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Research Article

Thriving on Job Demands? Exploring Associations between Goal Uncertainty, Anxiety, and Job Autonomy for Employees with Metabolic Syndrome

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ABSTRACT

Anxiety disorders are among the most common distressing diseases worldwide and have been the focus of increasing attention by companies, as they are associated with impaired work performance, higher absenteeism, and greater health-related costs. The risk of disease is particularly pronounced in individuals with metabolic syndrome and unfavorable working conditions. Nevertheless, empirical knowledge on interactions of metabolic syndrome, job characteristics, and psychiatric morbidity is still sparse. This cross-sectional study included survey data from 176 company employees with diagnosed metabolic syndrome to examine associations between anxiety and job-related factors, namely goal uncertainty and job autonomy. Descriptive data analysis along with Spearman's rank correlation analysis were performed. Study hypotheses were tested using moderated hierarchical multiple regression analyses. Results extend worksite health promotion literature by demonstrating a slightly U-shaped relation between goal uncertainty and anxiety (β=.16, $p \leqslant .05$). While moderate levels of goal uncertainty contributed to well-being in terms of low anxiety severity, low and high goal uncertainty were associated with more severe anxiety. This highlights the need to consider differentiated stressor conceptualizations in research on antecedents of employees' well-being. However, job autonomy showed neither a direct nor a moderating effect on anxiety.

Keywords: job stressor, anxiety, challenge-hindrance stressor model, job demands-resources model

INTRODUCTION

Anxiety, characterized by feelings of tension, apprehension, nervousness, inner unrest, and excessive worry (Dilling and Freyberger, 2019), represents a highly disabling disorder causing decreased job performance (Ford et al., 2011; McCarthy et al., 2016), higher work disability and absenteeism (Hendriks et al., 2015; Jones et al., 2016) as well as significant economic burden (Csupak et al., 2018; Kahl et al., 2015). In 2019, approximately 38% of the world population suffered from an anxiety disorder, representing not only about 300 million prevalent cases but also a 50% increase in the absolute number of anxiety disorders since 1990 (Yang et al., 2021). Noteworthy, individuals with underlying medical conditions and those with high job stress appear to be particularly affected.

Thus, for individuals with metabolic syndrome, a clustering of cardio-metabolic risk factors (Grundy et al., 2005; Huang, 2009; Vinluan et al., 2012), anxiety is more prevalent and severe (Carroll et al., 2009; Räikkönen et al., 2002). Similarly, individuals who experience stressful working conditions are at increased risk of an anxiety disorder (Jones-Rincon and Howard, 2019; Melchior et al., 2007). The consequences are concerning, considering that both metabolic syndrome and work-related stress are widespread and associated with adverse outcomes.

The results, opinions, and conclusions expressed in this study are not necessarily those of Volkswagen Aktiengesellschaft.

Accordingly, metabolic syndrome per se affects one in four people worldwide (O'Neill and O'Driscoll, 2015) and leads to increased health-related absenteeism and health risks (Burton et al., 2008; Jones-Rincon and Howard, 2019) as well as higher health care costs (Schultz and Edington, 2009a, 2009b, 2010). In addition, a Europe-wide workforce survey revealed that more than one-sixth (17%) experience daily stress at work (ADP, 2019). It was also estimated that in the United Kingdom alone around 0.8 million workers suffered from work-related stress, depression, or anxiety in 2019/2020, resulting in 17.9 million lost workdays (Health and Safety Executive, 2020).

The findings suggest two things: firstly, a possible reinforcing mechanism whereby poor working conditions are correlated with higher levels of anxiety, especially in individuals with metabolic syndrome who are predisposed to it anyway; and secondly, the need to better understand the relationship between work characteristics and mental health, particularly with a view to the development of effective prevention measures in the workplace.

In this regard, previous stress research has already indicated that certain health effects are associated with specific stressors and resources of work activity (Bakker and Demerouti, 2007; Bakker et al., 2003; Demerouti et al., 2001). For instance, high levels of job autonomy, a job resource that implies a high degree of control over how to accomplish job tasks (Stegmann et al., 2010), have been shown to be negatively related to employees' anxiety (Griffin et al., 2002; Wieclaw et al., 2008; Zurlo et al., 2018). Other studies additionally revealed that job autonomy attenuates the relation between job stressors and anxiety (Jensen et al., 2013; Prem et al., 2016). A recent Korean study, for example, found that wage workers with high demands and low decision latitude suffer more frequently from anxiety than those with high decision latitude while dealing with high demands (Kim et al., 2021). Thus, job resources such as job autonomy not only have a positive main effect on well-being in terms of low anxiety intensity but also attenuate the negative effects of work-related stress on mental health.

However, findings on job stressors, understood as those aspects of work that require sustained effort and therefore impose certain psychophysiological costs (Bakker and Demerouti, 2007; Demerouti et al., 2001), are less clear. On the one hand, there is a large body of research showing that exposure to job stressors relates to higher levels of anxiety in the absence of sufficient job resources (Chen et al., 2017; Diestel and Schmidt, 2012; Prem et al., 2016; Rodell and Judge, 2009; Santa Maria et al., 2018). As an example, goal uncertainty, a job stressor defining a general lack of clear information (Semmer et al., 1999), has been shown to have a positive relation with anxiety (Caplan and Jones, 1975; Yongkang et al., 2014). In turn, other empirical findings suggest that job stressors also trigger favorable responses, depending on whether they are perceived as hindering or challenging.

