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More GP contacts and poorer health of informal caregivers with low socioeconomic status in Germany: results from the population-based DEGS1 and the cross-sectional GPCare-1 study

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ABSTRACT

Objectives Informal caregivers are known to have poorer mental health. Risk factors for caregiver burden include low education, female gender, cohabitation with the care recipient and lack of resources. General practitioners (GPs) have an important role in supporting caregivers. Drawing on data from two surveys, associations between caregivers' socioeconomic status (SES), psychophysical health and GP contacts are analysed.

Design Cross-sectional study. The study draws on data from two surveys (German Health Interview and Examination Survey for Adults, DEGS1 and General Practice Care-1, GPCare-1).

Setting Germany.

Participants DEGS1: German general population (18+ years) n=7987. GPCare-1: general practice patients (18+ years) n=813.

Primary outcome Psychophysical health, GP contacts and communication.

Methods Using representative DEGS1 data, the prevalence of informal caregivers, caregivers' burden, chronic stress, various health conditions and frequency of GP contacts were evaluated stratified by SES. Data from the GPCare-1 study addressed caregivers' experiences and communication preferences with GPs.

Results In the DEGS1, the prevalence of caregivers was 6.5%. Compared with non-caregivers, caregivers scored significantly higher for chronic stress (15.45 vs 11.90), self-reported poor health (37.6% vs 23.7%) and GP visits last year (3.95 vs 3.11), while lifestyle and chronic diseases were similar. Compared with caregivers with medium/high SES, those with low SES had a significantly lower prevalence of high/medium caregiver burden (47.9% vs 67.7%) but poorer self-reported health (56.9% vs 33.0%), while other characteristics did not differ. In the GPCare-1 study, the prevalence of caregivers was 12.6%. The majority of them felt that their GP takes their problems seriously (63.6%) without difference by SES.

Conclusion Caregivers with low SES constitute an especially high-risk group for psychological strain, requiring special GP attention to support their needs.

Strengths and limitations of this study

► This study determined the prevalence of informal caregivers using data from a representative population-based survey.
► The cross-sectional nature of both data sets did not allow for the analyses of cause-and-effect relationships.
► Informal caregivers with low socioeconomic status were newly outlined as a risk group for poorer health outcomes.
► The COVID-19 pandemic impaired recruitment as unnecessary general practitioners visits were avoided which was compensated by an extension of the data collection period.

INTRODUCTION

In recent years, family and other informal caregivers (CGs) have been identified as a vulnerable group with poorer subjective health, higher stress and higher prevalence of various risk factors and chronic diseases.[1–3] Studies have shown that they are at higher risk for adverse mental outcomes including depressive symptoms and depression.[2 4] Moreover, CGs were shown to have deficits in healthy lifestyle, such as smoking, alcohol consumption and physical inactivity.[2] In some studies, lower self-care behaviour and the risk for social isolation were reported.[5]

In line with studies from other countries, a German study of 2944 participants in need of care and their CGs showed that approximately 83% of CGs feel rather strongly or very strongly overburdened by their task.[6] The level of CGs' psychological strain is influenced by various factors. For example, strain is higher when caring for a relative with dementia.[7] Additional risk factors for high

CG burden include female gender, low education, cohabitation with the care recipient, high number of hours of care, social isolation, less coping strategies, financial stress and lack of choice in being a caregiver.[1 5 8–10] As multifactorial intervention strategies were shown to provide support,[11 12] informal CGs need to be identified. Yet, the mere identification can be a challenge, as not all CGs describe themselves as caregivers, but define themselves primarily in relation to the person they care for.[13] Therefore, CGs are also called 'hidden patients'.[13] Due to their knowledge of family settings, general practitioners (GPs) play an important role in identifying and supporting CGs,[14] yet non-detection might be increased by GPs' hesitancy to address social and economic factors, although these are known to be essential determinants of health status.[15]

In general, the relationship between socioeconomic status (SES) and health is well described in national and international studies. In Germany, the difference in life expectancy between people with low and high SES is 5–10 years.[16] While correlations between education, income, health status and mortality were studied in various populations,[17 18] few studies address the role of SES or income and health outcomes in CGs.[19 20] In a population-based Brazilian study with 176 elderly, Neri *et al*[21] showed a strong inverse correlation between family income and depressive symptoms of CGs.[21] A cross-sectional US study of 246 CGs for dementia patients showed a relation between CGs' SES, subjective CG burden and the number of hours spent caring[19]; the wealthier and higher educated CGs showed significantly higher subjective burden despite fewer hours of caregiving.[19] A cross-sectional Japanese study of 21 584 functionally independent adults aged ≥65 years showed that 8.3% had caregiving duties: compared with the highest income group, the lowest income group was at least twice as often engaged in caregiving hours ≥36 hours per week.[22] The risk for depressive symptoms was elevated across income groups in this study, while other studies suggest that CGs with low SES are more likely to suffer from depression.[23] In addition, reduced access to and use of professional care services was reported from some countries.[24 25]

The study aims to describe the relationship between CGs' SES, psychophysical health and GP contacts. Additionally, data are used to address patients' experiences and communication preferences with their GP on caregiving.

