Progress of mental strain in German public administrations in the course of the COVID-19 pandemic

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Abstract

Purpose

Due to the COVID-19 pandemic, an acceleration in the usage of digital working methods occurred in the setting of German public administrations. Besides the ostensible risk of infection due to the virus, compound mental stress arose for the employees. A subsequent progression of mental strain is to be examined. The aim is to estimate a residual pandemic effect approximated by controlling common influencing factors.

Methods

An online survey was conducted in 2020 and repeated 2022 among > 500 employees from three public administrations in Germany. Mental strain was measured using the Wuppertal Screening Instrument for Psychological Strain. The temporal variation was operationalized by the 1st and 2nd survey as an independent variable. For hypothesis testing, a t-test was calculated. A pooled OLS regression of the time-dependent differences was performed as a pre/post evaluation, supplemented by Breusch-Pagan and Durbin-Watson tests as well as calculation of variance inflation factors.

Results

More than 70% of the public administration's employees experienced non-optimal mental strain. The multiple regression model showed a significant increase in mental strain as well when the influence of socio-demographic changes on the department level was controlled for (β = -0.095, t = -2.275, df = 30, p < 0.05). Children, age and university degree were significant predictors of mental strain. The R-square revealed that about 40% of the variance in the temporal variation of mental strain could be explained by the temporal variation of the independent variables.

Conclusion

The observed influential factors explain a significant proportion of the increased mental strain in German public administration workers. Still, more than half of the increase remains unexplained. Environmental influences within the observed period were largely determined by the pandemic conditions. The results place emphasis on the health-related challenges as consequences even beyond the pandemic.

Introduction

Caring for children and/or relatives while working at the same time and in the same space, lack of movement and physical meetings in times of lockdowns and with increasing digitization, suboptimal workplace ergonomics, job insecurity are just a few of the recent stressors. Nevertheless, when it comes
to the predictors of workplace stress, job demands rather than the resources seemed to be responsible for psychological distress during the pandemic [1]. Working from home places demands on employees, which in turn have both positive and negative effects on stress [2]. In terms of work organization, there might be individual advantages, such as the elimination of commuting or improvement of time management. However, communication within organizations still lacks clear structures for working from home. The pandemic situation has accelerated e.g. the ministry's plans to digitalize the work of public administrations in North Rhine Westphalia, Germany [3]. The conditions coming along with the pandemic provided the opportunity to examine the temporal variation of mental strain in the setting.

**Mental stress and mental strain**

In May 2020, the World Health Organization described the impact of the COVID-19 pandemic on mental health as "highly worrying" [4]. Psychological fragility caused to human life is supposed to be the largest aftermath of the pandemic posing a raised public health concern globally. This psychological impact is i.a. identified as Post-Traumatic Stress Disorder (PTSD) which was the most commonly diagnosed psychological disorder during this pandemic [5]. If left unidentified this condition can be accompanied by multiple comorbidities and take a transformation into psychic dysfunctions.

According to DIN EN ISO 10075-1, mental stress is defined as the "totality of all detectable influences that come from outside and affect a person psychologically" [6, 7]. Mental (or syn. psychological) strain is understood as the corresponding immediate, but not long-term, effect of mental stress in the individual. Due to the possible positive as well as negative effects of mental strain and stress in the workplace, both terms are formulated neutrally [6, 8]. Stress and strain lead to long-term stress consequences, which are the long-term effects of mental strain in the individual, whereby this chain of effects is also dependent on the characteristics of the affected individual [8]. The consequences of the chain of effects can include, on the one hand, stimulating effects, such as further development of abilities or health, and, on the other hand, impairing effects, such as the occurrence of psychosomatic illnesses or early retirement [8].

