoly A. Peresetsky

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Sandwiched women: Health behavior, health, and life satisfaction

Marina A. Kartseva[1]
RANEPA, Moscow, Russia

Anatoly A. Peresetsky
NES; HSE University, Moscow, Russia

In this paper, we use unique nationally representative data from the 25th wave of Russia Longitudinal Monitoring survey, (RLMS-HSE) for 2016. Based on the survey data, we investigate the impact of sandwich generation caregiving on the health behavior of Russian women—their health behavior, self-assessed health and life satisfaction.

We found that sandwich generation caregiving reduces the likelihood of medical examinations, and regular meals, the effect is especially pronounced for working women. A small reduction in alcohol consumption is observed. The likelihood of smoking is reduced (especially for women under 50).

The likelihood of being overweight increases, the proportion of chronic diseases decreases, and self-assessed health improves (these effects are especially pronounced for women who are non-pensioners). The proportion of depression decreases. These effects may be the result of an inattentive attitude to one's health and a consciousness of the social significance of fulfilling one's duty. The latter also affects the decreasing number of sandwich generation givers (SGC) dissatisfied with life in general.

JEL classification: I12; I31; J14; J16.

Keywords: sandwich generation; sandwich caregiving; Russia; female caregivers; health; health behavior; life satisfaction; informal care.

1. Introduction

Since the second half of the 20th century, a combination of demographic and socioeconomic trends has resulted in the middle generation often experiencing a double care burden, caring for their children and their parents at the same time. The key factor of increased caregiving pressure on middle-age adults is increase in life expectancy, which has led to an increase in the demand for care for the parent generation. Earlier numerous siblings could share the care of elderly parents, now the entire caregiving burden often falls on an only middle-aged child. Another important demographic factor in the increase in the care burden is the rise of marriage and childbearing age. Middle-aged people may still have children in need of care. Moreover, in a modern society, the standards for raising children have changed significantly – members of the middle generation spend significantly more time on raising children than their parents (Aguiar, Hurst, 2007). This care burden growth cannot be fully compensated for by formal care services due to the imperfections of existing social institutions.

[1] E-mail addresses: mkartseva@mail.ru (Kartseva), aperesetsky@hse.ru (Peresetsky)

Additionally, traditions of informal care (especially elderly care) could discourage the middle-aged from the extensive use of formal care services.

Thus, middle-aged people are likely to be "caught in the middle" pressed by the double responsibility to their elderly parents and children. In the literature, this middle generation is called the sandwich generation (Miller, 1981). The concept of sandwich generation is expanding. In addition to caring for children and parents (the traditional sandwich), when defining care burden, researchers also take into account caring for grandchildren and grandparents (club sandwich) (Vlachantoni et al., 2020).

Modern empirical studies on sandwich caregiving are usually based on actual involvement in dual care. An individual is considered as a sandwich generation caregiver (SGC) if she provides informal care for two generations. Estimates of the prevalence of multigenerational caregiving vary significantly by country and by the definition of SGC used. According to (Boyczuk, Fletcher, 2016) SGCs make up 8–28% of the working population in Western countries.

SGCs face the great challenge of balancing their lives and multiple care burdens. The impact of heavy load on SGSs' health and well-being is widely discussed in the literature. In particular, many researchers address the different aspects of SGCs' physical and mental health, health behavior and subjective well-being.

In this work, we use unique nationally representative data from the 25th wave of Russia Longitudinal Monitoring survey, (RLMS-HSE)[2] conducted in 2016. Based on the survey data, we examined the effect of sandwich caregiving on the health behavior, self-assessed health and subjective well-being of Russian women.

We found that providing care for two generations negatively influences women's health behavior. Compared to non-caregivers and other caregivers, SGCs are less likely to undertake regular medical examinations and to have regular meals. The effect is especially pronounced for working women. SGCs are less likely to drink alcohol regularly and they are less likely to smoke. We find little evidence of the negative influence of sandwich caregiving on the health of caregivers, however. On the contrary, our results suggest that SCGs are less likely to have chronic conditions and more likely to be in good health than non-SGCs (the effects are stronger for pensioners). SGCs are also less likely to experience depression. But dual caregiving is negatively correlated with Body mass index **(**BMI) – SCGs have a higher probability of being overweight. We also found a small positive effect of sandwich caregiving on life satisfaction of women.

[2] "Russia Longitudinal Monitoring survey, RLMS-HSE, conducted by HSE University and OOO "Demoscope" together with Carolina Population Center, University of North Carolina at Chapel Hill and the Institute of Sociology of the Federal Center of Theoretical and Applied Sociology of the Russian Academy of Sciences. (RLMS-HSE web sites: https://rlms-hse.cpc.unc.edu, https://www.hse.ru/org/hse/rlms).

2. Literature review

The well-being of SGCs is widely discussed in the literature. In particular, attention is paid to the effect of multiple caregiving on the emotional and physical health of caregivers and their general life satisfaction. Below is a brief overview of empirical studies that quantitatively analyze the effect of sandwich caregiving on these aspects of well-being of individuals in developed countries. We mainly focus on studies using nationally representative data sets.

Sandwich caregiving may impair health behavior of caregivers. The constant time pressure, stress, and mental fatigue induced by high caregiving burden could force SGCs to be less focused on their own health. Chassin et al. (2010) shows that in comparison with non-SGCs those who are caring for two generations simultaneously are less likely to use seat belts, less likely to check the health value of food, they smoke more and are less likely to exercise regularly. The authors conclude that "possible explanation for the poorer health behavior of sandwiched individuals may be a reduced salience of personal health goals. That is, those caring for multiple generations may place more importance on the health of others than on their own health". It is worth noting that the study of the health behavior of SGSs is especially important as health behavior not only influences current health status, but also largely determines health in later life.

A number of works are devoted to the analysis of the effect of sandwich caregiving on the current health status of caregivers. In most studies, self-assessed health is used as an indicator of health. Although self-assessed health is not an objective measure of health status, it is an important predictor of morbidity and mortality (Idler, Benyamini, 1997; Wu et al., 2013), especially for middle-aged people (Miilunpalo et al., 1997). Basically, the research results indicate that dual caregiving has a negative effect on the health of caregivers. Do et al. (2014) show that in the US those individuals who have children under the age of 18, involvement in elderly care leads to lower levels of self-assessed health. Multigenerational caregiving is associated with the lower self-assessed health of Canadian employees (Duxbury, Higgins, 2013). The negative effect of sandwich caregiving on the self-assessed health of women in Norway is reported in the study (Daatland at al., 2010). In Switzerland, sandwich caregiving negatively affects the self-assessed health of male caregivers, but does not influence the self-assessed health of female caregivers (Häusler et al., 2018).

The emotional health of SGC is of particular interest to researchers. Some studies (Rubin, White-Means, 2009; Duxbury, Higgins, 2013; Pew Research Center, 2013) show that SGCs experience greater levels of stress and have significantly less free time than non-SGCs. The combination of providing care to both

children and parents increases the risk of psychological distress and the effect is more pronounced for women (Voydanoff, Donnelly, 1999). Sandwich caregiving not only provokes high levels of stress, but can also cause depression (Brenna, 2021; Turgeman-Lupo et al., 2020; Hammer, Neal, 2008).

However, not all studies support the hypothesis of the negative impact of multigenerational caregiving on the caregivers' health. Loomis, Booth (1995) did not find a negative effect of sandwich caregiving on the physical and psycho-emotional health of individuals. The results of Williams (2004) suggest that caring for multiple generations negatively affects self-assessed health but does not affect stress levels.

