



Development of gender inequality in self-rated health in the life-phase of raising children in Germany from 1994 to 2018 – A decomposition analysis of socioeconomic, psychosocial and family-related influencing factors

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ABSTRACT

Extensive research has documented gender inequalities in self-rated health (SRH) to the disadvantage of women. However, little research has been done on how this gender gap has changed against the backdrop of social change. Using data from the German Socio-Economic Panel Study (GSOEP), this study addressed this issue and examined time-trends in SRH between 1994 and 2018 in women ($n = 117,608$) and men ($n = 101,404$) aged 30–49 years. In addition, we analyzed the role of socioeconomic, psychosocial and family-related factors as possible mediators influencing these trends. We performed logistic regression analyses for analyzing the time-trends and applied the Karlson-Holm-Breen (KHB) method for decomposing the time effect into direct and indirect parts via mediators.

Over time, the chance of reporting good as well as poor SRH remained largely stable in both genders while the majority of socioeconomic and psychosocial factors pointed towards improvement. The decomposition analysis revealed a positive effect of most of these mediators on the time trend in SRH. After controlling for the mediators, the health trend became negative, leading to a decline in the proportion of good health over time by 5.4%-point and 4.3%-point in women and men, respectively. The same pattern was observed with respect to poor SRH. For both genders, the decline of economic worries and the rise in school education contributed most to the indirect time effect.

Our findings indicate a positive development of key socioeconomic and psychosocial health determinants particularly for women, but no corresponding increase in SRH. Thus, gender inequality in SRH remained largely unchanged. However, our results suggest that SRH would have developed much worse if there had been no improvements in the health determinants considered. Further studies are needed to determine what other factors may have counteracted a positive health trend and stood in the way of narrowing the gender health gap.

1. Introduction

While men suffer earlier and more frequently life-threatening diseases such as ischaemic heart disease and lung cancer (Allel et al., 2021; Lampert et al., 2018), women are more affected by health impairments and disabilities (Cabezas-Rodríguez et al., 2021; King et al., 2018; Sperlich et al., 2019). In order to explain these health disparities between women and men, it has become established to distinguish between the biological category ‘sex’ and the socio-cultural dimension of ‘gender’ (Mauvais-Jarvis et al., 2020; Regitz-Zagrosek, 2018). While ‘sex’ refers to all genetic, anatomical, physiological, and hormonal

characteristics, the term ‘gender’ describes socio-cultural differences between men and women based on different gender roles and social living conditions. The influences of sex and gender on health interact throughout the life course (Kautzky-Willer, 2014). From a gender-point of view, women compared to men report poorer health as they are structurally disadvantaged and more affected by psychosocial stress due to gender-specific role requirements (Geißler, 2014; Hapke et al., 2013).

The lives of women have changed dramatically in the last decades, which becomes particularly evident in the life-phase of child-raising. Today, young women in Germany are more likely to achieve high school-leaving qualifications as compared to their male counterparts,

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whereas the reverse was true in the past (Autorengruppe Bildungsberichterstattung, 2020). Many studies have demonstrated the positive associations between educational attainment and self-rated health (SRH) (Bartley et al., 2000; Valverde et al., 2021; Vandenheede et al., 2015). Given these health-promoting effects, gains in educational attainment over time might have altered gender health inequalities in favor of women. The rise in female educational qualifications has been accompanied by an increase in female employment (Geißler, 2014). The once-dominant role of women as homemakers has changed in favor of a dual earner while they still predominantly bear the main responsibility for the household and family care (McDonough et al., 2013). According to the ‘multiple role attachment hypothesis’, multiple roles enable attachment to broader networks, which provide social support and resources that enhance health (Barnett & Hyde, 2001). In accordance with this assumption, studies suggest that employed women, regardless of being mothers or childless, reported better SRH as compared to their non-employed counterparts (Fokkema, 2002; McMunn et al., 2006; von der Lippe & Rattay, 2016). Therefore, it can be assumed that also the increase in female employment rates had a positive effect on women’s health.

The majority of previous studies indicate a positive temporal trend for self-reported health measures in terms of SRH, functional health and health-related quality of life (Ellert & Kurth, 2013; Gheorghie et al., 2016; Pöld et al., 2016; Sperlich et al., 2019; Sundberg et al., 2016; Trachte et al., 2015). The few studies employing a gender-sensitive approach yielded ambiguous findings. While some suggest a decrease in gender differences in SRH in favor of women (Aguilar-Palacio et al., 2018; Cummings & Braboy Jackson, 2008; Pöld et al., 2016; Sperlich et al., 2019; Volken et al., 2017), others found no evidence for a narrowing of the gender gap (Galenkamp et al., 2013; Johansson et al., 2015; Pinillos-Franco & García-Prieto, 2017). In addition, recent findings suggest that health improvements are more visible among older individuals whereas hardly any change could be found for younger ages (Clause-Verdreau et al., 2019; Greaney et al., 2019; Sperlich et al., 2019; Wolff et al., 2017). These findings point to the importance of an age-differentiated consideration of health trends. From a gender perspective, the middle age with the focus on raising children is of special importance as differences in role requirements between women and men become particularly visible in this life phase.