METHODS
Study design
The study draws on data from two studies. First, data from the German Health Interview and Examination Survey for Adults (DESG1) were used to describe the prevalence of CGs, degrees of CGs' burden, chronic stress, various health conditions and frequency of GP contacts for the total population and stratified by SES (dataset 1). Second, data from the General Practice Care-1 (GPCare-1) study addressed CGs' experiences and communication

preferences with their GP (dataset 2). We analysed two data sets to describe informal CGs' GP contacts quantitatively (number of GP visits) and qualitatively (patients' communication experiences with GPs). Using data from the national representative DEGS1, we hypothesised that informal care givers have a poorer psychophysical health and a higher prevalence of GP visits. Additional data from the GPCare-1 exploratively investigated communication experiences of patients with informal caregiving.

Dataset 1: representative DEGS1
The DEGS1 was carried out by the Robert Koch Institute (RKI) from 2008 to 2011 and is part of the German health monitoring system. It is representative for the German general adult population.[26] Details about the design and concept are published elsewhere.[26–28]

The survey incorporated self-administered questionnaires, standardised computer-assisted personal interviews and examinations, laboratory analyses as well as tests of physical and cognitive function.[28–31] The target population was German residents between 18 and 79 years and consisted of 7987 adult participants. Datasets of the DEGS1 are available for public use on request. To allow for representative conclusions regarding the German adult population, data are adjusted using survey-specific weighting factors.[27 28 31]

DEGS1 variables: sociodemographic, health and CG characteristics
Sociodemographic parameters: the following items were used for analysis:

► Age, gender, marital status (married, single, divorced, widowed), number of persons in household.
► To calculate the multidimensional SES index (SES index) in three categories (low/middle/high), information on the highest level of education, job and monthly income were used. This categorisation is based on the international classification 'Comparative Analyses of Social Mobility in Industrial Nations.'[32 33]

Health, health behaviour and health utilisation parameters: The following items were used for the analysis:

► Participants' subjective health status had been obtained using a 5-point Likert Scale (very good health to very poor health); for this analysis, data were dichotomised (very good/good health vs middle/poor/very poor health).
► Self-reported chronic disease (at least one), history of physician-diagnosed depression, current therapy for depression, current depressive symptoms (Patient Health Questionnaire-2 (PHQ-2]; categorised)[34] and obesity.
► The following health behaviours were requested: smoking, risky consumption of alcohol; sport activity as number of hours per week (no sport, <2 hours, 2–4 hours, more than 4 hours).
► Chronic stress had been measured with the Strategies for Coping with Stress Scale (SCSS; score from 1 to 48), which was categorised as follows: 1–11=low stress, 12–22=middle stress, >22 = high stress. The

subgroups were calculated following the original DEGS1 approach.[35]

► Number of GP visits during the past 12 months.

Parameters addressing CGs and CGs' burden: The following items were used:

► Participants' information if they are informal CGs.
► If yes: participants were asked about the associated burden categorised in five levels (no burden, little burden, medium burden, high burden and very high burden); for this analysis, this was dichotomised into none/little/medium burden and strong/very strong burden.

Dataset 2: GPCare-1 study in GP practices addressing patients' experiences and communication preferences with their GP

Practice and patient recruitment and involvement

Practices of the teaching practice network of the Institute of General Practice and Family Medicine of the University of Bonn, Bonn, Germany, were asked for participation between June and August 2020. Based on population data for practice locations from the statistical state offices of North Rhine-Westphalia and Rhineland-Palatinate, selected sampling was used to ensure that participants of different age, income categories, education levels and migration background were included.