Interestingly, caring for two generations may not negatively impact life satisfaction, the major cognitive component of personal subjective well-being (Künemund, 2006; Williams, 2004; Pew Research Center, 2013). In some cases, dual care may positively affect life satisfaction. (Künemund, 2006; Daatland at al., 2010). The negative effects of sandwich caregiving could be compensated by positive effects on psychological well-being caused by the strengthening of intergenerational relationships, and strengthening the family. Caring for relatives is recognized by society and could be considered by caregivers as meaningful and rewarding work that brings a sense of accomplishment that is positively correlated with life satisfaction.

2.1. Sandwich generation in Russia

Russia is experiencing the same demographic trends as the most developed countries – increasing longevity, a higher childbearing age, a lower birth rate. In 2019, in Russia, the age dependency ratio, defined as the number of children (0-14 years old) and elderly (65 years or older) per 100 population aged 15 to 64 years, was 51, which is somewhat lower than the OECD average (54). Comparable to Russia, the age dependency ratio is observed in countries such as Austria, Hungary, Canada, Spain, Mexico, Norway, Poland, and the US. Israel and Japan have the highest age dependency ratio (67 and 68 respectively). According to the demographic projections, in the next 30 years, the age dependency ratio in Russia is expected to increase.

In Russia, the increase in care burden in the middle generation caused by demographic processes is amplified by the low level of the development of social services, especially the long-term care system. While parents can count on state support in caring for children, although the volume and variety of forms of such support are often criticized (Ovcharova, 2008; Volkova, Kudaeva, 2019), caring for elderly relatives in Russia mainly falls on family members (Korchagina, Prokofieva, 2012).

The underdevelopment of formal care services in Russia is one of the key reasons for the prevalence of informal elderly care. Formal home-based elderly care has a limited variety of forms and limited assistance.

Most often older people receive help only with shopping. Assistance with activities of daily living (washing, cooking, caring for clothes and home, etc.) is rarely provided by social services in practice (Parfenova, 2017). Institutional elderly care is also very limited in Russia. Unfortunately, despite the ongoing large-scale reform of the long-term care system in Russia, the quality of care in public nursing homes is still low, even the logistical support for nursing is considered to be insufficient (Zdravomyslova, Nazimova, 2019; Kiryanova, Kozlova, 2011). The market for private nursing homes in Russia is still in early development stages. The quality of care in private nursing homes is higher than in public ones, but the costs are high and private institutional care is inaccessible for the vast majority of the population.

The other important factor of informal care prevalence is that in Russia, caring for parents is traditionally considered as the responsibility of children (mainly daughters) (Levin et al. 2015). Formal care is usually seen as a last resort (Smirnova, Smirnov 2020). Thus, the problems of sandwich caregiving are especially urgent in Russia.

There is some evidence of the negative impact of kinship care on the health and well-being of caregivers in the Russian literature. For example, (Anikina, Pshonova, 2019; Savenysheva, Zapletina, 2019) conclude that childcare leads to high levels of parental stress, which can have a negative impact on the mental and physical health of caregivers. Informal caring for elderly relatives significantly worsens the emotional and psychological health of caregivers in Russia, increases the likelihood of stress and depression, chronic diseases, and lowers self-assessed health (Grishina, Tsatsura, 2020; Zdravomyslova, Savchenko, 2020; Maltseva et al., 2016). We formulate the hypothesis that SGC are a particularly vulnerable group in Russia. Caring for two generations could increase the likelihood and severity of negative effects, described in the literature for caregivers of only one generation.

There is limited research on the well-being of sandwich caregivers in Russia. Most studies are based on qualitative sociological research (Zdravomyslova, 2016; Tkach, 2015). Research results indicate that people caring for two generations simultaneously experience burnout, psychological difficulties, and a lack of free time.

To the best of our knowledge, the only attempt to estimate the quantitative effect of sandwich caregiving on the well-being of caregivers in Russia is a study (Kartseva, 2021). The empirical basis of the work was the nationally representative data of the time budget survey, conducted by Rosstat in 2019. The study showed that SGCs are statistically significantly more likely to have chronic diseases, experience a constant lack

of time, and have less free time. The study did not reveal a significant effect of sandwich caregiving on self-assessed health.

Compared to (Kartseva, 2021), we investigate the health of Russian sandwich caregivers using a wider range of indicators and an alternative data source (RLMS-HSE). Additionally to health status we consider the effect of sandwich caregiving on the health behavior and well-being of caregivers.

3. Data

In the current work, we use unique nationally representative data from the 25th wave of the Russia Longitudinal Monitoring survey, RLMS-HSE survey for 2016 in Russia. The survey covered approximately 5,000 households with a population of more than 12,500. RLMS-HSE data provide detailed information on the demographic and socio-economic characteristics of individuals and their households. In 2016, the questionnaire for adults, on an ad hoc basis, included questions about the involvement and frequency of individuals in the informal care for adults and children.

We analyze the impact of sandwich caregiving on women, as women are much more likely than men to be the main caregivers for both children and the elderly, especially in Eastern European and Central Asian countries (Levin et al. 2015). We restrict our sample to ages from 30 to 60 years, which corresponds to the midlife period (Lanchman, 2004). The sample size was 2,651 observations.

We consider a woman as sandwich generation caregiver (SGC) if she provides informal care both for children or grandchildren and for her elderly relatives, or physically or mentally handicapped ones, at least several times a week (for each group). Thus in our sample 11.7% of women at the age of 30–60 are SGCs. To analyze the effect of sandwich caregiving on women, we use a set of binary indicators of health behavior, self-assessed health, and life satisfaction, shown in Table 1. The table also presents the proportions of respondents with each of the indicators in the SGC subsample and the non-SGC subsample. A more detailed description of the indicators is given in Table A1 in the Appendix. We use post-stratification weights to reduce the sampling error and potential non-response bias. The mean values of some indicators differ by subsample, but it would be incorrect to draw conclusions on the influence of sandwich caregiving on these indicators only on this basis For this, it is necessary to compare individuals with the comparable socio-demographic factors. Results of such a comparison are presented in Section 5 (Results).

Table 1. Indicators of health behavior, self-assessed health, and life satisfaction, and their distribution by subsamples

Indicator	Description	SGCs, %	non-SGCs, %
	Health behavior		
Medical check-up	Dummy for getting medical checkup	12.5	21.8
Regular meals	Dummy for regular meals	72.7	83.9
Alcohol	Dummy for regular alcohol consumption	1.3	2.6
Smoking	Dummy for smoking	12.9	18.8
	Health		
Good health	Dummy for self-assessed good health	46.9	31.8
Chronic condition	Dummy for presence of at least one chronic condition	59.8	66.1
Overweight	Dummy for being overweight	62.1	58.9
Depression	Dummy for depression or serious nervous disorder	10.7	13.4
	Life satisfaction		
Satisfied	Dummy for being satisfied with life	42.4	45.9
Dissatisfied	Dummy for being dissatisfied with life	44.0	27.5
Neutral	Dummy for being neutral	31.5	26.6

Note: detailed descriptions of these indicators is given in Appendix, Table A1.

Descriptive statistics of the socio-demographic characteristics of SGC women and non-SGC women, which we use in our models, are presented in Table 2. There is no substantial difference between the means of these factors for the two subsamples. Some qualitative differences can be noted: in the SGCs subsample there are slightly higher average values of such factors as: the number of household members; the number of household members over 70 years old; the number of household members receiving a pension; and the number of children, grandchildren. SGCs also have a slightly lower education level.

Note that the information in the mean values of the socio-demographic characteristics by subgroups is not sufficient to make inferences on the impact on SGCs on the indicators (Table 1). For a detailed analysis, a multivariate regression analysis is required, and it is necessary to compare not only the average values of the obtained effects or factors, but their distributions, which contain much more information.