So far, studies on the health consequences of social change and their impact on the gender health gap are rare. The study by Hill and Needham (Hill & Needham, 2006) established that women’s health status has more steadily improved as compared to that of men. They attributed this trend primarily to women’s rise of high educational qualifications. With respect to changes in the working life, Corin et al. found only small, mainly positive changes in job demands over time (Corin et al., 2021). By contrast, the studies by Rigó et al. (Rigó et al., 2021) and Wolff et al. (Wolff et al., 2017) pointed to increasing work-related stress. However, as these studies are mostly lacking of a gender-sensitive approach, they do not allow any conclusions to be drawn about the impact of changing working conditions on gender inequalities in health. Given the research focus on paid work (Ophir & Polos, 2021), particularly little is known about how the distress related to unpaid household and family work has changed over time and impacted the health of women and men. We are not aware of any studies that have analyzed temporal trends in gender health inequality in Germany in the life-phase of child-raising.

To address this gap, we first analyzed the development of gender differences in SRH between 1994 and 2018 among individuals aged 30–49 years. To do this, we compared this age group over five time-periods using a population-based approach. In a second step, we examined, separately for women and men, changes over time in socioeconomic, psychosocial and family-related factors as possible mediators of the observed health trends. In a final step, we decomposed the total time effect on SRH into a direct and an indirect effect (via the mediators) and disentangled the contribution of each mediator.

2. Methods

2.1. Data source

The analyses are based on data from the German Socio-Economic Panel (GSOEP V.31), conducted by the German Institute for Economic Research. The GSOEP is a representative annual survey of German individuals aged 18 and older in private households that started in 1984 (Goebel et al., 2019). Data were collected by face-to-face interviews using different questionnaires for individuals, households or specific subgroups. The GSOEP population is updated regularly with new survey samples to reflect changes in the German population and in order to compensate for dropouts occurring over time. The central survey instrument for this study is an individual questionnaire on the personal social, family and health situation, which each adult household member is supposed to answer. Further information on GSOEP can be obtained from Goebel et al. (Goebel et al., 2019).

We included participants between 30 and 49 years of age as our focus was on the life-phase of raising children. Our analyses are based on a pooled dataset including the waves from 1994 to 2018, allowing for trend analysis on population level by means of cross-sectional comparisons. Although the GSOEP allows for individual-level observations, we did not examine them with respect to intra-individual changes over time. Rather, we examined SRH in the age cohort of 30- to 49-year-old men and women at the population level over different time-periods to determine whether the health status in this age cohort has changed over time. We used cross-sectional weights that are assumed to produce a nationally representative sample. Respondents with missing information were excluded. We used the STROBE cross sectional reporting guidelines (Elm et al., 2007).

2.2. Measures

2.2.1. Self-rated health (SRH)

SRH as the dependent variable was measured by asking the participants to assess their health with the following question: “In general, how would you rate your current health status?”. The five original response categories (‘very good’, ‘good’, ‘satisfactory’, ‘poor’ and ‘bad’ health status) were transformed into two binary variables indicating ‘good’ health status (‘very good’ and ‘good’ compared with ‘satisfactory’, ‘poor’ and ‘bad’) and ‘poor’ health status (‘poor’ and ‘bad’ health compared with ‘very good’, ‘good’ and ‘satisfactory’). SRH has proven to be a reliable and valid health indicator that predicts health-care utilization, future health problems, and mortality (DeSalvo et al., 2005; Idler et al., 2000; Kananen et al., 2021).

2.2.2. Time trend

The time trend as the independent variable was assessed by a categorical variable covering five time-periods (1994–1998, 1999–2003, 2004–2008, 2009–2013 and 2014–2018), using the first time-period as reference category. In addition, the time-trend was assessed using a continuous trend variable, coded 0 for 1994 and 1 for 2018, with the years in between getting fractional values, for example 0.042 for 1995, 0.084 for 1996 and so forth. The value determined with this variable gives the average change over the entire time-period.

2.2.3. Mediators

Socioeconomic, psychosocial and family-related factors that have been shown to impact health as well as health inequalities (Moor et al., 2017) were used as potential mediators of the health trends. Socioeconomic factors include educational level, occupational status, and household net adjusted disposable income according to the modified equivalence scale (Eurostat et al., 1995). Each of these indicators was classified into three categories, representing low, intermediate and high social status (see Appendix Table A). In addition, *employment status* was assessed using four categories: 1.) ‘unemployed and looking for work’,

2.) 'not employed (e.g. parental leave)', 3.) 'employed part-time' and 4.) 'employed full-time'.

Psychosocial factors include economic worries, worries about job security, satisfaction with work, satisfaction with own household activities, and satisfaction with child-care options. All variables were assessed since 1994 with the exception of satisfaction with own household activities and child-care options that were first surveyed in 1997. *Economic worries* were assessed by asking the participants "Are you worried about your own economic situation?" offering the following answer options: 1.) major worries, 2.) some worries and 3.) no worries. *Job security* was surveyed with the question: "If you are gainfully employed: Are you concerned about the security of your job?" Answer options were again 1.) major worries, 2.) some worries and 3.) no worries. *Satisfaction with work, with activities in the household and with the possibilities of childcare* was each measured on a scale from 0 (completely dissatisfied) to 10 (completely satisfied). Participants that were not engaged in household activities by themselves or those for whom childcare facilities were not relevant due to childlessness, indicated 'not applicable'. Based on the empirical distribution, we formed three equally sized groups: 1.) less satisfied (scores 0–4), 2.) intermediate satisfied (scores 5–7) and high satisfied (scores 8–10).