The two-sided questionnaire was made available in four languages (German, English, Turkish, Arabic) and included a study information addressing the study aim, voluntary participation, data management and the anonymity of the survey. The questionnaire was pretested with 40 volunteers from the general population with subsequent minor adjustments. Practice staff and—if wished by the practice—study personnel informed patients about the study. Patients were asked to fill the questionnaire in the waiting room prior to their GP appointment. Once filled, they sealed the questionnaire in an envelope and placed it in a study letter box in the practice. Those not able or willing to fill the questionnaire in the practice, could use the same envelope for a cost-free mail to the study centre at the institute. Patients were eligible to participate when they were at least 18 years old, physically and mentally able to fill the questionnaire, and visited the practice during the time of recruitment.

GPCare-1 study: questionnaire development

In line with the DEGS1, items for sociodemographic, health and CG characteristics were used similarly in the questionnaire. Additional questions addressed patients' experiences with their GP and communication preferences. To shorten the questionnaire, some items from the DEGS1 were simplified according to categories used in the analysis of the DEGS1 data.

In detail:

► Age and relationship status were requested identical to the DEGS1.
► The third gender was added as answer option.
► Education was requested in three categories (no school education/ secondary school up to 9th/up to 10th grade, high school (A-levels)/vocational school and university degree).
► Income was requested identical to the DEGS1 asking participants to indicate their household net income.
► As in the DEGS1, the PHQ-2 was used to measure depressive symptoms.
► The health status during the past 4 weeks was assessed using the first question from the Short Form 8-Item Health Survey.

The following items were requested in addition:

Number of years with their current GP (<1 year, 1–2 years, 3–5 years and more than 5 years).

Details addressing the physician–patient communication were obtained using eight self-developed statements (5-point Likert scale: strongly agree to strongly disagree), which concerned the current situation and wishes of patients regarding their communication with the GP.

Prior to the study, the questionnaire was piloted in 40 persons from the general population and was found suitable with minor adjustments.

Statistical analysis

Statistical analyses were performed using the software SPSS V.26. All analyses of the DEGS1 data were weighted using the survey-specific weighting factor based on age, gender, region of residence, level of education, community class and nationality provided by the RKI, to allow for estimates representative of the German population.

Frequency distributions and descriptive estimates were inspected for the entire population. Comparison of the subpopulations of CGs and non-CGs, as well as caregivers stratified by low vs middle/high SES were conducted through χ^2 tests for categorical as well as a comparison of the means through t-tests for numerical data. The same approach was used for comparison of the employment situation of CGs with high burden, stratified by SES. All dataset fulfilled the necessary assumptions of these tests.

Multiple linear regression analysis was conducted to estimate how caregiving status and SES are associated with the number of GP contacts, the covariates age, sex and depressive symptoms were included. In order to fulfil all statistical requirements, 92 outliers (1.1%) were excluded from the regression analysis due to extreme values regarding GP contacts (>15).

The data from the GPCare-1 study was analysed using the same approach: following a first description and distribution analysis of the sample, group comparisons were conducted for the subpopulations consisting of CGs and non-CGs. Additionally, χ^2 analysis was used to compare patients' answers regarding their communication preferences stratified by subgroups.

Practice and patients involvement

The GPCare-1 questionnaire was pretested in the four languages with 40 native speakers from the general population. Suggestions were integrated in the final version of the questionnaire. Primary care physicians from the institute were involved in the design and conduct of the study.

Some of the participation researcher had experiences as patients themselves which influence the development of the questionnaire. The teaching practices and patients recruited were not involved in the planning, conduct, reporting or dissemination of this study. Results will be disseminated in scientific context and through patient associations.

RESULTS

Characteristics of the DEGS population

The population of the DEGS1 consisted of 7987 participants. Half of the population were females (50.3%). The mean age of the participants was 47.4 years (95% C: 47.02 to 47.83). The majority of the participants had a middle SES (60.3%). The mean stress level of the total population was 12.11 (95% CI 11.85 to 12.38). The mean number of GPs visits in the last 12 months was 3.19 (95% CI 3.02 to 3.36). The majority of the participants reported their general state of health to be very good/good (74.7%). A total of 546 participants were informal CGs (6.5%) (table 1).

Comparison of informal CGs and non-CGs in the DEGS1 population

Informal CGs were more frequently female than male (63.8% vs 36.2%, p<0.01). No significant difference was found for the SES distribution between CGs and non-caregiver, yet non-caregivers indicated a significantly better health status than caregivers (76.3 vs 62.4%, p<0.001). CGs showed a higher prevalence of having at least one chronic disease (37.1% vs 29.7%, p=0.005), being diagnosed with depression (15.9% vs 11.1% p<0.01) and suffering from obesity (27.8% vs 22.8%, p=0.040). Also, CGs had a significantly higher mean number of GPs' visits than non-CGs (3.95 vs 3.11, p<0.001). For details see table 2.