Consider the age of the respondents as an example of the need to analyze the distribution of a factor, not only its average value. The mean age among SGCs in our sample is 44.4 and 45.7 for non-SGC. The difference is not statistically significant. However, the age structure is significantly different (see Fig. 1). The distribution of age in the sandwich generation is shifted to the left. (In the non-sandwich subsample, there are many respondents aged 55-60 who do not have an older generation or who already have adult children who do not need care, or who are without dependents).

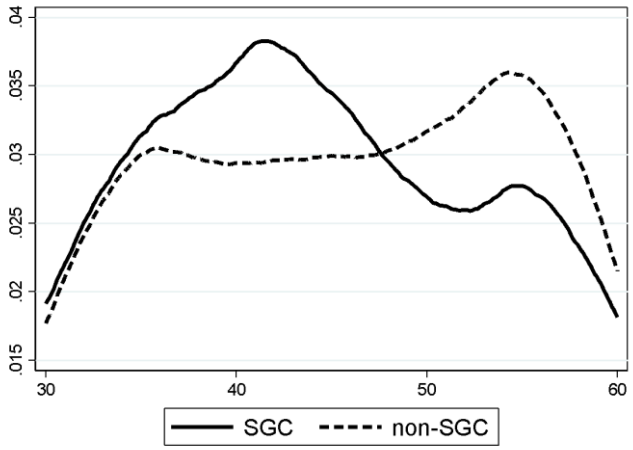

Fig. 1. Kernel density estimates of the age distribution among female SGCs and non-SGCs in our sample.

Below we demonstrate that the same reasoning is valid for most of the marginal effects of the SGC status on the indicators of health behavior, self-assessed health and life satisfaction—their distribution are far from being normal. Thus, the analysis of only their mean values is non-informative and it is necessary to consider the distribution of the marginal effects over our sample.

4. Method

In our paper, we use the logit model to study the impact of sandwich caregiving on the binary factors (indicators) from Table 1. For the factor y_i (e.g. $y_i = 1$ if respondent i smokes) we consider following logit model:

$$P(y_i = 1 \mid sw_i, z_i) = \Lambda(\alpha + \beta \cdot sw_i + z_i'\gamma), \tag{1}$$

where Λ is c.d.f. of the logistic distribution, dummy variable $sw_i = 1$ if the individual belongs to the sandwich caregivers, z_i is the vector of socio-economic and demographic characteristics of the individual i and her household. Let $\hat{\alpha}, \hat{\beta}, \hat{\gamma}$ be the estimates of the model (1) parameters. In many papers the effect of sw_i on y_i is measured with Odds Ratio:

$$OR = \exp\left(\hat{\beta}\right), \tag{2}$$

which in our view is not an appropriate measure of the effect. Norton, Dowd (2018) also noted that the magnitude of the odds ratio is sensitive to the data set and to the model specification (choice of z_i). In our paper, we use the estimate of the observation-specific marginal effects as a measure of the effect of sw_i on y_i:

$$ME_i = \hat{P}(y_i = 1 \mid sw_i = 1, z_i) - \hat{P}(y_i = 1 \mid sw_i = 0, z_i) = \Lambda(\hat{\alpha} + \hat{\beta} + z_i'\hat{\gamma}) - \Lambda(\hat{\alpha} + z_i'\hat{\gamma}) \cdot \tag{3}$$

The mean value of the marginal effect $ME = \overline{ME}_i$ is less sensitive to changes in the model specification than the odds ratio OR. In contrast with OR, ME_i is observation-specific, which allows a more detailed study of the effect of sw_i on y_i. As we demonstrate, the mean value of ME_i is much less informative compared to the distribution of the ME_i.

We use a wide set of control factors z_i (see the list in Table 2), many of them are discrete, it means that the logit model is close to the matching technique which is used in many papers as an alternative to the logit model. Having the ME_i we calculate sample mean $ME = \overline{ME}_i$ and sample standard deviation $s(ME)$ of the marginal effect measure, which are more precise tools for constructing confidence intervals and hypothesis testing than the usual asymptotic estimates reported by logistic STATA command.

In our models we use set of control factors z_i shown in Table 2.

Table 2. Control factors z_i and their means for SGCs and non-SGCs

Factor	Description	SGCs	non-SGCs
age	Age (years)	44.4	45.7
age2	Age squared		
edu1	Education. General secondary and less	20%	14%
edu2	Primary professional	21%	22%
edu3	Secondary professional	32%	29%
edu4	Tertiary professional	28%	35%
num_emp	Number of employed members of the household, excluding the respondent	1.08	0.92
num_pens	Number of pensioners in the household, excluding the respondent	0.97	0.42
live70	Dummy for at least one household member 70+ y.o.	0.41	0.10
num	Number of household members	4.68	3.27
num_ch02	Number of children 0–2 y.o.	0.060	0.065
num_ch36	Number of children aged 3–6 y.o.	0.173	0.126
num_ch712	Number of children aged 7–12 y.o.	0.307	0.217
num_ch1317	Number of children aged 13–17 y.o.	0.261	0.183
num_grch02	Number of grandchildren aged 0–2 y.o.	0.058	0.038
num_grch36	Number of grandchildren aged 3–6 y.o.	0.062	0.042
num_grch712	Number of grandchildren aged 7–12 y.o.	0.064	0.031
num_grch1317	Number of grandchildren aged 13–17 y.o.	0.011	0.011
mar	Married	70%	68%
rural	Lives in a rural area	31%	25%
pens_i	Receives a pension	24%	30%
emp_i	Employed	58%	68%
linchh_pp	Per person household income, log	9.44	9.67

5. Results

Results of logit model (1) estimates over our sample of 2,651 observations are presented in Table 3. Columns 4–6 present Pseudo-R2, estimates of the coefficient β, at SGC dummy sw_i, and estimates of its standard deviation. Note that this standard deviation (and the significance of the $\hat{\beta}$) are derived by the asymptotic theory of ML estimators. The standard deviations may not be correct if the distribution of $\hat{\beta}$ is far from normal.

Column 1 presents the sample mean of the estimated marginal effects ME_i; column 3 presents the sample standard deviation of these estimates, $s(ME)$. Column 2 presents the value $P = 2 \cdot P\left(Z > \frac{|ME|}{s(ME)} \right)$, (here $Z \sim N(0,1)$), that is P is a measure of deviation of the mean of ME from 0, calculated using the nonparametric estimate $s(ME)$ of the standard deviation under the assumption of the normal distribution of ME_i (as shown below this assumption is violated for some indicators). Note that "significance" of mean ME not necessarily corresponds to the statistical significance of the β estimate.

All estimates of the marginal effect, except for alcohol consumption, were significant at the 5% level. Note that the significance of the estimates $\hat{\beta}$ and $\overline{ME}$ does not necessarily coincide, which is a consequence of the fact that the distribution may be far from normal.

Table 3. Results of the model (1) for various indicators. Coefficients for control factors z (Table 2) are omitted for brevity.