Job stressors perceived as challenging are positively related to mental well-being (e.g., feelings of vitality, enthusiasm, job satisfaction), whereas stressors perceived as hindering are negatively associated with it (Cavanaugh et al., 2000; Crawford et al., 2010; Gerich, 2017; Liu and Shi, 2010). A study by Rodell and Judge (2009) also concluded that hindrance stressors were positively related to feelings of anxiety and anger. Remarkably, challenge and hindrance appraisals are not necessarily mutually exclusive, which means one and the same stressor can be perceived as both challenging and hindering (Gerich, 2017; Lazarus and Folkman, 1984). Webster et al. (2011) accordingly found that uncertainty due to a lack of clear information can be rated as a challenge or a hindrance to varying degrees.

Building on this, activation theory offers a possible explanation for these results (Gardner and Cummings, 1988). It states that particularly low and high levels of job stressors should be perceived as under – or overloading, in other words, as hindering and consequently cause negative responses (e.g., high anxiety), whereas moderate levels of job demands should be appraised as challenging and trigger positive effects (e.g., low anxiety).

In summary, the assumption of a U-shaped relationship between job stressors (e.g., goal uncertainty) and employees' anxiety is theoretically appealing. However, to our knowledge, corresponding interactions and their boundary conditions have not yet been investigated, certainly not in employees with metabolic syndrome. We address this gap by examining the relations between the job stressor of perceived goal uncertainty, the work-related resource of perceived job autonomy and anxiety severity. The aim of the present study is to test the following hypotheses:

1. **Hypothesis 1:** There is a U-shaped relationship between goal uncertainty and anxiety.
2. **Hypothesis 2:** Job autonomy is negatively related to anxiety.
3. **Hypothesis 3:** Job autonomy moderates the U-shaped relationship between goal uncertainty and anxiety. Employees with high job autonomy respond with high levels of anxiety to low or high levels of goal uncertainty and with low levels of anxiety to moderate goal uncertainty. In contrast, anxiety is linearly and positively related to goal uncertainty for those with low job autonomy.

METHODS

Procedure and Participants

The current study is part of a cooperation project between Volkswagen AG and Hannover Medical School for health promotion of Volkswagen employees. The collaboration was launched by a randomized controlled trial (RCT) of the effectiveness of regular exercise on metabolic syndrome severity (Haufe et al., 2019). Following this pilot study, we conducted the present cross-sectional analysis. Participants were approached within a 12-month follow-up of the RCT. For recruiting, study nurses and physicians initially informed attendees about the additional survey study and asked for their participation. If volunteers agreed to participate, they were provided with a survey package and an information sheet with a study description. Anonymous survey data was collected at Volkswagen's main plant in Wolfsburg (Lower Saxony, Germany).

Measures

Anxiety

A corresponding 7-item subset of the hospital anxiety and depression scale (HADS; Herrmann-Lingen et al., 2011) was used to collect psychopathological data. The items (e.g., "I get sudden feelings of panic.") were answered by participants on a 4-point rating scale ranging from 0 to 3 and added up to a sum score (range: 0 to 21). Clinically relevant anxiety is indicated as the score of seven points is exceeded. More specifically, a sum score of 8 to 10 points can be interpreted as mild anxiety, 11 to 14 indicates moderate anxiety, and values equal to or greater than 15 define severe anxiety. The HADS is not considered to be biased by physical conditions as it excludes items that relate anxiety or depression to physical health issues. Cronbach's alpha for the German version of the anxiety scale is .80 (Hinz and Schwarz, 2002; Petermann, 2011).

Goal uncertainty

For measuring unclear or contradictory instructions from supervisors as well as the lack of job-related information in decision-making processes, we used the subscale for goal uncertainty from the instrument for stress-oriented task analysis (ISTA) (Semmer et al., 1999). This is a widely applied German questionnaire for the assessment of stress-relevant job characteristics. Participants answered a total of five items (e.g., "How often do you receive conflicting instructions from different supervisors?") with a 5-point Likert scale ranging from 1 (very seldom/never) to 5 (very often/once to several times a day). Ratings were summarized to an average score. Cronbach's alpha was .78.