For assessing *family-related factors* we used a variable that contains four categories: 1.) partnered parents (married or cohabitating), 2.) single parents, 3.) married/cohabitating individuals being childless, and 4.) singles being childless.

2.3. Statistical analyses

First, we analyzed the temporal development of good and poor self-rated health by means of logistic regression analyses using cluster-robust standard errors to adjust for the panel structure of the data. We calculated interaction terms between the time-trend and gender in order to determine changes in gender inequality in SRH, using both the categorical and continuous time-trend variable. Reference category for the interaction term was the temporal development of SRH in men, starting with first time of observation. For the categorical variable, this was the first period (1994–1998) and for the continuous variable the first year (1994). In addition, we investigated the temporal development of the mediators (socioeconomic, psychosocial and family-related factors). In addition to odds ratios (OR), we reported predicted probabilities.

Based on logistic regression analysis, the Karlson-Holm-Breen-method (KHB-method) (Kohler et al., 2011) was applied to examine how much of the total time effect on SRH is mediated by changes in socioeconomic, psychosocial and family-related factors over time. The KHB method extends the decomposition properties of linear models to logistic regression models by decomposing the total effect of time on SRH into a direct and indirect effect. This method ensures that the crude and adjusted coefficients are measured on the same scale and thus, are unaffected by the rescaling bias that arise in cross-model comparisons of non-linear models.

In our case, the *total effect* is the effect of time on SRH without the mediators, only controlled for age and the residual variance. The *direct effect* of time corresponds to the effect that remained after controlling for the mediators. Accordingly, the *indirect effect* is the part of the time-effect on SRH that is explained by the mediators. In addition to odds ratios (OR), we reported average partial effects (APE) giving the decomposition a more substantial interpretation. APE are measured on the probability scale and estimate the average marginal effect of each mediator as expressed in percentage points (Kohler et al., 2011).

With respect to OR, the indirect effect is calculated as the total effect divided by the direct effect. Regarding APE, it is calculated by the total effect minus the direct effect. All regression analyses were performed separately for men and women. We controlled for age by including a continuous age-variable as a covariate, taking possible shifts in age composition into account. Population weights were employed to match the official population statistics. All analyses were performed with

STATA v13.1.

3. Results

Overall, 40,841 respondents (21,396 women/19,445 men) were observed 219,012 times (117,608 women/101,404 men). The weighted sample characteristics, separated by gender and time-period, are presented in Table 1. The proportion of missing values on the variables included varied between 0 and 2.1%.

Most of the socioeconomic, psychosocial and family-related mediators considered showed a significant association with SRH in both genders (see Appendix Table B and C). With increasing schooling, higher occupational status, and income, the proportions of good SRH increased while those of poor SRH decreased. In addition, not being employed or unemployed, and, exclusively for men, being part-time employed, were associated with poorer SRH. Having children with a cohabitating partner proved to be the family status most conducive to SRH. In addition, most of the psychosocial factors revealed to be relevant for SRH in both genders. Proportions of good SRH decreased while that of poor SRH increased with higher levels of economic worries and with increasing dissatisfaction with work and own household activities. A high level of satisfaction with the child-care options, on the other hand, was associated with better SRH. After controlling for psychosocial factors (model 2), the effect of socioeconomic factors decreased, in particular employment status, occupational position and income. This indicates that psychosocial factors accounted for the relationship between socioeconomic factors and SRH.

Table 1

Weighted sample characteristics in %, men and women aged 30–49 years, Germany, 1994–2018

	Women (n = 117.608)	Men (n = 101.404)
Age groups in yrs.		
30–34	23.6	23.6
35–39	24.8	24.8
40–44	25.9	26.0
45–49	25.8	25.6
missing	0	0
Parental Status		
partnered parent	50.5	50.1
partnered/childless	25.2	23.2
single parent	9.4	1.1
single/childless	14.9	25.6
missing	0	0
School education¹		
low	29.3	34.8
intermediate	40.7	32.5
high	29.9	32.7
other qualification	8.8	8.0
missing	1.7	1.6
Employment status		
unemployed	6.1	6.2
not employed	22.0	4.4
part-time	34.9	4.2
full-time	37.0	85.2
missing	0	0
Occupational position¹		
low	15.7	13.7
intermediate	42.2	46.3
high	14.7	29.5
not working	27.4	10.5
missing	0.3	0.2
Household income¹		
low	9.7	7.6
intermediate	69.7	68.7
high	20.7	23.7
missing	2.1	2.0

Notes: n = number of observations. ¹ categories low, intermediate and high are explained in Table A (Appendix).