	1	2	3	4	5	6
Indicator	Sample mean $\overline{ME}$	P	Sample St.dev. $s(ME)$	Pseudo R2	$\hat{\beta}$	$s_{\hat{\beta}}$
Medical check-up	**–0.0699**	0.0037	0.0241	0.050	–0.499**	(0.191)
Regular meals	**–0.1010**	0.0020	0.0328	0.064	–0.652***	(0.157)
Alcohol	**–0.0135**	0.1940	0.0104	0.058	–0.710	(0.592)
Smoking	**–0.0505**	0.0343	0.0238	0.087	–0.405**	(0.199)
Good health	**0.1060**	0.0001	0.0276	0.113	0.524***	(0.141)
Chronic condition	**–0.0273**	0.0001	0.0071	0.099	–0.136	(0.139)
Overweight	**0.0626**	0.0000	0.0138	0.105	0.306**	(0.147)
Depression	**–0.00751**	0.0131	0.0030	0.046	–0.070	(0.221)
Satisfied	**0.00837**	0.0000	0.0011	0.064	0.0368	(0.136)
Dissatisfied	**–0.0201**	0.0003	0.0055	0.071	–0.112	(0.163)
Neutral	**0.0153**	0.0000	0.0015	0.009	0.0773	(0.143)

Note: ***,** — significance at 1% and 5% levels.

Read the results of Column 1 of Table 3 as follows. For example, for the *medical check-up* indicator: female SGC less often undergo regular medical examinations than non-SGC by 6.99 p.p. Below we provide a more detailed analysis of the sandwich caregiving effect on various indicators from Table 3.

5.1. Results. Health behavior

Medical checkup

On average, female SGCs are less likely to undergo medical checkups in comparison with non-SGCs. The mean marginal effect for *medical check-up* is –6.99 p.p. But in the kernel density plot of the ME_i distribution (Fig. 2a) we see a two-mode distribution, which mean that the distribution of ME_i is a mixture of two distributions.

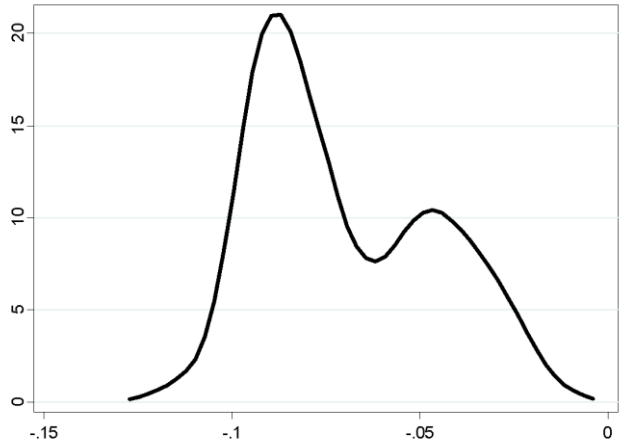

Fig. 2a. Distribution of the ME_i for a *medical check-up.*

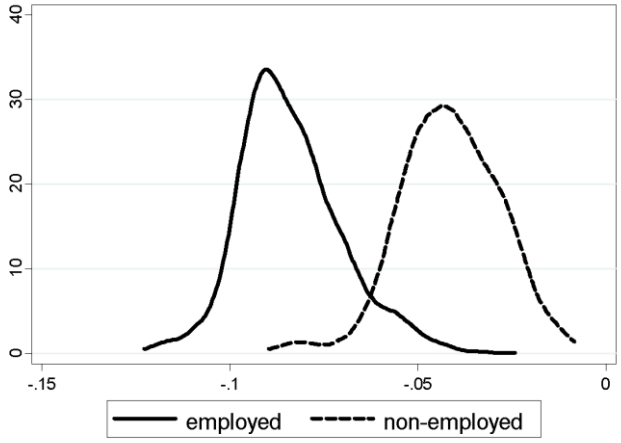

Fig. 2b. Distribution of the ME_i for *medical check-up*, separate for employed and non-employed.

We try various factors which could explain this mixture. Visual analysis shows that the best splitting of the distribution is achieved by separating the sample in two subsamples: employed and non-employed. Perhaps the regularity of medical check-up depends on the employment status of the respondent. In Russia, many firms provide their employees with regular annual medical examinations.

The graphs of the marginal effect distribution by employed and non-employed respondents are shown in Fig. 2b. In each of the two subgroups, the distribution is close to normal. Mean value *ME* for employed is –8.1 p.p. which is twice as large than the mean *ME* for non-employed, –4.0 p.p. Accordingly, the standard errors are smaller in each of the subgroups, since the mixture standard error includes the difference between the means. This can lead to a situation where the effect is significant in each of the subgroups, but it can be concluded that the effect is insignificant in the population due to the failure to take into account the fact that the distribution is a mixture of two (or more) distributions.

Note that for all observations, the values are negative (the minimum and maximum values are of the same sign). The same is true for other indicators that we discuss below.

Although, to our knowledge, there is no research on the effect of sandwich caregiving on preventive medicine use, there is some evidence on preventive health behavior of caregivers. Some studies find that caregivers are more likely to forget to take prescription medicine or to keep appointments with doctors than non-caregivers (Burton et. al, 1997; Wang et.al, 2015). The effect is more pronounced for high-intensity caregivers. These findings are consistent with our results, especially considering the fact that sandwich caregiving is usually associated with a higher care burden.

Table 4. Descriptive statistics of the ME_i for *medical check-up*, percentage points

	Obs.	Mean	St.dev.	min	max
non-employed	885	–0.041	0.013	–0.090	0.008
employed	1766	–0.084	0.014	–0.123	–0.024
Total	2651	–0.070	0.024	–0.123	–0.008

Regular meals

The sandwich care burden has a significant negative effect on the eating behavior of women. SGCs are significantly less likely to have regular meals than non-SGCs. On average, sandwich caregiving reduces the proportion of respondents who have regular meals by 10.1% (–11.5 p.p. for the employed and –7.5 p.p. for non-employed).

Plots of the distribution of the marginal effect ME_i for the indicator *regular meals* are presented for the whole sample (Fig. 3a) and separately by subgroups employed/non-employed (Fig. 3b). In each of the two subgroups distribution is close to normal.

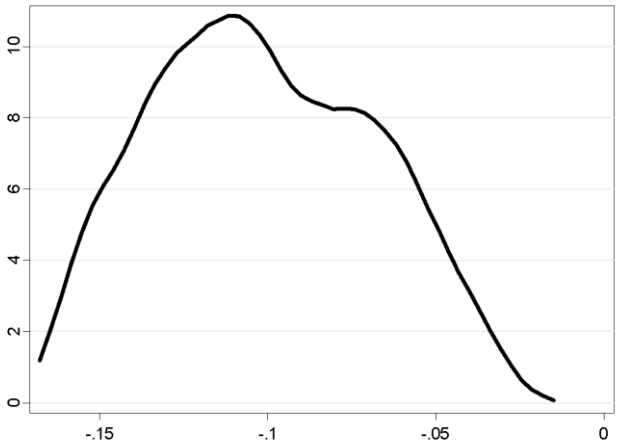

Fig. 3a. Distribution of the ME_i for *regular meals*

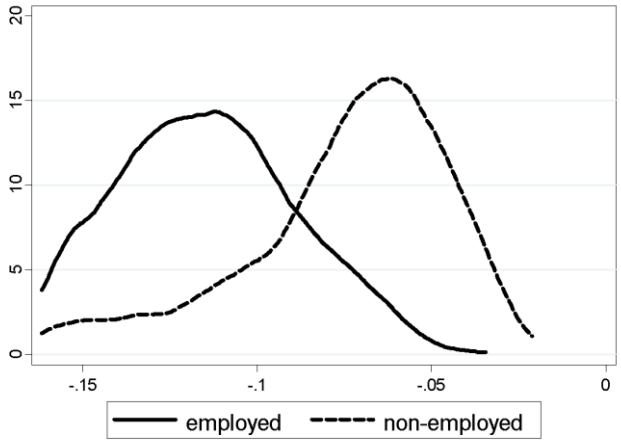

Fig. 3b. Distribution of the ME_i for *regular meals*, employed and non-employed women.