The linear regression analysis showed an association between the number of GP visits, SES and depressive symptoms that remained significant after adjustment for gender and age (R^2=0.058). Men, older participants and those with currently more depressive symptoms visited their GP more often. However, there was no significant relationship between being a CG and GPs visits (table 3).

When stratified by SES, CGs with low SES reported significantly less CGs' burden than those with middle/high SES (52.1% vs 32.3%, p=0.02) (figure 1). However, compared with CGs with medium/high SES, those with low SES had a higher prevalence of subjective poor health (56.9% vs 33%, p<0.002), were more often in therapy for depression (63,9% vs 25,9%, p<0.05) (figure 1) and showed a higher chronic stress level (16.58 vs 15.21) (table 4). CGs with low SES visited their GP significantly more frequently in the last 12 months (6.08 vs 3.45, p<0.001) (figure 2). Considering the group of CGs with high CG burden, there were no significant differences in employment status and working hours per week between SES groups.

Table 1 DEGS1 participants: sociodemographic and medical characteristics, weighted

	N* (n=7987)	%*
Sex (female)	4198	50.3
Age, mean, CI	47.43	47.02–47.83
Living situation		
Married	5160	62.5
Single	1695	26.2
Divorced/widowed	996	11.4
Persons in household, mean, CI	2.69	2.63–2.74
Living alone	1243	15.8
2 Persons	3495	39.5
3 Persons	1424	19.2
4 Persons	1198	16.8
≥5 Persons	529	8.6
Socioeconomic status		
Low	1238	19.7
Middle	4743	60.3
High	1916	20.0
Caregiving		
Caregivers	546	6.5
Burden of caregiving: (n=529)		
Very high/high burden	138	24.3
Medium burden	203	39.8
Little/no burden	188	36.0
Physical and mental health		
Subjective health very good or good	5815	74.7
Subjective health moderate, poor or very poor	2082	25.3
Has at least one chronic disease	2575	30.5
History of depression	924	11.6
Current symptoms of depression	536	7.7
Chronic stress, mean, CI	12.11	11.85–12.38
Lifestyle		
Smoker	2115	29.8
Risky consumption of alcohol	2517	33.6
Obesity	1702	23.5
Sport activity (hours per week)		
No sport	2524	33.7
<2 hours	3286	40.9
2–4 hours	1203	15.3
>4 hours	727	10.1
GP contacts		
Visited a GP in last 12 months	6231	79.4
No of GP visits in last 12 months, mean, CI	3.19	3.02–3.36

*n or per cent unless noted otherwise.
DEGS1, German Health Interview and Examination Survey for Adults; GP, general practitioner.

Characteristics of the GPCare-1 population

The total population consisted of 813 patients from 12 general practices. The majority of the participants were

Table 2 DEGS1 participants: comparison of sociodemographic and medical characteristics between caregivers and non-caregivers, weighted

	Caregivers		Non-caregivers		
	N* **(n=546)**	**%***	**N*** **(n=7135)**	**%***	**P value**
Sex (female)	375	63.8	3673	49.5	<0.001
Age, mean, CI	52.90	51.19–54.61	46.67	46.25–47.10	<0.001
Living situation					<0.001
Married	403	70.2	4621	61.9	
Single	59	14.1	1606	27.4	
Divorced/widow	83	15.7	863	10.8	
Number of persons in household, mean, CI	2.65	2.51–2.78	2.69	2.63–2.75	0.504
Living alone	70	12.7	1111	15.8	
2 Persons	255	43.2	3132	39.2	
3 Persons	105	21.3	1292	19.2	
4 Persons	79	14.7	1109	17.3	
≥5 Persons	37	8.1	453	8.4	
Socioeconomic status					0.138
Low	89	19.4	1061	18.6	
Middle	353	64.3	4280	60.6	
High	103	16.3	1786	20.8	
Burden of caregiving					
Very high/high burden	138	24,3			
Medium burden	203	39.8			
Little/no burden	188	36.0			
Physical and mental health					
Subjective health very good or good	342	62.4	5342	76.3	<0.001
Subjective health moderate, poor or very poor	201	37.6	1763	23.7	
Has at least one chronic disease	218	37.1	2248	29.7	0.005
History of depression	89	15.9	793	11.1	0.010
Current symptoms of depression	45	6.1	461	7.4	0.488
Stress scale, mean, CI	15.45	14.40–16.50	11.90	11.63–12.16	<0.001
Lifestyle					
Smoker	126	25.0	1925	30.1	0.072
Risky consumption of alcohol	143	27.6	2348	34.0	0.021
Obesity	136	27.8	1494	22.8	0.040
Sport activity					0.052
No sport	193	38.3	2297	33.3	
<2 hours	240	41.9	3000	40.9	
2–4 hours	73	12.3	1118	15.5	
>4 hours	36	7.4	682	10.3	
GP contacts					
Visited a GP in the last 12 months	457	83.4	5682	93.3	0.090
No of GP visits in the last 12 months, mean, CI	3.95	3.20–4.69	3.11	2.95–3.27	<0.001