The biopsychosocial model [9] is a fundamental theory of the body-mind unit and enables a holistic understanding of illness or health. Thoughts and feelings are not only mental, but always at the same time also physical events that belong to the same process, even if they appear as distinguishable phenomena and are described in two different language systems. With this approach, the logical and empirical-scientific problem of "psychosomatics" that has persisted for centuries can be solved to some extent on a systems-theoretical (and semiotic) basis [10]. Nixon et al. [11] outline the psychosomatic effects of workplace stressors, i.e. organizational constraints, such as interpersonal conflict, role conflict, role ambiguity, workload, work hours and lack of control. All of these occupational stressors are significantly related to physical symptoms. Gastrointestinal complaints and sleep disturbances are significantly associated with more stressors than the other symptoms studied. In the biopsychosocial model, illness and health are not defined as a state, but as a dynamic process, i.e. Salutogenesis [12]; health must be "created" at all times. Therefore, illness occurs when the organism cannot sufficiently
provide the auto-regulative competence to cope with occurring disturbances on any level of the system "human being" and relevant control circuits for the functioning of the individual are overstrained or fail.

In the short term, stress can be beneficial to health [8]. If the stressor has a stimulating, positive function it is referred to as eustress (e.g., motivation, feeling of happiness). It becomes harmful if the short-term activation cannot be compensated or coped with. Stressors that are perceived as unpleasant or overwhelming have a negative function, speaking of distress (e.g. despair, pain). Distress brings a strongly increased tension of the body, which, for example, leads to a decrease of attention and performance [13].

Knight et al. [1] reveal two pandemic-related mental distress profiles for employees: (i) a declining distress profile where employees experienced reduced distress over time, suggesting adaptation and/or improved coping; (ii) a rising distress profile where distress increased and eventually plateaued, suggesting a stress reaction process followed by adaptation. Employees with high workload, underload, or close monitoring, are more likely to belong to the rising distress profile [1]. Detachment from work buffers the negative effect of workload and close monitoring on distress profile membership. Scheduling autonomy and colleague support do not predict profile membership. Contrary to predictions, manager support is associated with membership in the rising distress profile. Further research indicates that perceived stress is negatively associated with job performance and this relation is mediated by psychological distress [13]. In the context of a crisis which can cause considerable stress, such as the COVID-19 pandemic, health-promoting management practices can buffer the deleterious effect of perceived stress on psychological health and job performance.

In today's PAID (Pressure, Always-on, Information overload, Distracted) reality [14], stress has emerged to be an integral part of everyone's life which affects an individual directly or indirectly in many ways. The COVID-19 pandemic even enhanced the cruciality of managing stress, as it created a massive impact on the economy, education, healthcare, business areas and other aspects of society in every possible manner [15]. Specifically, the employees' emotional reactions are elicited from the perceived organizational support, in how organization cares for their well-being and work contributions and, in turn, influence the psychological safety. For instance, the approach of online communication practiced by managers has implications on the different levels of psychological safety experienced by the employee [16].

Absenteeism due to mental disorders during the pandemic

Looking at health reports by social insurers for the reporting year 2020, the first thing that stands out is that the cases of incapacity for work due to mental disorders were on the decline [17]. Thus, there were fewer documented new mental illnesses, which can potentially be attributed to underdiagnosis, especially during lockdown phases. In contrast, days of sick leave in the pandemic year 2020 increased compared to the previous year 2019, which could indicate an aggravation of prevalent cases. Mental illnesses were responsible for a total of 17.5 per cent of all days of sick leave, making them the second most common cause of incapacity for work after musculoskeletal complaints. This corresponds to the second most
sickness benefit cases (20 %) and the most sickness benefit days (28.7 %) which is due to the constantly high duration of mental illness cases with 43.4 days on average. Within this group of illnesses, the more serious cases dominated. The most important diagnoses were "reactions to severe stress and adjustment disorders" (F43 in ICD-10-GM; 2.56 cases and 77.3 days per 100 insured persons, 30.2 days average case duration) and depressive episodes (0.5 cases and 39.1 days, 78.9 days case duration). The significance of mental illnesses increased monotonously up to retirement age. A clear frequency peak was found in the 60–64 age group. In all age groups, women appear to be more frequently affected by mental illnesses, while musculoskeletal disorders dominate among male employees. Burnout syndrome (Z73 in ICD-10-GM) is not recognized as an independent disorder, but corresponds to an additional diagnosis. In a year-on-year comparison, the number of cases per 100 insured persons also decreased. The case duration per 100 insured persons was increasing for female employees (95 versus 104 days) and constant for male employees (61 days). Due to the high comorbidity and misclassification rate of burnout, a high proportion of those suffering from a depressive disorder in addition or instead can be assumed.

