

Subjective underchallenge at work and its impact on mental health

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Abstract

Purpose To investigate the relation between subjective underchallenge at work and the degree of depressiveness and life satisfaction.

Methods A representative sample of the German general population of $N = 1,178$ (52.5% men; age: $M = 40.4$ years, $SD = 11.3$) was included in this study. Measurements contain Satisfaction with Life Scalè (SWLS) and the Patient Health Questionnaire (PHQ-D). To assess subjective underchallenge at work, a ten-item scale was developed for the purpose of this study. The association between subjective underchallenge at work, life satisfaction and depressiveness was examined by means of path analyses.

Results A significant positive association was found between subjective underchallenge at work and depressiveness, mediated by life satisfaction. This association was not moderated by income but by level of education. Participants with a medium educational level displayed a weaker association than participants with either a high or a low educational level.

Conclusion Not only work overload but also feeling underchallenged at work can have a negative impact on mental health and well-being. This is not an issue for

blue-collar workers only and deserves more attention in future research.

Keywords Underchallenge · Boredom · Workplace · Life satisfaction · Depressiveness · Moderated mediation analysis

Introduction

The burden of underutilization and being underchallenged at work

The majority of studies about strains and mental health hazards in the workplace focus on high workload resulting in stress (e.g. Darr and Johns 2008; Drach-Zahavy 2008; Hallman et al. 2003; Leiter 1992; Melamed et al. 1999; Pearson 2008). The effects of having to work beneath one's own capabilities and experiencing underutilization and underchallenge have been examined less thoroughly but nonetheless they can cause stress and affect health (Fisher 1993, 1998; Parasuraman and Purohit 2000). The negative influences of monotonous activities on one's well-being are indeed unquestioned and substantiated in some studies, although studies are rare compared with studies on work overload (e.g. Cox 1985; Davis et al. 1983; Melamed et al. 1995). Furthermore, the majority of these studies are limited to the examination of the workflow of blue-collar workers in jobs requiring a rather low occupational qualification. Few studies (e.g. Guest et al. 1978) indicated that experiencing strain caused by being underchallenged and bored is not limited to factory workers (Fisher 1993). In the media, the expression 'boreout' has been used to represent the concept of perceived stress caused by feeling underchallenged and underutilized in a broad variety of

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workplaces with different qualification profiles (Rothlin and Werder 2007). In contrast to the ‘Burnout Syndrome’ (Maslach and Jackson 1981), which is caused by being overstrained by workload or work tasks, it has been postulated that the experience of being underchallenged can affect one’s health just as negatively as a high workload.

Being underchallenged and being well

As it is a powerful source for personal growth and development, work is of increasing importance for health and well-being in adult life in modern societies today (Siegrist et al. 2004). Being chronically underchallenged goes along with a lack of sense of achievement, in other words, an absence of internal gratification and environmental reward. Equity theory (Adams 1963, 1965) roots in exchange, dissonance and social comparison theories and states that subjects prefer situations in which all input/outcome ratios are equal. Among other things, the theoretical framework predicts a positive linear relationship between the degree of inequity an individual perceives in forms of under-reward as well as in forms of over-reward and the distress the individual feels.

The core notion of equity theory is somewhat specified for the work-related context in the effort-reward imbalance model (Siegrist 1996a, b) insofar as within the effort-reward imbalance model only inappropriately low gain and high effort matters for adverse health outcome (Siegrist 2002; Siegrist et al. 2004). Both theories state, however, that a perceived imbalance in cost/gain and effort/reward respectively leads to personal distress and can become a risk factor for mental and even physical health (e.g. Marmot et al. 1997, 2001). Equity theory proposes two levels of comparison: interpersonal and intrapersonal levels without specifying their separate or combined effects on strain. In contrast, the effort-reward imbalance model analyses the equity of reward exclusively as a function of invested effort. The model of effort-reward imbalance assumes that effort at work is spent as part of a contract based on the norm of social reciprocity where rewards are provided in terms of money, esteem and career opportunity including job security (Siegrist 1996a, b). Intervention studies show an increase in employees’ self-esteem in terms of occupational reward by helping the employees’ recognizing their important roles and skills (Bourbonnais et al. 2003). Working beneath one’s capabilities frequently goes along with doubts about one’s self-efficacy (Judge and Bono 2001) and fears about job loss that arise if assignments are absent or when one feels not to contribute to the achievements of the company. Being underchallenged and bored could therefore be seen as specific stressors, as the underchallenged individual perceives an imbalance between their effort and the received reward (e.g. salary) by interpersonal as well as by intrapersonal comparison.