3.1. Temporal development of SRH

Between 1994 and 2018, the predicted probabilities of good SRH increased in women and men aged 30–49 years from 53.7% to 57.0% and 58.2%–61.4%, respectively (Fig. 1). The corresponding odds ratios are OR = 1.15 (CI: 1.03–1.27) and OR = 1.13 (CI: 1.00–1.28), respectively (Table 2). At the same time, predicted probabilities of poor SRH rose slightly from 13.6% to 14.2% in women and from 10.3% to 11.3% in men. At all time-points, women showed poorer health relative to men. As indicated by the non-significant interaction term between gender and time, there has been no change in this gender relationship over time (see Appendix Table D). However, gender differences in good and poor SRH tended to widen after the time-period 2009–2013, while before that they have narrowed somewhat.

3.2. Temporal development of the mediators

Over time, the chance of getting a tertiary education increased approximately threefold for women (OR: 2.97, CI: 2.50–3.53) and nearly twofold for men (OR: 1.97, CI: 1.65–2.34) (Table 3). Expressed in predicted probabilities, the proportion of tertiary education rose in women from 18.4% to 36.4% (Appendix Table E) and in men from 24.1% to 36.4% (Appendix Table F). Similarly, the chance for a high occupational position increased by 129% in women (OR: 2.29, CI: 1.88–2.78) and by 29% in men (OR: 1.29, CI: 1.10–1.51). In women only, the chance of being unemployed (OR: 0.68, CI: 0.51–0.90) and not being gainfully employed (OR: 0.32, CI: 0.24–0.43) substantially decreased over time. High income levels increased slightly in both genders while also low incomes increased significantly in women (OR: 2.31, CI: 1.99–2.69) and

Table 2

Temporal development of good and poor self-rated health (SRH) in women and men aged 30–49 years, Germany, 1994–2018

Women				
	Good SRH		Poor SRH	
Model 1:	OR	95% CI	OR	95% CI
Time (cat.)				
1994–1998	1		1	
1999–2003	1.17***	1.09; 1.26	0.83***	0.75; 0.92
2004–2008	1.08	0.99; 1.19	0.96	0.85; 1.09
2009–2013	1.17***	1.06; 1.28	0.91	0.61; 1.36
2014–2018	1.14**	1.04; 1.25	1.05	0.93; 1.20
Model 2:				
Time (cont.)	1.15*	1.03; 1.27	1.08	0.93; 1.26

Men				
	Good SRH		Poor SRH	
Model 1:	OR	95% CI	OR	95% CI
Time (cat.)				
1994–1998	1		1	
1999–2003	1.10*	1.02; 1.19	0.95	0.83; 1.07
2004–2008	1.03	0.94; 1.13	1.10	0.94; 1.28
2009–2013	1.07	0.97; 1.19	1.03	0.88; 1.20
2014–2018	1.14*	1.03; 1.27	1.10	0.93; 1.30
Model 2:				
Time (cont.)	1.13*	1.00; 1.28	1.12	0.93; 1.35

Notes: Logistic regression analyses of good/poor SRH on time, adjusted for age. The continuous time variable ‘Time (cont.)’ in model 2 is coded 0 for 1994 and 1 for 2018. Reference group in model 1: first time period (1994–1998) and in model 2: first year of observation (1994). 95%CI = 95% confidence interval, *p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001.

men (OR: 2.60, CI: 2.12–3.19). As the interaction-terms of time and gender indicate, gender differences with respect to tertiary education, employment status and occupational position have narrowed over time to the advantage of women (Table 3). However, in 2014–2018 women were still disadvantaged in terms of employment status, occupational position and income (Appendix Table E) as compared to men (Appendix Table F). With regard to family status, it revealed that the proportion of partnered parents significantly decreased in both genders while particularly childless singles were on the rise. All psychosocial factors showed a positive trend towards improved conditions for health. Among women, levels of job satisfaction increased in particular (OR: 1.49, CI: 1.34–1.66), leading to a reduction of the gender gap in this respect. Men showed a greater reduction of economic worries and concerns about job security as compared with women. In addition, the increase of satisfaction with the household activities was more pronounced in males (Table 3).

3.3. Decomposition of the time-trend on SRH

Table 4 displays the effect of time on SRH, divided into the ‘total time effect’ (without the mediators), the ‘direct time effect’ (after controlling for the mediators) and the ‘indirect time effect’ (part of the time-effect that is explained by the mediators). As indicated by the size of the total time effect, the chance of good SRH did not substantially change between 1994 and 2018 in both, women (OR: 1.01, CI: 0.90–1.14) and men (OR: 1.08, CI: 0.94–1.24) (Table 4). After controlling for the mediators (direct time effect), the health trend became negative in women (OR: 0.78, CI: 0.69–0.89) and men (OR: 0.82, CI: 0.71–0.94). Accordingly, a positive effect of time on SRH that is explained by the mediators (indirect time effect) could be established in both, women (OR: 1.29, CI: 1.23–1.36) and men (OR: 1.32, CI: 1.24–1.41).