Absence periods reports by the social insurers, state equal trends and emphasize the increased burden on the tertiary and especially the health sector [18]. In there, reference is made to a publication, which, based on a convenience sample beyond the world of work, finds that generalized anxiety, symptoms of major depression and psychological distress were permanently elevated over the entire survey period (March to July 2020) compared to pre-pandemic levels [19]. It is noteworthy that the course of the pandemic as well as the decrease in the number of cases in the phase of the "new normality" (May to July 2020) had no influence on these outcomes. In contrast, the fear of a COVID-19 infection correlated clearly with these phases of different incidence and thus with the actual risk of infection. Consequently, the increased psychological strain during the pandemic might have been mainly not due to fear of infection. It can be assumed that the absenteeism report underestimates the actual prevalence because many employees may have avoided going to medical care due to fear of infection or uncertainty about the security of care.

In summary, it can be said that in 2020 there was not yet an increase in cases of mental illness among workers caused by the pandemic. At the same time, however, an aggravation of existing disorders, especially more serious ones, was evident.

Initial data for the reporting year 2021 indicate that the mental health effects of the pandemic are reflected in the incapacity to work statistics, albeit with a delay, but now recognizably [20]. It no longer only records an increase in days of incapacity for work due to mental illness. Meanwhile, an increase in the number of cases of sick leave can also be observed; probably slowly approaching the actual prevalence.

Hypothesis: socio-demographic and psychosomatic correlates of mental strain

The COVIDiSTRESS Global Survey data reveals that higher levels of strain are associated with younger age, being a woman, lower level of education, being single, staying with more children [21].
Competing interpretations exist regarding the impact of multiple roles, such as having children, on psychological distress. Greater role involvement is associated with greater well-being; however, only well educated women with multiple roles show higher levels of autonomy [22]. Women form a more vulnerable population group with regard to mental health impairments, as women suffer more frequently from mental disorders and are more prone to emotional exhaustion [23, 24]. Biopsychosocial explanations include higher sensitivity and differences in reporting behaviors, and, additionally, women evaluate negative health consequences more strongly [25]. Female employees are more likely than their male counterparts to experience resource loss due to work-family interference and demanding household chores when working from home [26]. Another pandemic consequence that is directly related to the mental strain of working women is an increased adherence to traditional gender roles and in some places even regressions in the sense of a re-traditionalization [27]. This can be attributed to the fact that "proven" behavior patterns are increasingly used in new emerging, potentially dangerous situations.

Perhaps the gravest restrictions of the COVID-19 pandemic was social isolation [28, 29]. In Kettschau et al. [30] it is discussed that more than half of the administrative employees are overweight, which is regarded to as a risk factor for physical complaints. Overweight individuals are predictive of weight gain [31], exercise avoidance [32], emotional eating [33], and non-optimal mental health [34]. Furthermore, individuals with obesity are already at higher risk of social isolation [31, 35]. Moreover, weight management may have been especially difficult during the COVID-19 pandemic, as reduced in-person support, less physical activity options, daily routine disruption, and food-focused coping are all associated with weight gain [36, 37]. The majority of participants enrolled in a behavioral weight loss program gained weight during the COVID-19 pandemic. Loneliness and working remotely predicted difficulty engaging in weight-related health behaviors [38].