*n or percent unless noted otherwise.
DEGS1, German Health Interview and Examination Survey for Adults; GP, general practitioner.

Table 3 DEGS1 participants: multiple regression analysis for number of GP visits during the last year

Parameter	Estimate	SE	95% CI	P value
Constant	1.191	0.150	0.896 to 1.486	<0.001
Low SES (Ref. Middle/high SES)	0.535	0.122	0.294 to 0.0776	<0.001
Caregivers (Ref. Non-caregivers)	0.202	0.180	−0.152 to 0.557	0.262
Female (Ref. Male)	−0.314	0.079	−0.470 to −0.158	<0.001
Depressive symptoms	0.403	0.044	0.317 to 0.489	<0.001
Age	0.027	0.003	0.022 to 0.033	<0.001
R^2 Adj.	5.8%			

Dependent variable: number of GP visits during the last year.
DEGS1, German Health Interview and Examination Survey for Adults; GP, general practitioner; SES, socioeconomic status.

female (59.3%) and the mean age was 51.6 years (SD 18.7). As 24.2% of the patients did not report their income, the education level was used to classify SES. The majority of participants had a middle education level (low 32.0%, middle 43.5%, high 24.6%). In the patient population, 12.6% (n=98) were current CGs. For details see table 5.

Differences between CGs and non-CGs from GP practices

CGs differed from non-CGs significantly regarding several characteristics: caregivers were more likely to be female (69.1 vs 57.7%) and in a self-reported medium/poor/very poor state of health (55.7% vs 39.6%, p=0.003). Almost twice as many CGs had a history of depression (caregivers: 25.5%; non-CGs: 13.4%, p=0.002), while current depressive symptoms did not differ between groups (23.9% vs 25.6%, p=0.73). Additionally, the prevalence of high chronic stress measured by the SCSS was almost twice as high among CGs (48.1% vs 27.3%, p<0.001). There was no significant difference in educational level between CGs and non-CGs (p=0.531).

Regarding communication with their GP, about 65% of CGs and non-CGs report that their GP makes them feel comfortable talking about sensitive issues (64.4% vs 66.5%) and asks about their personal strains (53.4% vs 52.9%). Also, in both groups more than 60% felt that their GPs takes their problems very seriously (63.6% vs 72.7%, p=0.211). While the majority in both groups

prefers to be rather asked directly about their personal strains (46.6% vs 40.8% p=0.355), more CGs indicated that they would rather prefer a questionnaire about their personal strains (39.8% vs non-CGs: 26.5%, p=0.035). For details see table 5.

DISCUSSION

In line with the international literature, our analysis of the population-based, representative German DEGS1 data showed that CGs are a population at high risk for adverse mental outcomes: Compared with non-CGs, CGs showed significantly higher prevalence of poor subjective health, high chronic stress, depression and more GP visits during the last year. Focusing on SES, our study is one of the few that identified caregivers with low SES as a very high-risk group when compared with those with medium/high SES: those with low SES reported even poorer subjective health, were more likely to receive therapy for depression and had more GP visits during the last year. Yet, the prevalence of high CG burden was significantly lower in this very high-risk group when compared to those with medium/high SES.