The descriptive statistics for the distribution of the marginal effect for the indicator *regular meals* separately by subgroups are shown in Table 5.

Table **5.** Descriptive statistics of the ME_i for *regular meals*, percentage points

	Obs.	Mean	St.dev.	min	max
non-employed	885	–0.075	0.030	–0.162	–0.021
employed	1766	–0.115	0.026	–0.162	–0.034
Total	2651	–0.101	0.033	–0.162	–0.021

As for medical check-ups, the sandwich caregiving effect is higher for the employed: among SGCs 11.5 p.p. more respondents neglecting regular meals. The employed woman is constantly pressed for time and has to sacrifice her lunch break, to do other things -- pick up children from kindergarten or school, buy and bring food to parents, etc.

For the case with the *regular meals* indicator it is also possible to split the sample by pensioner status (see Table 6).

Table 6. Descriptive statistics of the ME_i for *regular meals*, percentage points

	Employed	Non employed	Total
Pensioner	–0.089	–0.063	–0.075
Non-pensioner	–0.121	–0.086	–0.112
Total	–0.115	–0.075	

Thus, the largest by absolute value average marginal effect (–12.1% pp) is achieved for employed and not receiving pensions, and the smallest for non-employed pensioners (they can allocate their time more flexibly). All four estimates are significant at 5% level.

We found that sandwich caregiving negatively affects the eating behavior of individuals, reducing the regularity of meals. In general, our findings are consistent with (Chassin et. al, 2010) who found that SGCs are less likely to check food labels and choose food based on health values.

Alcohol

We do not find a substantial effect of sandwich caregiving on alcohol consumption. The effect is negative, with a mean –1.34 p.p. and varies in the range [–1.50; –0.07] p.p. The plot of the ME distribution is presented in Fig. 4. We do not find any significant effect of sandwich caregiving on the alcohol consumption for any subgroups. A similar finding was also reported by (Gottschalk et al., 2020) who studied the effect of caregiving

on the drinking behavior of individuals. They found the drinking frequency of high intensive caregivers (dementia caregivers) does not differ from that of non-caregivers.

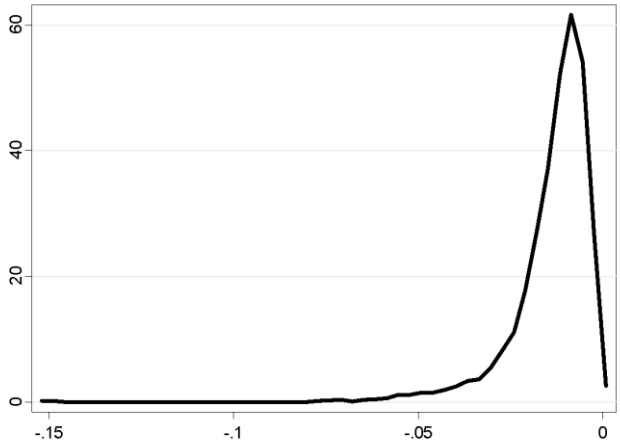

Fig. 4. Distribution of ME_i for *alcohol*

Smoking

The plot of the marginal effect distribution is presented in the Fig. 5a. The mean effect is negative and is –5.0 p.p., it varies in the range [–10.1; –0.4] p.p. Only 12.9% of sandwich caregivers smoke, compared to 18.9% of non-SGCss. There is a slight difference in ME_i of smoking by age (see Fig. 5b): the effect is more pronounced in women under 50. This could be explained by the larger proportions of female smokers 50 (22.0%) compared to the proportion of female smokers in ages above 50 (11.7%).

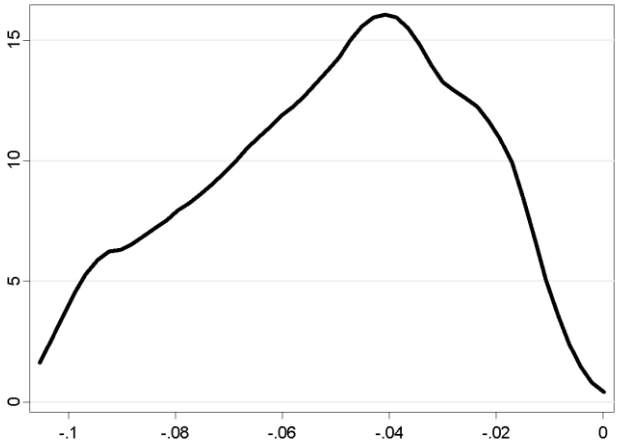

Fig. 5a. Distribution of ME_i for *smoke*

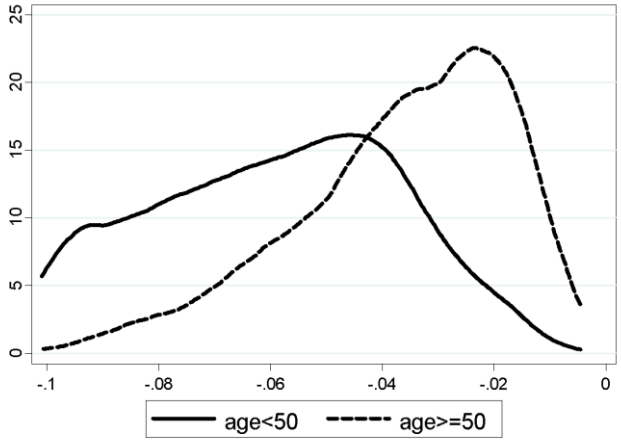

Fig. 5b. Distribution of ME_i for *smoke*, by age

This outcome is contrary to that of (Chassin et al., 2010) who found that on average SGCs smoke more in comparison with non-SGCs. Our result differs from some of the adult caregiving literature as well. Most

researchers found that caregiving may increase the probability of smoking or has no significant effect on smoking (Gottschalk et al., 2020; Tough et al., 2020; Lambert et al., 2017; Rabinowitz et al., 2007).

The difference in the results could be explained by using different indicators of smoking. (Chassin et al., 2010) used the number of cigarettes per day, while we used a dummy variable. Thus, our results cannot be directly compared with those of (Chassin et al., 2010).

The low probability of smoking among SGCs could be also explained by their wanting to protect the dependents from second-hand smoking.

5.2. Results. Health

Good health

We found a positive effect of sandwich caregiving on the self-assessed health of individuals. The mean marginal effect of sandwich caregiving on the self-assessed health is 10.6 p.p., varying in the range [0.5; 13.0] p.p. The density plot of this marginal effect is two-mode (fig. 6a), and could be presented as a mixture of two distributions by subsamples of pensioners and non-pensioners (fig. 6b). Descriptive statistics of the ME_i for *good health* are presented in Table 6. Mean marginal effect is higher for non-pensioners (12.1 p.p.) compared to pensioners (6.8 p.p.).

Thus we found that sandwich caregiving is positively correlated with self-assessed health of individuals. This finding is contrary to previous studies which have suggested sandwich care has a negative or no effect on self-assessed health. This inconsistency may be due to self-selection. Women with poor health are less likely to be SGCs. Another possible explanation is that kinship care is highly recognized in Russia. SGCs have a sense of accomplishment and receive social recognition. Caring for relatives SGCs could get satisfaction from strengthening connections in the family. The positive moral aspects of care could have a positive impact on the perception of life in general and the perception of one's own health in particular. In our view, however, conclusions about the positive effect of sandwich caregiving on women's health must be treated with caution. As we showed above, sandwich caregiving significantly negatively influences health behavior (reducing preventive care and the regularity of meals) that could result in worsening of SGCs' health in the future.