While civil service mostly counts as secure (i.e. job security and social security benefits), modernization and digitalization in the administrative profession is a challenge. In German public administration, work stress is reported due to restructuring measures, staff shortage, workload, the aging of the workforce, as well as low employee participation and few opportunities for relief at work [39]. The organization of the departments and the work processes are a major cause of stress, while the interventions mostly address individual behavior rather than performance and organizational aspects. Wrede et al. [40] found that within the setting having relatives to care for is a significant risk factor for digital stress.

We contribute this work to investigate on how mental strain progressed within the setting in 2020–2022? With regard to the current literature, we assume that psychological strain differs from the first to the second time of the survey.

Methods

706 employees in 2020 and 521 employees in 2022 from three public city administrations in North Rhine Westphalia (Germany) were surveyed using an online tool. For each of the 38 associated departments, the average proportion or arithmetic mean of each variable was used. No imputation of missing values at
the individual level took place. The unit of analysis was the department level. The sizes of the respective administrations and departments in terms of respondents can be found in Table 1. Within the three city administrations, which were numbered from one to three for reasons of anonymity and are referred to as model regions, the departments included had the highest digitization reference.

The present study is part of the "Health and Digital Transformation" project within the framework of the digital model regions funding set by the then Ministry of Economic Affairs, Innovation, Digitalization and Energy of the State of North Rhine Westphalia (NRW MWIDE). The three participating municipalities each represent different quartiles of the German Index of Socioeconomic Deprivation (GISD) [41].

The survey was hosted via an external link on the LimeSurvey platform and was open for four weeks. After two weeks, a reminder was sent out via the departments' e-mail distribution list, as was the invitation to the survey. Participation required informed consent. Data analysis was performed with the software R-Studio in version 2022.02.2. The study was given a positive vote by the Ethics Committee of the University of Witten/Herdecke under reference number 158/2020. This means that it was checked for compliance with the Declaration of Helsinki and applicable data protection regulations.

The primary outcome was (non-optimal) psychological strain, which was operationalized using the Wuppertal Screening Instrument for Psychological Strain (WSIB) [7]. Suboptimal was combined with dysfunctional strain to form the new category "non-optimal" strain, which contrasts with optimal strain. The latter requires a positive strain balance and a high level of control. Strain balance and control experience are assessed using a previously developed list of characteristics for recording strain and emotions (see Table 2). Strain balance is expressed as the difference between functional, positive strain (+) and dysfunctional, negative strain (-). Control experience is measured one-dimensionally using the same scale ("influential").

The central independent variable was the temporal development, which was clearly characterized by the beginning (first survey) and development (second survey) of the COVID-19 pandemic. Thus, the research hypothesis was that the psychological strain experience of employees in German city administrations changed significantly over the course of the COVID-19 pandemic. The aim was to estimate a pandemic effect, which was to be approximated by controlling for known influencing factors.

On the one hand, a t-test for dependent samples was calculated. In addition, a pooled OLS regression of the time-dependent differences was performed as a before/after comparison. The estimation procedure was the first-difference approach. The regression constant is to be understood as a time-related or pandemic-related residual effect [42]. The binary control variables integrated into the regression model were the presence of one or more children in one's own household, relatives in need of care, a civil servant status, the existence of a university degree, and overweight in the sense of a body mass index of 25 or more. The same applies to the metric control variable age in years. To examine the effect size of the regression constant, a conversion was made to Cohen's D [43]. A classification of the effect sizes was made following Ellis [44]. In addition, to rule out autocorrelation, heteroskedasticity, and multicollinearity,
the Breusch-Pagan [45] and Durbin-Watson [46] tests were calculated as regression diagnostics, and variance inflation factors [47] were output and graphed.

**Results**

The psychological strain experience and the socio-demographics of the employees surveyed are demonstrated separately according to the two survey dates in Table 3. The standard deviation between the departments is presented in parentheses after the respective proportion or arithmetic mean. The share difference in the fourth column from the left forms the basis of the first-difference regression with the 95% confidence interval in parentheses behind it. Differences significant at this level are marked in bold.