Also in behavioural theories, inadequate environmental reward has consistently been highlighted as a risk factor for impaired well-being and negative affect, particularly with regard to the development and maintenance of depressive symptoms (Armento and Hopko 2007; Ferster 1973; Hopko et al. 2003a, b; Kazdin 1974; Lewinsohn 1974; Lewinsohn et al. 1985, 1998; Martell et al. 2001). Based on this framework, several behavioural treatments for depression were developed to facilitate increased access to reward (Lewinsohn et al. 1980; Sanchez et al. 1980).

Aims of the present study

Based on these considerations, the concept of subjective underchallenge at work and its impact on mental health was operationalized and examined. Due to a current lack of psychometric evaluated instruments and with reference to Rothlin and Werder’s ‘Boreout-concept’ (2007), a questionnaire was developed to assess different aspects of subjective underchallenge at work. Its psychometric properties were evaluated based on the data of a representative sample. Subsequently, the relation between subjective underchallenge at work and the degree of depressiveness was investigated. The following hypotheses were examined in this context:

Hypothesis 1

Based on the assumption that feeling underchallenged at work disturbs the effort-reward balance of a person and that behavioural theory views such an imbalance as a risk factor for depressive patterns, we hypothesize that there is a significant association between the reported level of the reported experience of being underchallenged at work and depressiveness.

Hypothesis 2

Feeling distressed in one’s workplace as one core domain of life affects the overall life satisfaction depending on how many other domains contributing to life satisfaction are intact. We therefore further assume that the relation between subjective underchallenge at work and depressiveness is mediated by overall life satisfaction, presuming that overall life satisfaction may function as a buffer against negative health impact of the feeling of being underchallenged at work.

Taking into account the repeatedly shown gender (e.g. Breslau et al. 2000; Daig et al. 2009; Kendler et al. 2001; Lucht et al. 2003) and age differences (e.g. Bourque et al. 2005; Brenninkmeijer et al. 2008; Daig et al. 2009; Engström and Janson 2007; Lubetkin et al. 2005) in

depression and sensitivity to stress, we controlled for these variables.

In addition, we analysed exploratively whether the proposed relations were moderated by educational background and income. As years of education could be seen as an invested effort, a higher educational background could therefore increase the perceived imbalance. Then, again it could also function as a protective factor, as findings suggest that the adverse health effects of effort-reward imbalance are greater among the less privileged working population (Kuper et al. 2002). Again, only the high effort/low reward perspective within the effort-reward imbalance model has been considered in those studies.

Furthermore, income could serve as a protective factor being an external reward in higher-income groups or being considered as justified low in lower-income groups (Veenhoven 1991, 1992; Diener and Diener 1995). On the other hand, a higher income could increase the perceived imbalance and therefore enhance the experienced distress.

Method

Procedure

This study was part of a nationwide representative face-to-face household survey conducted in Germany. Study participants were interviewed using a structured self-report questionnaire. The survey was carried out between May and July 2009 by professional interviewers of a demographic consultation company (USUMA, Berlin). A representative sample of the general German population, aged 14–59 years, was approached using 258 sample points. Addresses were selected following the random-route procedure. If the target person was not at home, a maximum of three attempts was made to contact him or her. All subjects were visited by a study assistant. They were

informed about the investigation, and self-rating questionnaires were presented. The assistant waited until participants completed all questionnaires and offered help if someone did not understand the meaning of the questions. Written informed consent was provided by all participants after the procedures had been fully explained. A total of 2,512 participants had been interviewed.

Instruments

Subjective underchallenge at work

The present questionnaire comprises ten items (see Table 1) based on the popular science ‘Boreout-concept’ by Rothlin and Werder (2007). The participants were instructed as follows: ‘Please answer the following questions with regard to how you felt about your work situation *over the last four weeks*’. The answers were reported on a 5-point likert scale ranging from ‘never applies’ (=0) to ‘applies very often/all the time’ (=4). The total ‘subjective underchallenge’ score was computed by summing up all items after reversing the polarity of items 4, 7, 9 and 10 (see Table 1) with a range from 0 to 40. In this sample, values ranged from 0 to 35 ($M = 10.14$, $SD = 6.29$). The internal consistency was satisfactory (*Cronbach’s alpha* = 0.85).