Expressed in average partial effects (APE), the probability of good SRH between 1994 and 2018 increased slightly in women and men by 0.3%-points and 1.6%-points, respectively (total time effect). After controlling for the mediators, the probability of good SRH decreased over time by 5.4%-points in women and 4.3%-points in men (direct time

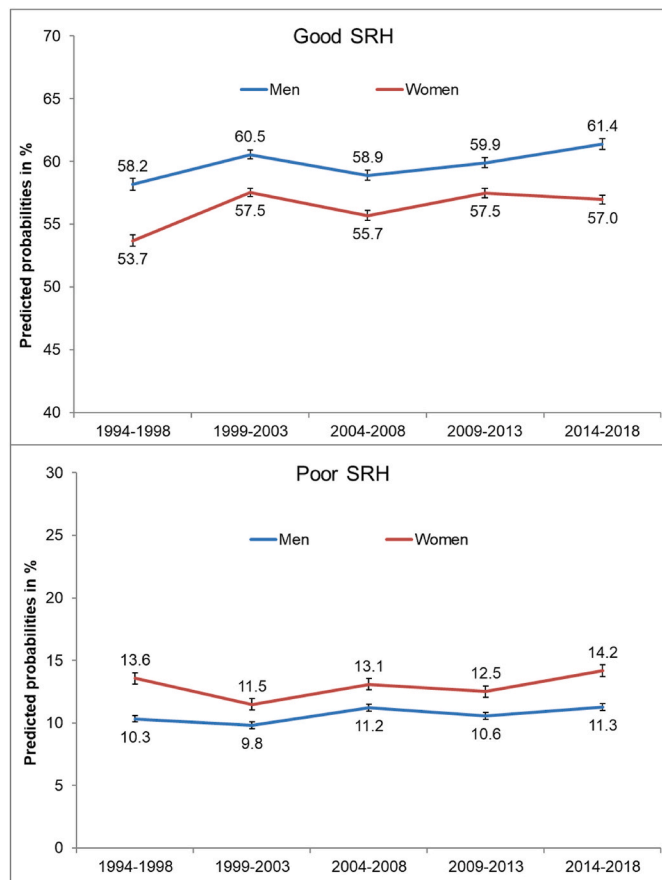


Fig. 1. Predicted probabilities and standard errors of good and poor SRH from 1994–1998 to 2014–2018 in women and men aged 30–49 years, Germany, adjusted for age.

Table 3
Temporal development of the mediators (socioeconomic, psychosocial and family related factors) in women and men aged 30–49 years, Germany, 1994–2018

Temporal development:	Women		Men		Interaction Time*Gender	
	OR	95% CI	OR	95% CI	OR	95% CI
School education						
primary	0.24***	0.20; 0.29	0.35***	0.29; 0.41	0.88	0.63; 1.24
secondary	0.84*	0.73; 0.97	0.96	0.82; 1.13	0.87	0.71; 1.08
tertiary	2.97***	2.50; 3.53	1.97***	1.65; 2.34	1.48***	1.17; 1.88
Employment Status						
unemployed	0.80*	0.67; 0.96	1.18	0.94; 1.47	0.68**	0.51; 0.90
not employed	0.54***	0.47; 0.61	1.62***	1.24; 2.11	0.32***	0.24; 0.43
part-time	1.60***	1.41; 1.80	3.04***	2.23; 4.13	0.57***	0.41; 0.79
full-time	1.06	0.92; 1.21	0.55***	0.46; 0.66	1.86***	1.50; 2.31
Occupational position						
low	0.80**	0.69; 0.93	0.88	0.74; 1.05	0.97	0.77; 1.21
intermediate	1.19**	1.05; 1.35	0.76***	0.67; 0.87	1.59***	1.34; 1.90
high	2.29***	1.88; 2.78	1.29***	1.10; 1.51	1.75***	1.35; 2.24
Income						
<60% median	2.31***	1.99; 2.69	2.60***	2.12; 3.19	0.90	0.70; 1.15
60% - < 150%	0.64***	0.56; 0.72	0.62***	0.54; 0.71	1.03	0.85; 1.24
≥150%	1.14	0.97; 1.35	1.22*	1.03; 1.44	0.94	0.74; 1.18
Parental Status						
single parent	1.20	0.97; 1.47	1.60	0.82; 3.12	0.72	0.36; 1.44
partnered parent	0.72***	0.63; 0.82	0.53***	0.46; 0.61	1.25*	1.03; 1.51
partnered/childless	0.93	0.79; 1.09	1.30**	1.10; 1.54	0.77*	0.61; 0.97
single/childless	1.85***	1.50; 2.28	1.75***	1.46; 2.09	1.12	0.85; 1.46
Economic worries						
no	1.53***	1.33; 1.76	1.89***	1.64; 2.19	0.82*	0.67; 0.99
some	0.84***	0.76; 0.91	0.79***	0.72; 0.87	1.04	0.91; 1.19
considerable	0.84**	0.75; 0.94	0.69***	0.61; 0.78	1.22*	1.03; 1.44
Worries about job security						
no	2.09***	1.85; 2.35	1.93***	1.70; 2.19	1.10	0.93; 1.30
some	0.91	0.82; 1.00	0.61***	0.55; 0.68	1.51***	1.30; 1.75
considerable	0.74***	0.64; 0.86	0.58***	0.50; 0.67	1.29*	1.05; 1.58
Satisfaction with job						
less satisfied (0–4)	0.90	0.76; 1.06	0.73***	0.63; 0.86	1.22	0.97; 1.54
intermediate	1.28***	1.16; 1.41	0.97	0.88; 1.07	1.34***	1.17; 1.54
(very) satisfied (8–10)	1.49***	1.34; 1.66	1.12*	1.00; 1.25	1.36***	1.17; 1.58
Satisfaction with household						
less satisfied (0–4)	0.67***	0.58; 0.77	0.58***	0.48; 0.69	1.18	0.93; 1.49
intermediate	0.83***	0.76; 0.91	1.41***	1.26; 1.57	0.60***	0.52; 0.69
(very) satisfied (8–10)	1.10	0.99; 1.23	2.81***	2.48; 3.19	0.40***	0.34; 0.47
Satisfaction with child-caring						
	0.27***		0.24***		1.09	