The finding of an inverse relationship of CG burden and SES was also reported in studies from other countries with differing healthcare and social systems. For example, CGs' education (which was used as a surrogate for SES) was associated with higher CG burden but fewer CG hours.[19] One assumption is that individuals with higher SES have less time for caregiving due to their professional obligations. Other possible explanations are differences in coping strategies between SES groups[19] as well as different subjective perceptions of the caregiving burden.[36] A 2020 German online-survey among 1000 CGs showed that about 50% of respondents wished more support.[37] Stratified by SES, working CGs and those with a high education level wished slightly, but significantly more support. In contrast, those living in the same household with the care recipient and those with high household income scored slightly underproportionally.[37] In contrast, our analysis which is based on population-based data showed no association between CG burden and employment when stratified by SES.
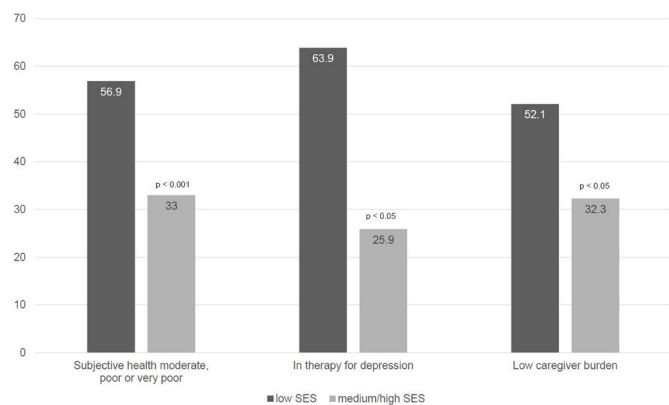

Figure 1 DEGS1: Health status of informal caregivers by SES. SES, socioeconomic status.

Table 4 DEGS1 caregivers: comparison of sociodemographic and medical characteristics between low and middle/high SES, weighted

Variable	Low SES		Middle/high SES		P value
	N*	%*	N*	%	
Sex (female)	6	69.3	310	62.4	0.393
Age, mean, CI	54.38	50.73–58.03	52.54	50.64–54.44	0.255
Living situation					0.042
Married	58	65.8	343	71.2	
Single	8	8.8	51	15.4	
Divorced/widow	23	25.4	60	13.4	
No of persons in household, mean, CI	2.79	2.50–3.07	2.61	2.47–2.75	0.210
Living Alone	12	13.5	58	12.5	
2 Persons	38	35.1	216	45.1	
3 Persons	20	22.0	85	21.1	
4 Persons	12	17.9	67	14.0	
≥5 Persons	7	11.5	30	7.4	
Burden of caregiving					0.022
Very high/high burden	16	22.4	122	24.8	
Medium burden	23	25.5	179	42.9	
Little/No burden	47	52.1	141	32.3	
Physical and mental health					
Subjective health very good or good	39	43.1	302	67.0	0.002
Subjective health moderate, poor or very poor	50	56.9	151	33.0	
Has at least one chronic disease	44	40.8	174	36.1	0.513
History of depression	14	14.6	75	16.2	0.711
Current symptoms of depression	8	10.3	37	7.8	0.513
Stress scale, mean, CI	16.58	13.83–19.32	15.21	14.09–16.32	0.276
Lifestyle					
Smokers	25	32.5	101	23.2	0.100
Risky consumption of alcohol	20	19.6	123	29.5	0.143
Obesity	21	22.9	115	29.0	0.379
Sport activity (hours per week)					0.157
No sport	39	50.1	154	35.5	
<2 hours	33	32.9	206	44.0	
2–4 hours	12	12.1	61	12.4	
>4 hours	5	4.9	31	8.1	
GP contacts					
Visited a GP in the last 12 months	80	88.9	376	82.1	0.283
No of visits in the last 12 months, mean, CI	6.08	3.16–9.01	3.45	2.99–3.90	<0.001

*n or per cent unless noted otherwise.
DEGS1, German Health Interview and Examination Survey for Adults; GP, general practitioner; SES, socioeconomic status.

In line with prior studies, our analysis of the DEGS1 data showed a significant higher prevalence of depression among CGs than non-CGs, yet there was no significant difference when stratified by low vs medium/high SES. This is in contrast to findings from a Brazilian study by Neri et al[21] which showed a higher prevalence of depression among the poorest participants. Differences in the countries' social systems likely play a role: various health, social and financial support structures for care recipients and care givers are available in Germany, for example, nursing insurance is part of the statuary health insurance. In addition, methodological differences may play a role as Neri et al[21] only used income, while the DEGS1 combined various information to calculate SES.[21]
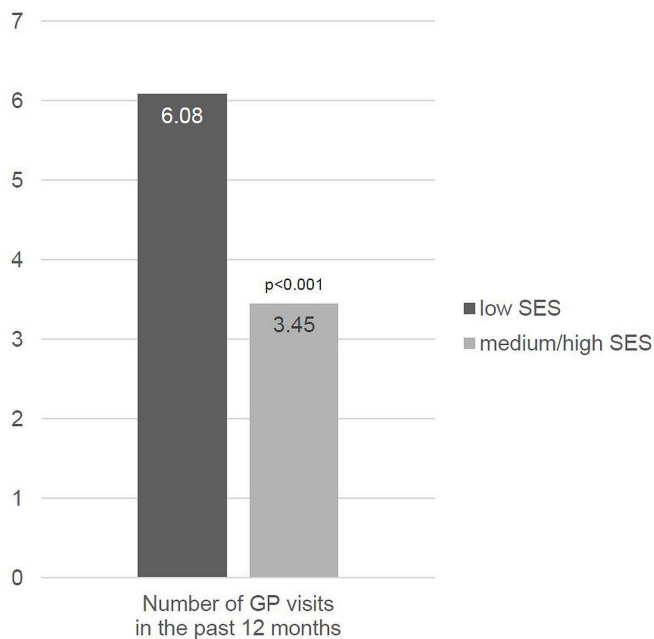
Figure 2 DEGS1: Number of GP visits of caregivers with low versus medium/high SES. GP, general practitioner; SES, socioeconomic status.