The proportion of mentally non-optimally strained employees increased from 71.330% in 2020 to 73.315% in 2022. However, this difference of 1.985 percentage points is not significant (t = 0.563, df = 37, p = 0.577, 95% CI: -5.163% - 9.133%). The breakdown of non-optimal strain between suboptimal and dysfunctional strain originally proposed by the authors of the WSIB yields a share of dysfunctional strain of 2.925 percent in 2020 and 3.275 percent in 2022 (to obtain the share of suboptimal strain, dysfunctional strain must be subtracted from non-optimal strain).

There was a significant increase in the proportion of employees with one or more children in their own household (t = 4.252, df = 37, p < 0.0001, 95% CI: 10.816 - 30.510) and employees with relatives in need of care (t = 3.554, df = 37, p < 0.01, 95% CI: 7.440% - 27.176%).

The results of the multiple OLS regression of first differences, each with 95% confidence interval, are shown in Table 4, significant effects again marked in bold. In this case, the regression constant corresponds to the change in the proportion of employees with non-optimal mental strain between the two survey dates (keeping the remaining covariates constant).

The multiple regression model shows a significant increase of 9.5 percentage points in non-optimal psychological strain between the two survey waves when the influence of socio-demographic changes is removed (β = 0.095, t = 2.275, df = 30, p < 0.05). Converting this into an effect size yields a value of d = 0.351, which can be classified as a small effect.

The interpretation of the influence of the covariates is as follows: An increase of employees with children in a department by ten percentage points leads to a 3.313 percentage point reduction in non-optimal psychological strain. Each additional year of life increases the proportion of non-optimal mental strain by 1.931 percentage points. Increasing the proportion of employees with a university degree in a department by ten percentage points reduces the proportion of non-optimally strained employees by 3.785 percentage points. All other effects do not reach significance.

The R-square shows that about 40 percent of the variance in the temporal variation of mental strain can be explained by the temporal variation of the independent variables. The adjusted R-squared reduces to 25.800 percent. Consequently, the variance explanation of the model can be rated as strong.
The result of the Breusch-Pagan test argues against the presence of heteroskedasticity (BP = 5.083, p = 0.650). The Durbin-Watson test shows no significance (DW = 2.241, p = 0.412), so that autocorrelation of the residuals cannot be assumed. All variance inflation factors are clearly below five, so that there is also no multicollinearity, which is graphically represented in Figure 1 as a bar chart.

**Discussion**

In summary, the proportion of mentally non-optimal strained employees in the German public administrations has increased compared to the beginning of the COVID-19 pandemic. Viewed naively, significant changes at the department level only occur for one or more children in one's own household as well as relatives in need of care. On the one hand, this trend is consistent with an increasing number of births since the beginning of the COVID-19 pandemic in Germany [48] and, on the other hand, is due to pandemic-related health dislocations with resulting needs for care [49, 50].

The finding of a rising mental strain experience only emerges when the opposite (i.e. “protective”) socio-demographic changes that occurred at the departmental level are out-factored. The term "strain experience" is used deliberately so that it is clear that this is a self-assessment.

Socio-demographic characteristics include children in the household, increasing age and education level: While with the increasing average age in a department, the psychological strain increases, the academic rate as well as children prove to be protective factors. In this context, it can be assumed that these three variables positively influence individual control beliefs, which in the present study form the majority of the difference between optimal and non-optimal strain, and thus influence the strain experience to a much greater extent than the less varied strain balance.

The increased psychological strain experience (and thus the decreased personal locus of control) can be attributed to a residual effect of the COVID-19 pandemic, because both time-constant unobserved influencing factors (via first-difference estimation) and time-varying observed influencing factors (as covariates in the model) were controlled. In addition to the aforementioned factors (average age, parents, academics), the latter include the employees with relatives in need of care, the gender ratio, the civil servants and the overweight of employees.