Depressiveness

The degree of depressiveness was measured by means of the German version of the ‘Patient Health Questionnaire’ (PHQ-D; Gräfe et al. 2004). Following the DSM criteria for the existence of depressive symptoms, nine 4-point likert scale items were presented to the participants. For analysis, item responses were combined in a sum score ($M = 2.00$; $SD = 2.73$, range = 0–22). The internal consistency was satisfactory (*Cronbach’s alpha* = 0.86).

Table 1 Item characteristics ‘subjective underchallenge at work’

<i>N</i> = 1,178			
The following questions aim towards your feeling at work <i>over the last 4 weeks</i>	<i>M</i>	<i>SD</i>	Corr. item-total correlation
I feel bored by my job	0.71	0.85	0.61
I’m underchallenged by my job	0.84	0.91	0.52
I feel exhausted after work, even though having little to do at work	0.93	0.89	0.42
My job is fulfilling	1.18	1.04	0.61
I miss a deeper meaning in my job	0.93	1.02	0.66
I could accomplish my work faster than I do	1.15	0.97	0.43
I find my job interesting	1.21	1.04	0.65
I do things at work to look busy	0.74	0.92	0.48
My job makes me happy	1.45	1.03	0.58
I have a sufficient amount of work to do	0.99	0.94	0.55

Life satisfaction

Overall life satisfaction was measured by the five items of the German version of the ‘Satisfaction with Life Scale’ (SWLS; Schumacher 2003). Responses were given on a 7-point likert scale (‘disagree absolutely’ = 1 to ‘agree absolutely’ = 7) and summed up. The sample mean of overall life satisfaction was $M = 25.98$ ($SD = 5.60$; range = 5–35).

Sample

Data of $N = 1,725$ participants, aged 14–59 years ($M = 40.36$ years; $SD = 11.31$), were evaluated. About one-fourth ($n = 497$) of the attendants declared to neither study nor be employed and were excluded from analyses.

Another 45 participants did not respond to any of the ten items. In addition, five participants who did not answer the questionnaire in total were excluded, which resulted in a sample size of 1,178 participants. A missing data analysis did not show significant group differences regarding the sociodemographic variables, except for the status of employment. The sociodemographic characteristics of the study sample are listed in Table 2.

Analysis

Hypotheses were tested calculating path analyses with manifest variables with the statistical software AMOS 18 (Arbuckle and Wothke 1999) which allows multi-group comparisons beyond linear regression analyses only.

Table 2 Sample characteristics

	<i>n</i>	%	SUCAW <i>M</i> (<i>SD</i>)	
Sex				
Male	619	52.5	9.87 (6.29)	$F [1.1176] = 2.33$
Female	559	47.5	10.43 (6.23)	
Marital status				
Single	345	29.3	10.35 (6.74)	$F [4.1173] = 1.68$
Married, living with partner	652	55.3	9.88 (6.05)	
Married, living alone	11	0.9	10.45 (4.48)	
Divorced	150	12.7	10.34 (6.18)	
Widowed	20	1.7	13.30 (6.78)	
Age in years				
<24	129	11.0	10.03 (6.32)	$F [4.1173] = 0.50$
25–34	233	19.8	10.63 (6.31)	
35–44	349	29.6	9.97 (6.27)	
45–54	325	27.6	9.97 (6.29)	
55+	142	12.1	10.26 (6.30)	
Education				
≤8 years	401	34.0	12.29 (6.81)	$F [4.1173] = 30.51^*$
10 years	508	43.1	9.57 (5.62)	
12+ years	177	15.0	7.89 (5.62)	
Academic graduation	82	7.0	7.89 (5.62)	
Unclear	10	0.8	11 (7.36)	
Income per month in €				
<1000	332		10.95 (6.83)	$F [2.1175] = 13.08^*$
1000–1500	396		10.80 (6.25)	
1500+	450		8.96 (5.71)	
Employment status				
Blue-collar worker	83	7.0	15.37 (7.76)	$F [5.1172] = 19.79^*$
Skilled labour	270	22.9	10.61 (6.13)	
Self-employed/freelance	100	8.5	6.96 (5.48)	
Employee	611	51.9	10.00 (5.80)	
Civil servant	46	3.9	7.98 (6.34)	
Student/trainee	68	5.8	9.26 (6.14)	