In addition to the higher prevalence of depression, CGs in the DEGS1 showed significantly higher rates of chronic stress and having at least one chronic disease compared with non-CGs. These findings are in line with other studies, yet it is important to note that a long held narrative that this psychological strain is linked to poorer health and increased mortality is not supported by several prospective studies.[36 38 39] Based on more than 3500 US family CGs, the REGARDS (Reason for Geographic and Racial Differences in Stroke) study showed that CGs had a 16.5% lower mortality than non-CGs (HR 0.83) after a 7-year follow-up.[40] Depressive symptoms and perceived high strain were associated with higher mortality in non-CGs, but not in CGs.[40] These findings led to the 'stress-buffering hypothesis' of caregiving[40] which suggests that caregiving is similar to other prosocial helping activities which ameliorate the adverse impact of other factors on mortality.

While findings on psychological well-being are consistent between studies, contradictory results are reported with regard to health behaviour of CGs. In the DEGS1, caregivers were significantly less likely than non-CGs to engage in risky drinking. Beesley *et al*[11] studied CGs of 101 women with ovarian cancer and showed that more than half of the CGs experienced negative lifestyle and weight changes after becoming a caregiver.[41] Similarly, our findings indicate that CGs had a higher prevalence of obesity which could be explained by the inability to maintain healthy habits as a consequence of the emotional and physical demands imposed by their caregiving duties.

According to the DEGS1 data, over 80% of CGss and non-CGs visited a GP during the last year. While bivariate analyses of the DEGS1 data showed that caregivers

had significantly more GP visits during the last year than non-caregivers, no significant relationship was found in the regression model after adjusting for gender, age and depressive symptoms. Interestingly, caregivers with low SES had a significantly higher prevalence of current therapy for depression which indicates that GPs offer support. This is in line with results of our GPCare-1 study: more than 50% of patients reported that their GP asks for their personal strains, and more than 60% reported that their GP makes them feel comfortable in discussing sensitive issues and then they felt to be taken seriously. This is of utmost importance as GPs have the opportunity to address the burden of caregiving and help to prevent adverse mental outcomes by providing emotional support and access to supportive services, for example, various CG support approaches offered by the German statutory nursing insurances. Although the majority of patients wished to talk to their GP directly, more CGs than non-CGs indicated to accept a questionnaire to address their strain. This new finding warrants further studies to be understood more in detail.

Strengths and limitations

First, it is noteworthy that the population-based nature of the DEGS1 is a strength as it allows for the description of CGs on a population base, that is, irrespective of specific caregiving disease contexts and potential selection biases as in many other studies. Second, the additional GPCare-1 study complements these data with information on patients' communication preferences. Limitations are the lack of details on care situations such as the amount of care needed, the emotional relationship between CGs and recipients, and the conditions requiring care. Furthermore, the cross-sectional nature of both surveys does not allow for the analysis of cause-and-effect relationships regarding depression and caregiving which requires prospective studies. And last, within the GPCare-1 study, education rather than SES as in the DEGS1 was used because of about 20% missing data on household income. Unexpectedly, the COVID-19 pandemic impaired recruitment as unnecessary GP visits were avoided by patients, which was compensated by an extension of the data collection period.