Table 3 (continued)

Temporal development:	Women		Men		Interaction Time*Gender	
	OR	95% CI	OR	95% CI	OR	95% CI
less satisfied (0–4)		0.22; 0.34		0.19; 0.30		0.81; 1.48
intermediate	0.33***	0.28; 0.38	0.37***	0.32; 0.44	0.84	0.67; 1.04
(very) satisfied (8–10)	1.10	0.95; 1.28	1.09	0.93; 1.28	0.96	0.77; 1.19

Notes: Logistic regression analyses of the mediators on time (continuous time-trend variable), adjusted for age. For layout reasons, the continuous predictor (time) is listed in columns while the mediators (dependent variables) are listed in rows. A regression model was calculated for each mediator, separated for men, women and for interaction time*gender. Reference category for men and women: first year of observation (1994), reference category for time*gender: temporal development in men, starting in 1994 (main effects of gender and time not displayed). 95%CI = 95% confidence interval, *p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001.

effect). Accordingly, the mediators contributed to an increase in the probability of good SRH in women and men by 5.7%-points and 6.0%-points, respectively (indirect time effect). A similar picture emerged with respect to poor SRH. A moderate increase of poor SRH was found over time for both genders that became significantly stronger after controlling for the mediators. Accordingly, the indirect effects pointed towards a significant decrease in poor SRH that could be explained by the mediators.

Disentangling the contributions of each mediator revealed that the reduction of economic worries over time had the greatest influence on trends in SRH in both genders. This factor contributed to a proportion of 29.1% and 33.0% of the indirect-effect on good SRH in women and men, respectively (P_diff, Table 4). In addition, the decline in primary education accounted for a further 17.6% and 16.8% of the indirect effect on good SRH in women and men, respectively. Exclusively for men, also changes in satisfaction with the own household activity contributed significantly to the positive health trend, while for women the rise in job satisfaction was of particular importance. Largely similar findings were also found for poor SRH. Overall, the pseudo R² values between 0.07 and 0.10 indicate a moderate model fit.

4. Discussion

We analyzed temporal changes in SRH between 1994 and 2018 among women and men aged 30–49 years and investigated the role of socioeconomic, psychosocial and family-related factors as possible drivers behind these trends. Our main result was that despite positive developments in socioeconomic and psychosocial factors, particularly for women, proportions of good and poor SRH for both genders have not changed markedly. This corresponds to previous work that indicated that SRH did no substantial change in younger ages (Clause-Verdreau et al., 2019; Greaney et al., 2019; Sperlich et al., 2019; Wolff et al., 2017). Accordingly, we found that gender inequalities in SRH to the disadvantage of women did not substantially change over time.

4.1. Temporal changes in socioeconomic, psychosocial and family-related mediators by gender

Between 1994 and 2018, social inequalities between genders reduced significantly. This applies particularly to the chance of a high school education that increased approximately threefold for women but only twofold among men. In addition, the chance for a high occupational position increased by 129% in women but only by 29% in men (Table 3). The rise of women's number in a high occupational position went hand in hand with the overall increase in women's participation in the labor

Table 4

Decomposition of the total time effect on good and poor self-rated health (SRH) into direct and indirect effects via mediators (socioeconomic, psychosocial and family-related factors) in women and men aged 30–49 years, Germany 1994–2018