SUCAW subjective underchallenge at work

* $p < 0.001$

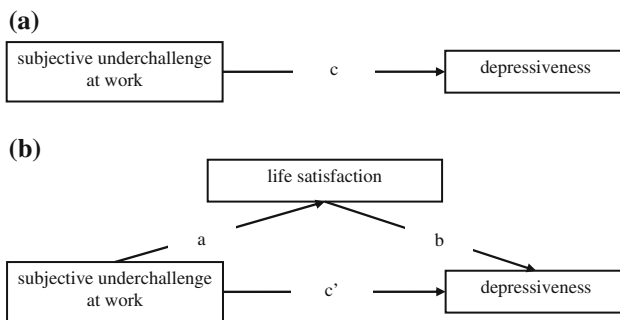


Fig. 1 Mediator analysis with **a** The unmediated, total effect and **b** Mediated, indirect effect of subjective underchallenge at work on depressiveness

Mediation analysis

The total and indirect effects of subjective underchallenge at work on depressiveness controlled for age and sex were examined by mediation analyses. Mediation analysis tests whether a total effect (path *c*) can be explained by a third variable (see Fig. 1). In case the direct effect (path *c'*) becomes non-significant when controlling for the mediator, full mediation is found. If the direct effect (path *c'*) turns out to be weaker but still significant, a partial mediation is proven. Overall life satisfaction was considered to be a mediator of the relationship between underchallenge at work and depressiveness. The significance of the indirect effect (paths *a***b*), indicating a mediation effect, was tested with the Sobel test (Preacher and Hayes 2004).

Moderation analysis

Moderation analysis permits to test whether a given total effect depends on further characteristics, i.e. on the values of a moderator variable. Moderation analyses were calculated conducting multigroup analyses (Kline 2005). The variables ‘income’ and ‘education’ were considered as categorical moderators with three levels defining the groups for analyses (low, medium, high). In multigroup analyses, ‘nested models’ were tested against each other. At first, the path coefficients of the hypothesized associations were tested separately for each group in a general model. Secondly, all paths were restricted to be equal across groups. $\Delta\chi^2$ -test was used to test whether an aggravation in χ^2 , moving from the general to the more restricted model, was significant. If this was the case, group comparisons were made by post hoc analyses. For the moderation analysis, additional models with a free coefficient of path *c* for each group were specified and compared with the restricted model. As three post hoc comparisons were made in each case, the significance level was corrected according to Bonferroni ($p < 0.017$) in order to avoid a type I error accumulation.

Moderated mediation analysis

In addition to the mediation analysis, a moderated mediation analysis tests whether single paths in the mediation model depend on the values of a moderator and must be considered to be unequal for different values of the moderator. For moderated mediation analyses, multigroup analyses were conducted as explained earlier (Kline 2005) with ‘income’ and ‘education’ examined as categorical moderators. If the $\Delta\chi^2$ -test indicated moderations in the model, post hoc analyses were performed following a two-step-procedure. At first, three models were tested, comparing respectively one path *a*, *b* or *c'* to be estimated freely for each group against the restricted model, where all paths are set to be equal. Paths, which could not be assumed to be invariant across groups, were investigated more closely in a second step in order to compare groups. Three additional models were specified with the coefficient of the respective path set to be free for one group and compared with the restricted model. As before, Bonferroni correction of significance ($p < 0.004$) was applied.

Results

The overall mean for the SUCAW—Questionnaire in this sample was $M = 10.41$ ($SD = 6.29$). As displayed in Table 2, subjects did not differ in their feeling of being underchallenged at work compared by sex, marital status or age. Regarding employment status, blue-collar workers were more prone to feel underchallenged at work than other employment groups. Furthermore, subjects with a lower education level displayed a higher level of feeling underchallenged at work than subjects with a higher educational level. Also subjects with an income below 1,500 Euro/months scored higher on the SUACW than subjects earning more than 1,500 Euro/month.