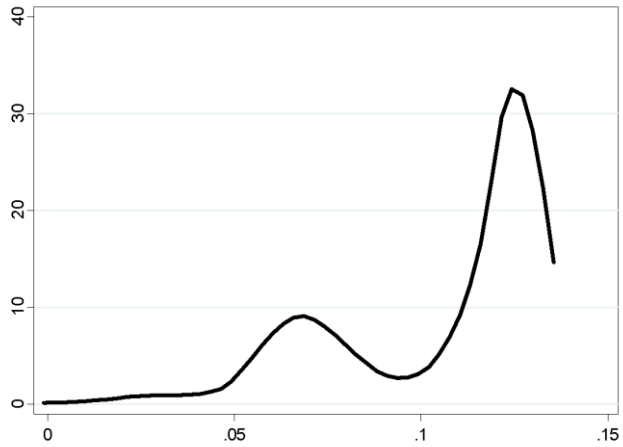

Fig. 6a. Distribution of ME_i for *good_health*

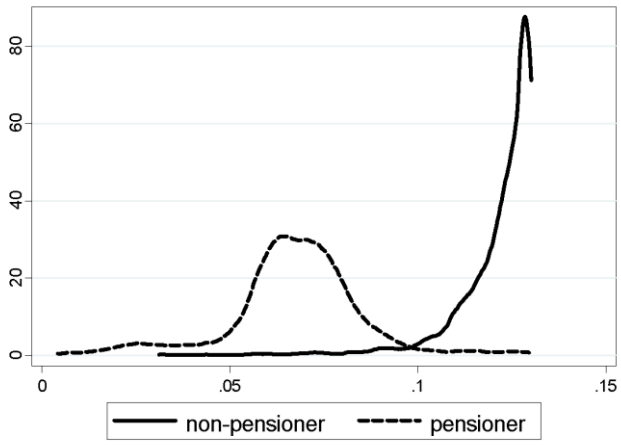

Fig. 6b. Distribution of ME_i for *good_health* by the groups of the pensioners and non-pensioners

Table 6. Descriptive statistics of the marginal effect for *good health*, percentage points

	Obs.	Mean	St.dev.	min	max
non-pensioners	1870	0.121	0.011	0.040	0.130
pensioners	781	0.068	0.018	0.005	0.130
Total	2651	0.106	0.028	0.005	0.130

Chronic conditions

Surprisingly, effect of sandwich caregiving on the presence of chronic conditions is negative (mean $ME = -2.7$ p.p.). Most likely, there is reverse causality here — people with chronic diseases simply do not have the strength to take care of two generations. Again, we have a two-mode distribution (fig. 7a) which could be presented as a mixture of two distributions (see fig. 7b) by subgroups of pensioners ($ME = -1.7$ p.p.) and non-pensioners ($ME = -3.2$ p.p.). The descriptive statistics of the ME_i for *chronic condition* are presented in Table 7.

Thus in general SGCs are less likely to experience chronic conditions. A possible explanation is that chronic disease in SGCs are not less frequent but undiagnosed, due to the fact that they pay less attention to their own health in caring for two generations. In particular, as shown above, they are less likely to see a doctor for medical check-ups. Our outcome is contrary to that of Kartseva (2021) showed positive correlation between chronic morbidity and SGC status for Russia. This discrepancy could be partially attributed to research differences: Kartseva's (2021) sample includes both males and females and use a different empirical dataset

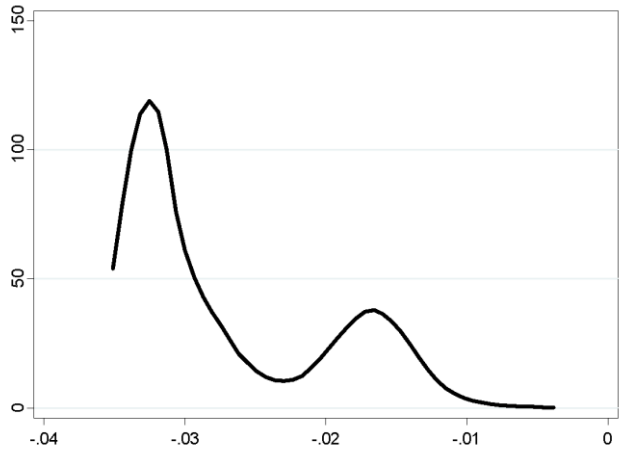

Fig. 7a. Distribution of ME_i for *chronic condition*

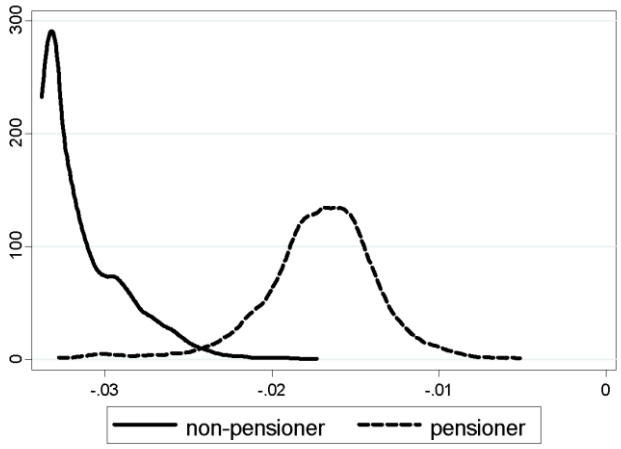

Fig. 7b. Distribution of ME_i for *chronic condition* by the groups of the pensioners and non-pensioners

Table 7. Descriptive statistics of the ME_i for *chronic condition*, percentage points

	Obs.	Mean	St.dev.	min	max
non-pensioners	1870	–0.032	0.003	–0.034	–0.018
pensioners	781	–0.017	0.004	–0.033	–0.006
Total	2651	–0.027	0.007	–0.034	–0.006

Overweight

Being overweight (measured as BMI>25) can be considered as one of the indicators of health, and as a consequence of a decrease in attention to their own health behavior. Descriptive statistics of the ME_i for *chronic condition* are presented in Table 8. **The ME** of sandwich caregiving on the indicator *overweight* is positive and varies in the range [1.3; 7.6] p.p. This means that SGCs are more likely to be overweight than non-SGCs. This effect is more pronounced for non-pensioners ($ME = 6.8\,\text{p.p.}$), than for pensioners ($ME = 4.8\,\text{p.p.}$), see Table 8.

This difference could be partially explained by the initial state — the average age of pensioners is higher, and by this age many women are already overweight. In our sample, 48.4% of women under 50 years are overweight and 76.9% of women aged 50 or over. Corresponding ME density plots are presented at fig. 8a, b.

To the best of our knowledge there are no studies of the effect of sandwich caregiving on BMI for women. A strong relationship between adult caregiving and overweight/obesity has been reported in the literature for adult caregivers (Reeves et al., 2012; Gottschalk et al., 2020; Turgeman-Lupo et al., 2020), however. Our result supports these findings. The effect is not surprising — as shown above SGCs in Russia are less likely to follow a healthy diet.