	Good SRH				Poor SRH			
	Women		Men		Women		Men	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Total time effect	1.01	0.90; 1.14	1.08	0.94; 1.24	1.20	0.99; 1.44	1.14	0.92; 1.42
Direct time effect	0.78***	0.69; 0.89	0.82**	0.71; 0.94	1.54***	1.27; 1.86	1.52***	1.21; 1.92
Indirect time effect	1.29***	1.23; 1.36	1.32***	1.24; 1.41	0.78***	0.73; 0.83	0.75***	0.69; 0.82
	APE	95% CI	APE	95% CI	APE (%-points)	95% CI	APE (%-points)	95% CI
Total time effect	0.3	-2.36; 2.96	1.6	-1.31; 4.56	1.9*	0.18; 4.00	1.2	-0.69; 3.06
Direct time effect	-5.4***	-8.29; -2.81	-4.3**	-7.35; -1.32	4.6***	2.59; 6.56	3.7***	1.71; 5.72
Indirect time effect	5.7	— ¹	6.0	— ¹	-2.6	— ¹	-2.5	— ¹
Indirect effects:	Coef	P_diff	Coef	P_diff	Coef	P_diff	Coef	P_diff
No economic worries	1.6	29.1	2.0	33.0	-0.9	33.3	-1.0	38.0
Primary education	1.0	17.6	1.0	16.8	-0.5	19.2	-0.5	18.2
Tertiary education	0.6	11.4	0.6	9.8	0.1	-2.7	-0.2	8.4
High satisfaction household	0.3	4.6	1.3	22.4	-0.1	4.7	-0.7	25.9
High job satisfaction	1.6	27.7	0.7	11.2	-0.7	27.3	-0.3	11.0
No worries job security	0.8	13.3	0.3	5.2	0.1	-2.8	-0.2	7.7
Low income	-0.3	-5.7	<-0.1	-0.7	0.2	-6.8	<0.1	-3.3
High income	0.2	3.2	0.1	2.4	-0.1	4.8	-0.1	5.0
Low occupational position	0.1	2.5	<-0.1	-0.4	-0.1	2.1	<-0.1	1.3
High occupational position	0.3	5.4	0.2	3.7	-0.2	6.1	<0.1	-1.7
Not employed	-0.2	-3.0	<-0.1	-0.2	-0.7	26.9	<0.1	-0.7
Partnered parent	-0.4	-6.7	-0.2	-3.6	0.3	-12.8	0.3	-9.9
High satisfaction child-caring	<-0.1	0.7	<-0.1	0.4	<-0.1	0.8	<-0.1	0.1
Pseudo R ² (Mc Fadden)	0.08		0.09		0.07		0.10	

Notes: Based on KHB-method for logistic regression, adjusted for age. OR = Odds ratio, APE = average partial effects (change in average probability of SRH over time in percentage points), ¹ = 95% confidence interval cannot be calculated since standard errors of indirect effects are not known for APE method, Coef: indirect effect due to each of the mediators, P_diff: contribution of each mediator to the indirect effect in percentages (the sum of all P_diff values adds up to 100 percent), *p < 0.05, **p < 0.01, ***p < 0.001. 95%CI = 95% confidence interval.

force. However, gender inequalities to the disadvantage of women still persist, indicating that in 2014–2018 one in three men (Appendix Table F) but only one in five women (Appendix Table E) held a high occupational position. The continuing disadvantage of women in high occupational positions might point to structural barriers that stand in the way of the corresponding translation of a high educational qualification into a high occupational status.

4.2. Gender-specific trends in SRH

In line with previous work (Lampert et al., 2018; Oksuzyan et al., 2008; Regitz-Zagrosek, 2018), we found that women reported poorer SRH compared to men, which applies to all time-points considered. Different to other studies (Aguilar-Palacio et al., 2018; Cummings & Braboy Jackson, 2008; Pöld et al., 2016; Sperlich et al., 2019; Volken et al., 2017), we found no evidence of a significant reduction in this gender health gap. This corresponds to some previous work that also found no substantial change in this gender relationship over time (Galenkamp et al., 2013; Johansson et al., 2015). However, this result differed from an earlier study, in which a narrowing of the gender gap in SRH to the advantage of women was determined for the time-period 1994 to 2014 (Sperlich et al., 2019). The present study with the extended observation period until 2018 suggests that gender inequalities in SRH have increased again in recent years.

4.3. The contribution of the mediators in explaining the health trends in women and men

By disentangling the contributions of each influencing factor, we found that in both genders, the reduction of economic worries and the rise in educational attainment had the most conducive effect on the health trend. However, also gender-specific effects emerged. While the increase in job satisfaction made a higher contribution to women’s health, the rise in satisfaction with the own household activities was

more important in men. It was particularly striking that the proportion of men who answered ‘not applicable’ to this question, declined significantly over time, from 47.0% to 15.7% (Appendix Table F). Presumably, the rise in satisfaction with men’s own involvement in household and family work is related to this higher overall engagement. Fathers’ uptake for parental leave has been found to be important in improving fathers’ commitment to family work and the German government is increasingly recognizing that paid leave for fathers is an important tool for gender equality (OECD, 2017). However, the study conducted by the OECD suggests that German fathers have increased the hours spent on childcare, while their time spent on housework has not changed much (OECD, 2017). Given the significant impact of perceived fairness in the division of household and family work on SRH (Eek & Axmon, 2015) more research is needed to analyze the way in which gender equality in household and family work has evolved over time and affected the health trend in both genders.