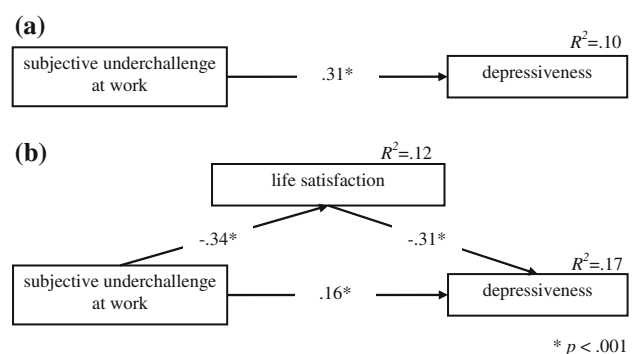


Fig. 2 Mediator analysis with **a** The unmediated, total effect and **b** Mediated, indirect effect of subjective underchallenge at work on depressiveness, controlled for gender and age

Table 3 Moderation of the total effect c: multigroup analyses comparing education levels

	Total effect model				Group-specific paths			
	Total sample		Low education		Average education		High education	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Path c								
SUCAW → depressiveness	1.21**	0.13	1.49**	0.19	0.76**	0.22	1.37**	0.29
$\Delta\chi^2$ (<i>df</i>)	6.87* (2)		3.99 (1)		6.75* (1)		0.37 (1)	

B unstandardized path coefficients, *SE* standard error of *B*, *SUCAW* subjective underchallenge at work

* $p < 0.05$, ** $p < 0.001$

Total effect of subjective underchallenge at work on depressiveness

In line with the first hypothesis, a significant positive total effect *c* was found between subjective underchallenge at work and depressiveness ($\beta = 0.31$, $p < 0.001$; $R^2 = 0.10$), controlled for age ($\beta = 0.12$, $p < 0.001$) and sex ($\beta = -0.01$, *n.s.*) (see Fig. 2, panel a). These findings indicate that the experience of being underchallenged at work is detrimental for mental health and potentially a risk factor for depressiveness, regardless of the effects of age and sex.

Mediation of the effect of subjective underchallenge at work on depressiveness by overall life satisfaction

Confirming the second hypothesis, the association between subjective underchallenge at work and depressiveness was partially mediated by overall life satisfaction (see Fig. 2, panel b). The indirect effect $a*b$ of subjective underchallenge at work on depressiveness via life satisfaction was significant ($\beta_{\text{indirect}} = 0.10$, $Z_{\text{Sobel}} = 8.05$, $p < 0.001$). However, the direct effect c' became weaker but remained significant ($\beta = 0.16$, $p < 0.001$).

Moderation and moderated mediation by income and education

Income

Neither the total effect ($\Delta\chi^2(2) = 3.47$, $p = 0.18$) nor the mediation model ($\Delta\chi^2(6) = 9.83$, $p = 0.13$) was moderated by the level of income. Income did not affect the association of subjective underchallenge at work and depressiveness.

Education

Considering education as a moderator variable, the total effect *c* of subjective underchallenge at work and depressiveness was found to be moderated ($\Delta\chi^2(2) = 6.87$,

$p = 0.03$). Post hoc comparisons revealed that participants with an average educational level (graduation after 9 or 10 years; $\Delta\chi^2(1) = 6.75$, $p = 0.009$) did not equal the other two groups. In comparison with participants with a low or a high educational level (graduation after 8 years resp. more than 12 years; $\beta = 0.36$, $p < 0.001$; $R^2 = 0.14$), they showed a weaker association between subjective underchallenge at work and depressiveness ($\beta = 0.16$, $p < 0.001$; $R^2 = 0.03$) (see Table 3).

Education was also found to moderate the mediation model ($\Delta\chi^2(6) = 21.18$, $p < 0.001$). While path *b* and path c' could be assumed invariant across groups, group differences were found for the association of subjective underchallenge at work and life satisfaction (path *a*: $\Delta\chi^2(2) = 14.67$, $p < 0.001$). As before, participants with a medium educational level did not equal the other two groups ($\Delta\chi^2(1) = 14.46$, $p < 0.001$). They displayed a weaker association ($\beta = -0.15$, $p < 0.001$) of subjective underchallenge at work and life satisfaction than participants with either a high or a low educational level ($\beta = -0.38$, $p < 0.001$). The indirect effects $a*b$ were $\beta_{\text{indirect}} = 0.05$ ($Z_{\text{Sobel}} = 3.20$, $p = 0.001$) in the group with an average educational level and $\beta_{\text{indirect}} = 0.12$ ($Z_{\text{Sobel}} = 7.75$, $p < 0.001$) in the other two groups. Figure 3 and Table 4 present the final model.