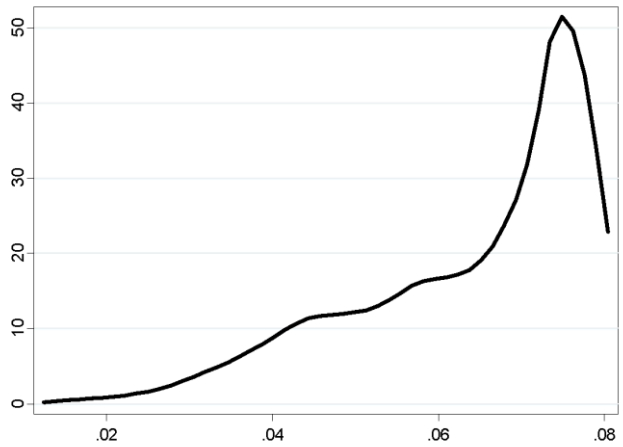

Fig. 8a. Distribution of ME_i for *overweight*

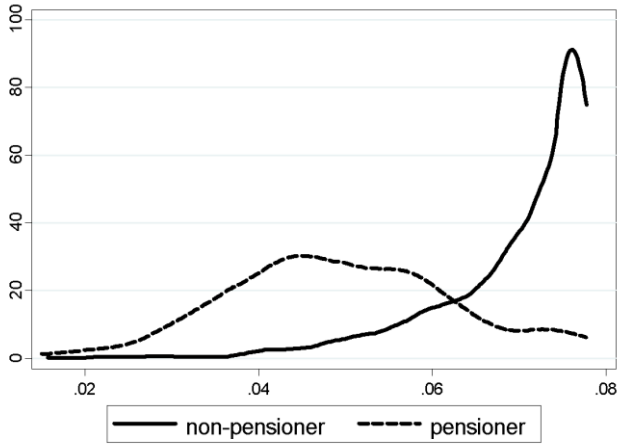

Fig. 8b. Distribution of ME_i for *overweight* by the groups of the pensioners and non-pensioners

Table **8.** Descriptive statistics of the ME_i for *overweight*, percentage points

	Obs.	Mean	St.dev.	min	max
non-pensioners	1870	0.068	0.009	0.015	0.076
pensioners	781	0.048	0.013	0.013	0.076
Total	2651	0.062	0.014	0.013	0.076

Depression

The effect of sandwich caregiving on depression in our data is negative but not pronounced. The average *ME* is –0.9 p.p. varying in the range [–2.1; –0.04] p.p. The density plot of the marginal effect is close to normal (fig. 9). In general, our results are in accord with recent studies indicating that SGCs have nearly the same depression risk as non-SGCs (Loomis, Booth, 1995, Williams 2004). As we note in the discussion of the marginal effect of sandwich caregiving on self-assessed health, the psychological burden and strain induced by caregiving could be compensated by a sense of accomplishment, social approval and enhanced intergenerational relationships. The positive effect of care could be more pronounced in Russia as there are strong stereotypes and traditions of informal family care.

With age, the absolute magnitude of the effect slightly increases. Fig. 10 shows the non-parametric regression of ME on the age of respondent. This relationship may partly be explained by the fact that older individuals are less likely to recognize depression in comparison with younger ones (Connery, Davidson, 2006; Polenick, Martire, 2013). Another possible explanation for this is that younger females could experience more strain due to stronger conflict between family and work. Finally, older females could have more traditional views on care that allow them to adapt to the situation more easily.

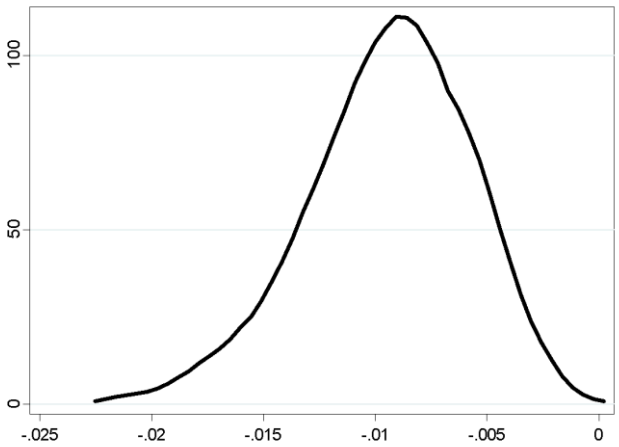

Fig. 9. Density of ME_i on *depression*

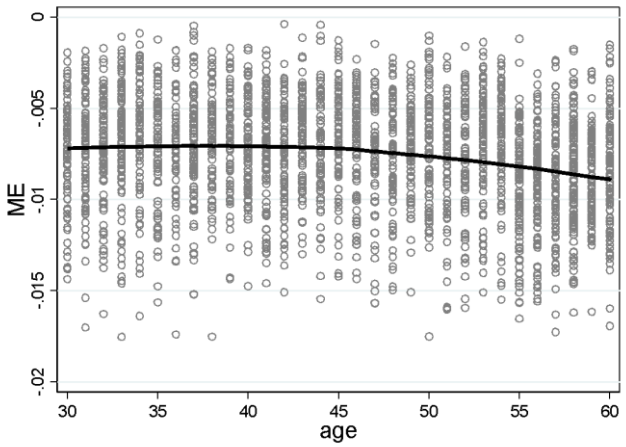

Fig. 10. Nonparametric regression of ME_i on *depression* on age.

5.3. Results. Life satisfaction

How does sandwich caregiving affect life satisfaction? The answers are divided into 3 categories according to the results of the answer to the question "How satisfied are you with your life in general at the present time?" (see Table A1 in Appendix). The answers were distributed as follows:

Satisfied (45.5%); *Dissatisfied* (27.4%); *Neutral* (27.1%).

An interesting effect is observed: sandwich caregiving has a positive effect on the "satisfied" response (mean ME +0.84 p.p.) and on "neutral" (mean ME +1.53 p.p.) but negatively on "dissatisfied" (mean ME –2.01 p.p.). Thus, on average, satisfaction with life slightly increases. Kernel density estimates of the density of the marginal effect of sandwich caregiving on these three categories are presented in Fig. 11a,b. Descriptive statistics of the ME_i for the gradation of life satisfaction are presented in Table 9.

These results reflect those of (Künemund, 2006; Daatland at al., 2010) who also found that sandwich care is positively related to general life satisfaction.

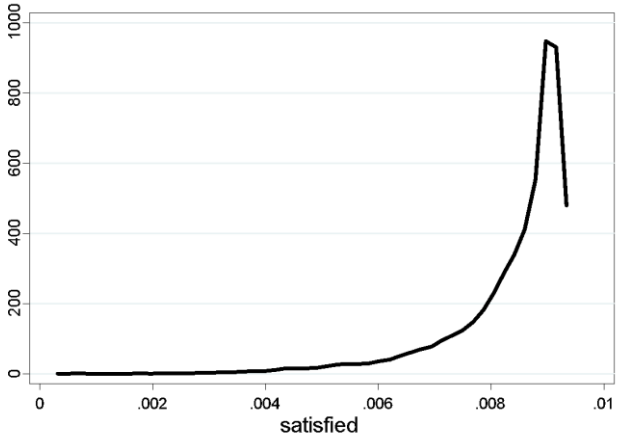

Fig. 11a. Density of ME_i on *satisfied*

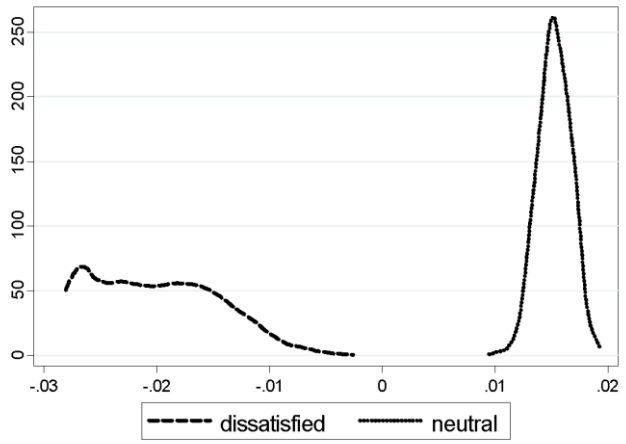

Fig. 11b. Density of ME_i on *dissatisfied* and *neutral*

Таблица 9. Descriptive statistics of the ME_i for the gradation of life satisfaction

	Mean	St.dev.	min	max
Satisfied	0.84%	0.11%	0.05%	0.0092
Dissatisfied	–2.01%	0.56%	–2.81%	–0.0026
Neutral	1.53%	0.15%	0.95%	1.93%

6. Conclusions and discussion

In the current study we test if sandwich caregiving is associated with the health behavior, physical and emotional health and life satisfaction of Russian women using nationally representative data of the 25th wave of Russia Longitudinal Monitoring Survey (RLMS-HSE). We found mixed results — sandwich caregiving negatively affects some aspects of women's health, health behavior and well-being while it has no effect or even positive effect for other aspects.