In contrast to the previously published cross-sectional studies based on the first survey in the project "Health and Digital Transformation" [30, 40, 51, 52], the repeat survey avoided the risk of a omitted variable bias. However, it still remains open to what extent the temporal development can actually be interpreted as a pandemic effect and whether, in concrete terms, it is a matter of personal-emotional or operational changes such as working from home, working more hours et cetera. Working from home as an additional variable in the regression model would have caused lagged collinearity.

In the most likely event, we see what we already expected based on the reports of the health insurers [17, 18]: The psychological late effects of the pandemic, as well as of the measures taken to combat it,
emerge only after a longer latency period, but now show up consistently. At the same time, the effect size in the present study is to be classified as low, so that further developments remain to be seen.

From a methodological point of view and in order to be able to speak of causality, a control group would have been desirable in order to be able to calculate a difference-in-differences. However, such a control group would be counterfactual, since all employees were affected by the pandemic in one way or another. For this reason, and because there may be other time-varying variables at the department level that have not been considered so far, we refer to this as an approximation of the true effect.

In addition, a significant decrease in the number of cases should be noted. Upon inquiry, the official integration of Ukrainian refugees and the resulting lack of time was cited by the project partners as by far the most frequent reason for loss-to-follow-up. Subsequently, additional administrative work for the employees accrued due to the reception of refugees from Ukraine after the Russian war of aggression in 2022. However, this would rather affect the presumably more strained employees, which on the one hand leads to an underestimation of the actual effect, but on the other hand reduces the confounding of the pandemic effect by a possible "Ukraine effect".

Furthermore, with regard to the variable overweight, it cannot be clearly determined whether mental overload could have been not only a cause but also a consequence of overweight (e.g. via self-esteem) in this case, so that an interaction would exist. With 61% overweight employees, the number in the setting is above the nationwide average in Germany [53]. No significant influence was found in the model within this study. However, the study indicated overweight and obesity as a problem among public administration employees that might have worsened during the pandemic [36, 37].

It would be interesting for further research to examine the extent to which an interaction between the age of workers and their stress response in the aftermath of the pandemic (as well as subsequent interventions) might be expected. Preliminary evidence suggests that older people coped and are coping much better psychologically with the pandemic than younger people [21]. The linear correlation calculated in this study has to be interpreted with caution and rather presents a limitation as we did not delve deeper into the relationship, which is likely to be non-linear.

Eventually, this study creates awareness for the existence and the extend of psychological strain progression during the pandemic to evoke managing stress organizationally within the public sector. This research can also help policymakers in education and overall industry sector to rebuild the policies on stress and interventions to prevent longer-term distress consequences. Stakeholders and employers should take these circumstances into consideration when designing future strategies in terms of occupational health and prevention programs and supportive workplace cultures.

**Declarations**

**Availability of data and material**
The dataset supporting the conclusions of this article is included within the article. Data available on reasonable request through the corresponding author SW.

**Code availability**

Not applicable

**Ethical approval and Consent to participate**

The study was given a positive vote by the Ethics Committee of the University of Witten/Herdecke under reference number 158/2020. This means that it was checked for compliance with the Declaration of Helsinki and applicable data protection regulations. Informed consent was obtained from all individual participants included in the study.

**Consent for publication**

Not applicable

**Competing interests**

No

**Funding**

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**Author contributions**

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by KC, DRdA, JK and HCB. The first draft of the manuscript was written by SW and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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**References**


Tables

Table 1
Department keys with associated participant numbers by survey year

<table>
<thead>
<tr>
<th>Model region (Departments)</th>
<th>Participants 2020 (n = 706)</th>
<th>Participants 2022 (n = 521)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (14)</td>
<td>209</td>
<td>199</td>
</tr>
<tr>
<td>2 (12)</td>
<td>237</td>
<td>137</td>
</tr>
<tr>
<td>3 (12)</td>
<td>260</td>
<td>185</td>
</tr>
<tr>
<td>In general, during work I feel:</td>
<td>Coding</td>
<td></td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>energetic (+)</td>
<td>hardly (1), somewhat (2), to some extent (3) quite (4), strongly (5), very strongly (6) extraordinarily (7)</td>
<td></td>
</tr>
<tr>
<td>nervous (-)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>influential (feeling in control)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>physically tense (-)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ready to perform (+)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>excited (+)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>physically uncomfortable (-)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>attentive (+)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>concentrated (+)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3
Mental strain experience and socio-demographics by time of survey