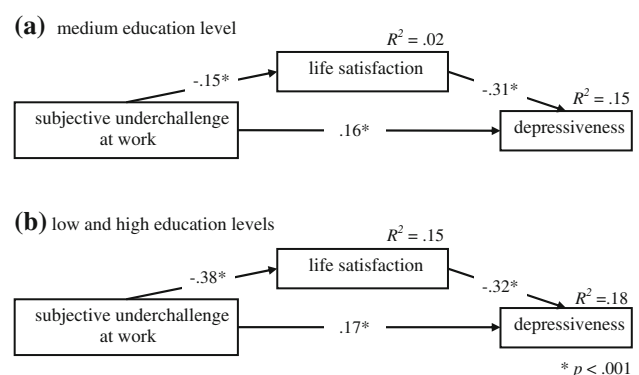


Fig. 3 Moderated mediation analysis with moderated path *a* for **a** Medium and **b** Low/high education levels, controlled for age and sex

Table 4 Moderated mediation: multigroup analyses comparing education levels

	Mediation model				Group-specific paths			
	Total sample		Low education		Average education		High education	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Path a								
SUCAW → life satisfaction	−2.72*	0.26	−3.36*	0.42	−1.42*	0.43	−3.68*	0.54
$\Delta\chi^2$ (<i>df</i>)	14.67* (2)		4.09 (1)		14.46* (1)		4.13 (1)	
Path b								
Life satisfaction → depressiveness	−0.16*	0.01						
$\Delta\chi^2$ (<i>df</i>)	2.62 (2)							
Path c'								
SUCAW → depressiveness	0.77*	0.13						
$\Delta\chi^2$ (<i>df</i>)	2.41 (2)							

B unstandardized path coefficients, *SE* standard error of *B*, *SUCAW* subjective underchallenge at work

* $p < 0.001$

Discussion

The aim of the study was to investigate subjective underchallenge and underutilization at work as a possible stressor and risk factor for impaired mental health. In accordance with the first hypothesis, subjective underchallenge at work was significantly associated with depressiveness. This could not be attributed to known influencing factors such as age and sex, since those were statistically controlled for. The findings confirm the idea that a pronounced perception of feeling underchallenged or underutilized and bored in the workplace is accompanied by a higher rate of depressiveness. With reference to working participants, it was further hypothesized that subjective underchallenge at work is not only directly connected to depressive symptoms but also affects general life satisfaction. The relationship between subjective underchallenge at work and depressive symptoms was mediated by overall life satisfaction. These findings suggest that psychological results of subjective underchallenge at work have negative consequences especially when overall life satisfaction is associated with work satisfaction or dissatisfaction to a larger extent. It can be assumed that the higher the meaning of work and employment as a source of gratification in relation to other areas of life, the higher the effects of the absence of these gratifications on well-being and self-esteem. Although participants with a high income reported significantly less subjective underchallenge at work, the mediation effect was independent of the level of income. It has been documented in numerous studies that in Western cultures, in particular, that income is an essential predictor of general well-being and general life satisfaction (Veenhoven 1991; Diener and Diener 1995). However, the consequences of feeling

underchallenged at work did not vary among different income groups. This underlines the importance of intrinsic gratification for well-being and mental health. In addition, the mediation was moderated by the level of education. It seems plausible that there is an association between life satisfaction and the experience of being underchallenged at work especially for subjects with a low level of education, with low education being a proxy for monotonous tasks which have been shown to negatively affect mental and physical health (Melamed et al. 1995; Shostak 1980). Frequently, less qualified employees are appointed to do any task including preliminary work and unskilled labour, which might not be challenging enough. In this study, we did not focus on the specific task demands required at work but on the subjective perception of working below one's own ability and capacity. In this case again, the actual salary level seems to be less important. Rather fear of job, loss might be of significance in this context. If the employee feels that his occupation is insufficiently demanding, not meaningful, or could be done faster, the employee will not consider himself as a valuable staff member and will possibly consider his position/himself replaceable if not dispensable. In times of economical precariousness and impending shortages of orders, there is a growing fear that 'one could be made redundant first' which is an important negative predictor for mental health (de Witte 1999). However, the moderation by educational level highlights that the risk of actually suffering from subjective underchallenge at work is not a specific problem of lowly qualified blue-collar workers. People with a higher educational background are prone to negative consequences from experiencing underchallenge and underutilization as well. In comparison with persons with a medium level of education, it should be