SGC are less likely to get medical check-ups (*ME*=–7.0 p.p.) and have regular meals (*ME*=–10.1p.p.). It is plausible that those who care for two generations are overtaxed with care responsibilities, experience constant time pressure and are less likely to take care of themselves and their health. The effects are more pronounced for employed than for unemployed females (ME=–8.4p.p. and ME=–11.5 p.p. respectively). These findings should not be surprising given that, in comparison with non-employed SGCs, employed SGCs are particularly overwhelmed — along with care responsibilities they have job obligations.

Sandwich caregiving could reduce risks of some negative health behaviors, however. We found that regular alcohol consumption and smoking are less prevalent among SGCs than among non-SGCs (*ME*=–1.3 p.p. and *ME*=–5.0 p.p. respectively). A possible explanation is that SGCs tend to reduce their own risky behaviors in order to preserve not only their own health, but the health of those they are caring for (for example, to protect them from second-hand smoke).

Our results provide some evidence of a negative effect of sandwich caregiving on women's health. In particular, caring for two generations simultaneously is strongly associated with a higher probability of being overweight (*ME*=6.2 p.p.). This finding corresponds with our conclusions on the health behaviors of SGCs. As shown above, SGCs are less likely to have healthy eating behaviors and this could negatively influence their weight. The damaging effect of being overweight for SGCs is less pronounced for pensioners (ME=4.8 p.p.). This could be partially attributed to the base effect. On average pensioners are older than non-pensioners, and the proportion of overweight women significantly increases with age in Russia. We did not find a negative effect of sandwich caregiving on the other considered health indicators.

Furthermore, our results showed that SGCs are more likely to have good health (*ME*=10.6 p.p, 12.1 p.p. for non-pensioners), less likely to have chronic conditions (*ME*=–2.7 p.p., 3.2 p.p. for non-pensioners), and less experience of depression although, the effect diminishes with age (*ME*=–0.9 p.p.). The beneficial effects of sandwich caregiving on health can be partially attributed to the fact that SGCs tend to pay less attention to their own health and their health problems could be underdiagnosed, especially if SCGs are employed. Also there could be a self-selection effect: if there are several siblings, than one with worst health is less likely to care on elderly relatives. Additionally, caring for relatives may have positive emotional and psychological effects on caregivers (social recognition, strengthening intergenerational ties, a sense of accomplishment). These effects could be positively correlated with the self-assessed physical and emotional health status of SGCs. Although our results suggest that the effect of sandwich caregiving on women's current health status is mixed (mostly positive), the dual care burden could damage their health in the future as it negatively affects women's current health behaviors.

With respect to subjective well-being, we found a positive impact of sandwich caregiving on life satisfaction of women: among SGCs the share of those satisfied with life is higher (*ME*=+0.8 p.p.) and the share of those dissatisfied with life is lower than among non-SGCs (*ME*=–2.0 p.p.). Similarly, the positive effect of sandwich caregiving on women's life satisfaction could be associated with positive emotional and psychological effects of caregiving.

Thus the results of our study provide some evidence for the negative effect of sandwich caregiving on health and health behavior of women in Russia. Due to demographic trends, the demand for informal care for elderly relatives in Russia is expected to grow in the future. This will lead to an increase in the care burden on middle-aged children, especially daughters, and consequently to an increase in the share of female SGCs in society. The problems of middle-age women's health related to high levels of caregiving burdens are going to be more and more pronounced and could be considered as a risk to public health.

Currently, Russian social policy provides very little help for SGCs. There is no doubt that people experiencing excessive family care burdens are in dire need of comprehensive social support. One of the key areas of such support is the social policy for families with children. In particular, it is necessary to expand the forms and increase the flexibility of formal childcare services. SGCs are in need of elderly care support as well. At present, in Russia, social support for caregivers for the elderly and disabled is very limited. It is necessary to develop and implement an effective long-term care system that combines various types of formal care services,

as well as specialized support measures for informal caregivers (measures aimed at maintaining employment, social benefits for caregivers, training in care skills, psychological support, counseling support, etc.).

This study makes a contribution to the caregiving literature, as little is known about the health and well-being of sandwich generation in Russia. Using nationally representative microdata allowed us to conduct a quantitative study and formulate conclusions on the national level. We consider a wide range of indicators of health and well-being, thus providing an overview of the situation of SGCs. Additionally we analyze the effect of sandwich caregiving on health behavior, continuing and extending the research (Chassin et al., 2010), that is to our knowledge the only study of health behavior of SGCs. In comparison to (Kartseva, 2021) we excluded men from the sample, as it is not common for men to provide informal care in Russia (especially intensive care).

The study has several limitations. The effect of informal caregiving on health could vary with care intensity. The more intensive the care the larger the negative effect on the health and well-being of the caregiver (Bremer et al., 2015; Kumagai, 2017; Bom et al., 2019). However, our data do not allow us to account for care intensity. RLMS-HSE does not ask caregivers about hours of care or about care responsibilities or about the duration of care. An additional potential limitation of the data is missed covariates in the regression analysis. For example, having parents alive, having siblings, parents' age and health, the distance to parents' place of living could affect both the probability and the intensity of informal caregiving.

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Competing interests
The authors declare no competing interests.

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Appendix

Table A1. Health, health behavior and well-being outcomes

Outcome	Description from the survey questionnaire
	Health
Good health	Self-assessed general health (5-point scale): very bad, bad, average, good, very good. Dummy for self-assessed good health equals 1 if self-assessed health is very good or good.
Chronic condition	Self-assessed presence of at least one chronic condition from the list of 18 kinds of chronic illnesses (self-assessed).
Overweight	From the self-assessed height and weight the body mass index (BMI) was calculated, Dummy for being overweight equals 1 if BMI is 25 and above.
Depression	Dummy for depression or serious nervous disorder. Equals 1 if an individual had depression or serious nervous disorder in the 12 months preceding the survey.
	Health behavior
Medical checkup	Dummy for getting a medical checkup. Equals 1 if an individual has seen a doctor for a medical checkup in the 3 months preceding the survey.
Regular meal	Equals 1 if an individual agrees or mostly agrees with the statement that she "always has meals regularly but no more than 3 times a day".(check in RLMS)
Smoking	Equals 1 if an individual smokes.
Alcohol	Dummy for the regular alcohol consumption, equals 1 if an individual consumed alcoholic beverages at least 2–3 times a week in the 30 days preceding the survey.
	Well-being
	Self-assessed life satisfaction with her life in general at the time of the survey. (5-point scale): (1) not at all satisfied, (2) less than satisfied, (3) both yes and no, (4) rather satisfied, (5) fully satisfied.
Satisfied	Equals 1 if self-assessed life satisfaction is (1) or (2).
Dissatisfied	Equals 1 if self-assessed life satisfaction is (4) or (5).
Neutral	Equals 1 if self-assessed life satisfaction is (3).