CONCLUSION AND PERSPECTIVES

It is important for GPs to be aware that CGs' are at increased risk for adverse mental outcomes. Our study identified CGs with low SES as a very high-risk group when compared with those with medium/high SES which was irrespective of employment. When asked for communication preferences, more CGs wished to be personally addressed by their GP rather than fill a questionnaire on their condition yet filling a questionnaire was accepted by more than one-third of patients with caregiving responsibilities. It is important for GPs to be aware that CGs' are at increased risk for adverse mental health outcomes. Our study identified CGs with low SES

Table 5 GPCare-1 study: characteristics of total population and comparison between caregivers and non-caregivers

Variable	Total sample N=813	%	Caregivers N=98	%	Non-caregivers N=680	%	P value
Sex (female)	474	59.3	67	69.1	388	57.7	0.034
Age, mean, SD	51.61 (18.67)		55.40 (15.95)		50.43 (18.71)		0.013
Low education	247	32.0	30	34.1	206	31.3	0.531
Medium education	336	43.5	40	45.5	281	42.7	
High education	190	24.6	18	20.5	171	26.0	
Living situation							
Household size (mean/SD)	2.46 (1.38)		2.69 (1.15)		2.45 (1.41)		0.108
Living alone	166	21.4	8	8.5	150	22.8	0.001
2 Person	343	44.2	43	45.7	286	43.5	
3 Person	112	14.4	24	25.5	87	13.2	
4 Person	98	12.6	10	10.6	87	13.2	
≥5 Person	57	7.3	9	9.6	47	7.2	
Years as patient in GP practice (mean/SD)	3.37 (0.99)		3.43 (0.97)		3.35 (1.00)		0.438
Physical and mental health							
Subjective general health: excellent/very good/ good	460	58.0	43	44.3	405	60.4	0.003
Subjective general health moderate/bad/very bad	333	41.0	54	55.7	265	39.6	
Being diagnosed with depression	116	15.0	25	25.5	87	13.4	0.002
Depressive symptoms	184	25.7	21	23.9	156	25.6	0.730
SCSS-score, mean, SD	17.01 (10.43)		21.07 (9.722)		16.49 (10.40)		<0.001
High chronic stress	205	29.8	39	48.1	160	27.3	<0.001
Medium chronic stress	260	37.8	28	34.6	224	38.2	
Low chronic stress	223	32,4	14	17.3	202	34.5	
Financial problems							
Ever experienced financial problems/debts	235	31.0	32	35.2	196	30.5	0.366
Burdened by financial problems/debts	58	24.7	8	25.0	50	25.5	0.951
Communication preferences:							
My doctor asks me about stress caused by personal strains	392	53.3	47	53.4	328	52.9	0.996
My doctor gives me enough space to describe personal strains	456	62.3	52	58.4	388	62.9	0.715
My doctor makes me feel comfortable talking about sensitive things	478	66.4	56	64.4	405	66.5	0.566
I get the feeling that my doctor takes my problems very seriously	529	71.6	56	63.6	452	72.7	0.211
I rather overcome personal strain without help from my doctor	381	52.5	48	55.8	314	51.1	0.630
Discussing personal strains with my doctor makes me feel uncomfortable	247	34.1	32	36.4	202	33.0	0.641
I would prefer my doctor to ask me directly about personal strains	310	42.7	41	46.6	250	40.8	0.355
I would prefer the doctor to give me a questionnaire regarding my personal strains	210	29.0	35	39.8	162	26.5	0.035

n or per cent unless noted otherwise.
GP, general practitioner; GPCare-1, General Practice Care-1 study; SCSS, Strategies for Coping with Stress Scale.

as a very high-risk group when compared with those with medium/high SES which was irrespective of employment. Given the high psychosocial burden associated with informal caregiving, a respective screening in GP practices should be implemented. In ageing societies such as Germany, additional formal and informal

support networks may be required to better support informal CGs.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval The DEGS1 survey had been approved by the Charité Universitätsmedizin Berlin Ethics' Committee (No. EA2/047/08). Participants provided written informed consent before the interview and examination. The Ethics Committee of the Medical Faculty of the University of Bonn provided ethical approval for the GPCare-1 primary data collection in June, 2020 (No. 215/20). The GP patient study was registered in the German Clinical Trials Register (DRKS00022330). Patients received information on study procedures, confidentiality, anonymity, and were informed that participation was voluntary both verbally and in writing. Thus, no formal written consent was required as the return of the anonymous questionnaire indicated informed consent from the patient for their data to be used in the study.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request. The DEGS1 data set is available on application to scientists as an anonymised dataset for secondary data analyses at the Robert Koch Institute (RKI). For further information contact datennutzung@rki.de. The GPCare-1 data are available on reasonable request to the Institute of General Practice and Family Medicine of the University of Bonn, Germany.

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