considered that more time-consuming education can be regarded as a higher investment in occupational development (Parasuraman and Purohit 2000). Therefore, it can be assumed—for this group specifically—that the imbalance between qualification and the actual demand is perceived as particularly negative and therefore impairing well-being and mental health.

Limitations and outlook

The present study used cross-sectional data. Therefore, causal connections cannot be deduced. The constructs ‘subjective underchallenge at work’ (as part of ‘work satisfaction’) ‘life satisfaction’ and ‘depressiveness’ overlap in part. It would be conceivable that humans with depressive symptoms and/or low life satisfaction view their life, work and occupation more negatively due to their more negative view of life, future and themselves at present. A major issue is that all study variables are based on self-reports that bear the risk of creating spurious or inflated relationships due to common method influences. In addition, responses to the items measuring underchallenge obviously comprise a strong evaluative component. Since the PHQ for the measurement of depressiveness contains strong evaluative judgements as well, more research has to be undertaken to assure that the observed associations do not simply reflect methodological artefacts but ‘true’ relationships. Controlling for negative affectivity in further studies could be one possible solution to this problem and as such has been recommended by several experts in this field (e.g. Frese and Zapf 1988; Spector 2006).

In this study, the data for depressive symptoms were collected via a self-assessment procedure. The PHQ is a well-established screening instrument for depressive symptoms. However, it cannot be utilized to diagnose a clinical depression. The distribution of data in our sample showed rather low values of depressiveness. Our concern was not to differentiate between depressive and non-depressive subjects, but to investigate the association of depressive symptoms and subjective underchallenge at work. In case of an existing clinical depression, it would be expected that the variance of the SUACW score would be smaller within the group of depressive subjects, and a comparison would not be very conducive to our purpose. Furthermore, it would be expected that clinically diagnosed depressive persons would consider themselves to be overburdened and exhausted irrespective of actual demands. In the present study, subjective underchallenge at work is not considered to be a symptom or catalyst for clinically relevant depressions. Future studies could examine such processes induced by subjective underchallenge in longitudinal research designs and illuminate the meaning of the experience of being underchallenged and underutilized for the development

of depressive symptoms and in depressive patients under psychiatric treatment. In this study, no information on objective job characteristics was collected. A subjective assessment was made with regard to the sense of job requirements and work intensity. Therefore, the emphasis is explicitly placed on the subjective experience of being underchallenged. Further studies will have to consider what kind of work and occupational attributes promote subjective underchallenge and its negative psychological consequences. In this context, the issue of organizational structures on the one hand and personality traits on the other hand need to be addressed as contributors to perceiving tasks as ‘underchallenging’. Furthermore, it is of interest at which stage this experience becomes a health risk. For example, equity theory and the effort-reward imbalance model are based upon the assumption that individuals are equally sensitive to equity, which is questioned by Huseman et al. (1987) who suggest that equity sensitivity should be considered as a control variable.

One further limitation of this present study is its exclusive focus on Western European workers in a German representative sample. As several studies show, risk and protective factors on health may not have the same impact on different cultural subgroups (Rodriguez et al. 1999), so our results will only be valid for this specific focus group.

For the present study, the subjective underchallenge was operationalized as a one-dimensional construct. The internal consistency of the instrument was satisfactory which allows assuming that the items are homogenous. Nevertheless, it might also be of interest for further research to examine differential aspects of underchallenge more closely, such as the quantitative experiences of being underchallenged, finding no or little meaning in ones work, and the lack of fun and job satisfaction in general. Future studies should consider a differentiation between the subjective feeling of underchallenge as a stressor and boredom as a reaction to stress. With regard to this question, little differentiation can be found in research to date.

Conflict of interest The authors declare that they have no conflict of interest.

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