Overall, we found that SRH has not significantly changed in both genders, despite positive trends in socioeconomic and psychosocial factors that were particularly evident for women. Our results suggest that SRH would have worsened significantly for both genders if there had been no improvements in the socioeconomic and psychosocial factors considered. However, this general positive trend of influencing factors might mask different developments for different socioeconomic groups. This could also explain why the model fit of the decomposition analysis in terms of pseudo-R² is not excellent. Consistent with this assumption, McDonough et al. suggested that the overall health trend may mask a growing gap among women (McDonough et al., 2013). They postulate that the social change in terms of increasing female labor participation may not be beneficial for all women. They argued that the employment trends, together with rising divorce rates might leave social disadvantaged women more vulnerable. This assumption is supported by a recent study showing that socioeconomic conditions as well as SRH among single mothers have deteriorated sharply over the past two decades (Sperlich et al., 2022).

Germany underwent major labour market policies changes in the 1990s and 2000s, which transformed the German economy from a conservative to a more liberal labour market. As a consequence, precarious employment has increased in Germany by means of labour market flexibilisation (Pfortner & Elgar, 2016). At the same time, Germany experienced also a rise in income inequality and income-related health inequalities (Siegel et al., 2014). Moreover, increased differences in poor SRH by working poverty and low wage were found during the economic crisis in 2008/09 and the post-recession periods (Pfortner et al., 2019). These findings suggest that the development of SRH during the child-rearing life stage may have varied by socioeconomic status. Therefore, further studies are needed for both genders, examining health trends and their potential determinants separately for different socioeconomic groups. Such analyses will provide information about vulnerable groups for whom strengthening preventive measures seem to be especially necessary.

4.4. Limitations

Finally, some important limitations of this study need to be addressed. It may be possible that the time-trends are biased by the exclusion of the institutionalized population and persons who could not participate in the survey for health reasons. In addition, due to the panel structure of the data, there could be some attrition in some cases because the health status of participants could deteriorate over time. Hence, we cannot fully rule out that the trends in SRH and in the mediators are overestimated in our study. However, there is no reason to assume that the proportion of persons not accessible with the survey increased over time and, therefore, the time-trends should not be majorly biased thereby.

Furthermore, a shift in the perception of health may also have contributed to changes in proportions of good and poor SRH over time. The changes observed may therefore also be due to changes in norms and values regarding health.

Another limitation of our study is that the predictive validity of SRH may differ according to gender. For instance, it was found that poor SRH is a more powerful predictor of short-time mortality for men as compared to women (Assari, 2016). One reason for this could be the different meaning of 'good' and 'poor' SRH for men and women, which may have contributed to the gender differences found in our study. However, Zajacova et al. (Zajacova et al., 2017) find little systematic gender difference in the structure of SRH and concluded that the meaning of SRH is similar for women and men.

Psychosocial and material factors have been identified as key pathways in the explanation of socioeconomic inequalities in health (Moor et al., 2017). Therefore, we analyzed changes in these factors over time as possible factors influencing the temporal development of SRH. However, because we used cross-sectional data, no firm conclusions can be drawn about the direction of the relationship. Moreover, it should be considered that the variables used as mediators may have their origins prior to the study period. For example, economic worries may have their origin in the socioeconomic status of the parents. Therefore, possible selection effects in the life course should be considered when interpreting the findings.

In addition, it should be noted that we considered all women and men between the ages of 30 and 49, both those with and without underaged children. Because of this approach, we focused on family-related factors that apply to all individuals. This means that, with the exception of satisfaction with child-care options, we excluded all variables that relate only to parents, such as the number and age of children. However, given the great importance of these factors for health (Mistry et al., 2007; Sperlich et al., 2011), they should be considered in further subgroup-specific analyses on parents.

Finally, our grouping of the temporal evolution in five-year periods may be too broad to capture significant turning points. Therefore, sensitivity analyses were performed using Joinpoint Regression

software, which is provided free of charge by the US National Cancer Institute. The results based on annual SHR data indicated significant turning points in women toward a decrease in good SRH after 2012 and an increase of poor SRH after 2009. By contrast, in men a significant increase in good SRH could be established after 2005 while no significant turning point could be found for poor SRH. These results confirmed our finding that after the period 2009–2013, gender inequalities in SRH have increased again to the disadvantage of women.

4.5. Conclusions

Our findings suggest a positive development of key structural and psychosocial health determinants among individuals aged 30–49 years that applied particularly to women. However, we found no corresponding increase in SRH and no evidence that gender inequalities in SRH have changed substantially between 1994 and 2018. We may assume that SRH would have deteriorated significantly in both genders if there had been no improvements in the socioeconomic and psychosocial determinants considered. Further gender sensitive studies are warranted in order to determine what other determinants might have opposed to a positive health trend.

Ethical statement

Ethical approval from the ethics committee is not required as this study using pre-existing and de-identified survey data.

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CRediT author statement

Frauke-Marie Tübbecke: Conceptualization, Formal analysis, Visualization, Validation, Writing - Original Draft, Jelena Epping: Writing - Review & Editing, Batoul Safieddine: Writing - Review & Editing, Stefanie Sperlich: Writing - Original Draft, English editing, Formal analysis, Supervision.

Data availability statement

The raw data were drawn from the German Socio-Economic Panel Study (GSOEP 21 V.31). The datasets used are available from the corresponding author on reasonable request. German data privacy laws necessitate that all users sign a data user contract with DIW Berlin.

Declaration of competing interest

All authors declared that they have no conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmph.2022.101183>.

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