<table>
<thead>
<tr>
<th>Variable</th>
<th>2020 (n = 706)</th>
<th>2022 (n = 521)</th>
<th>Difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Optimal strain (WSIB)</td>
<td>71.330% (+- 15.46 %)</td>
<td>73.315% (+- 23.16 %)</td>
<td>1.985% (-5.16 % – 9.13 %)</td>
</tr>
<tr>
<td>Children in household</td>
<td>38.123% (+- 15.63 %)</td>
<td>58.786% (+- 19.92 %)</td>
<td>20.663% (10.816 – 30.51 %)</td>
</tr>
<tr>
<td>Relatives in need of care</td>
<td>39.206% (+- 18.74 %)</td>
<td>58.515% (+- 18.11 %)</td>
<td>17.309% (7.44 % – 27.17 %)</td>
</tr>
<tr>
<td>Age in years</td>
<td>44.740 (+- 6.791)</td>
<td>44.495 (+- 7.133)</td>
<td>0.245 (-1.379 – 1.868)</td>
</tr>
<tr>
<td>Male sex</td>
<td>40.561% (+- 20.62 %)</td>
<td>40.312% (+- 22.88 %)</td>
<td>-0.249 (-5.67 % – 5.17 %)</td>
</tr>
<tr>
<td>Civil servants</td>
<td>58.137% (+- 24.17 %)</td>
<td>63.201% (+- 27.85 %)</td>
<td>5.064% (-2.05 % – 12.18 %)</td>
</tr>
<tr>
<td>College degree</td>
<td>50.557% (+-20.94 %)</td>
<td>48.253% (+- 26.02 %)</td>
<td>-2.304% (-8.96 % – 4.35 %)</td>
</tr>
<tr>
<td>Overweight (BMI ≥ 25)</td>
<td>60.883% (+- 24.00 %)</td>
<td>61.460% (+- 22.78 %)</td>
<td>0.577% (-7.04 % – 8.19 %)</td>
</tr>
</tbody>
</table>
Table 4
Constants, coefficients and quality measure of the multiple OLS regression of first differences

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value (+- SD)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant (Intercept)</td>
<td>0.095 (+- 0.042)</td>
<td>0.010 - 0.180</td>
</tr>
<tr>
<td>Children in household</td>
<td>-0.331 (+- 0.132)</td>
<td>-0.601 - -0.062</td>
</tr>
<tr>
<td>Relatives in need of care</td>
<td>-0.066 (+- 0.112)</td>
<td>-0.302 - 0.169</td>
</tr>
<tr>
<td>Age in years</td>
<td>0.019 (+- 0.008)</td>
<td>0.003 - 0.036</td>
</tr>
<tr>
<td>Male sex</td>
<td>0.436 (+- 0.225)</td>
<td>-0.022 - 0.895</td>
</tr>
<tr>
<td>Civil servants</td>
<td>0.048 (+- 0.180)</td>
<td>-0.332 - 0.429</td>
</tr>
<tr>
<td>College degree</td>
<td>-0.379 (+- 0.178)</td>
<td>-0.742 - -0.015</td>
</tr>
<tr>
<td>Overweight (BMI ≥ 25)</td>
<td>-0.116 (+- 0.152)</td>
<td>-0.426 - 0.194</td>
</tr>
<tr>
<td>R²</td>
<td>0.399</td>
<td></td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.258</td>
<td></td>
</tr>
</tbody>
</table>

Figures

![Figure 1](image-url)
Bar chart of the variance inflation factors of the regression variables for the exclusion of multicollinearity