Job autonomy

We assessed job autonomy with the subscales *work scheduling autonomy* (e.g., "The job allows me to make my own decisions about how to schedule my work."), *decision-making autonomy* (e.g. "The job gives me a chance to use my personal initiative or judgment in carrying out the work."), and *work methods autonomy* (e.g. "The job allows me to make decisions about what methods I use to complete my work.") from the German adaptation of the work design questionnaire (WDQ) (Stegmann et al., 2010). The participants' assessment of the total of nine items was based on a 5-point Likert scale. Average scores were calculated. To examine whether the three sub-scales are distinct constructs, we conducted confirmatory factor analyses in RStudio (version 1.2.1335). A three-factor model with respective items loading on whether a scheduling factor, a decision latitude factor, or a work methods factor showed an acceptable to good fit (χ^2=37.840; *df*=24, *p*=.036; *RMSEA*=.060; *SRMR*=.034; *CFI*=.988; *n*=176) and fitted the data better than a one-factor model with all items loading on a single factor (χ^2=179.740; *df*=27, *p*=.000; *RMSEA*=.188; *SRMR*=.078; *CFI*=.865; *n*=176). Cronbach's alphas, computed separately for the three sub-scales, ranged from .87 to .91.

Demographic and control variables

We collected gender, age, leadership responsibility, job tenure, contractual working time, shift work, height, and weight with single items. Using the individual size and weight information, the body mass index (BMI) was calculated according to the formula kg/m^2. Metabolic syndrome severity was calculated as a Z score according to a formula by Gurka et al. (2014) based on waist circumference, blood lipids (HDL and triglycerides), fasting glucose, and systolic blood pressure from RCT follow-up data. However, since none of these variables significantly correlated with anxiety, they were not included in the main analysis (Becker, 2005). In addition, work ability was assessed with the work ability index (WAI) (Tuomi et al., 1998) and general health with the eponymous scale of the 36-item short form health survey questionnaire (SF-36) (Morfeld et al., 2011). The WAI questionnaire includes seven dimensions with 10 questions on work, work ability, and health (e.g., "Do you believe, according to your present state of health, that you will be able to do your current job two years from now?"), which, when added up the points of each relevant item, yield a total score ranging from 0 to 49. The SF-36 general health scale consists of five items (e.g., "I am as healthy as anyone I know.") that result in a summed score between 0 (minimum) and 100 (maximum). For both scales, higher scores represent greater ability to work and better general health, respectively. Cronbach's alphas are .83 (WAI) (Bethge et al., 2012) and .76 (SF-36) (Bullinger and Kirchberger, 1998).

Statistical Analysis

Statistical analyses were done with RStudio (version 1.2.1335) and IBM® SPSS® statistics (version 24.0). Missing values were conservatively replaced by the mean of the data series. The statistical significance level for all tests was set at an α of $p \leq .05$. For pre-analysis, a series of Wilcoxon-Mann-Whitney tests for metric or ordinal scaled variables and chi-square tests for categorical variables were performed to compare survey participants and non-participants on clinical and demographic characteristics. Significance analyses of the contingency tables were evaluated using Fisher's exact test. We also calculated Wilcoxon-Mann-Whitney tests with anxiety as a response variable to investigate whether the psychopathological data of the study participants were affected by the prior lifestyle intervention (Haufe et al., 2019). The explanatory variable was study group in RCT. The problem of multiple comparisons was counteracted by correcting p-values according to Bonferroni-Holm.

Means (*M*), standard deviations (*SD*), minimum (*Min*), maximum (*Max*), and two-tailed Spearman's rank-order inter-correlations were calculated for all variables used in the main analysis. Study hypotheses were tested with moderated hierarchical multiple regression analyses. We excluded any violations of the regression assumptions before centering the variables on their respective grand mean and running the analysis. Consistent with the results of the confirmatory factor analysis, work scheduling autonomy, decision-making autonomy, and work methods autonomy were treated as separate independent and moderating variables in regression analyses. As the control variables are relatively highly correlated, an auxiliary regression was performed which regressed general health on work ability. In the main analysis, we then replaced the covariate 'general health' with the standardized residuals to avoid possible multi-collinearity problems. The results of the moderated hierarchical multiple regression analyses are presented as standardized regression coefficients accompanied by p-values and the akaike information criterion (AIC) as an indicator of model fit.

Table 1. Characteristics of survey respondents and non-participants

	All	Respondents	Non-participants
	(*n*=245)	(*n*=177)	(*n*=68)
Demographic characteristics			
Sex			
Women	32 (13%)	28 (16%)	4 (6%)
Men	213 (87%)	149 (84%)	64 (94%)
Age (years)	49.11 (8.24)	49.77 (8.08)	47.40 (8.45)
Clinical characteristics (baseline)[a]			
BMI (kg/m²)	32.96 (5.20)	32.77 (5.15)	33.47 (5.35)
MetS-Z score (unit)[b]	0.97 (0.64)	0.95 (0.64)	1.01 (0.64)
Anxiety severity (sum score)	5.16 (2.30)	4.12 (3.31)	4.90 (2.53)
Work ability index (total score)	37.44 (5.30)	37.25 (5.60)	37.95 (4.42)
General health (total score)	61.48 (15.86)	69.38 (18.10)	61.59 (15.72)
Clinical characteristics (follow-up)[c]			
BMI (kg/m²)	31.55 (5.13)	31.43 (5.31)	31.88 (4.63)
MetS-Z score (unit)[b]	.65 (0.68)	0.67 (0.73)	0.60 (0.56)
Anxiety severity (sum score)	4.03 (3.08)	4.16 (3.31)	3.70 (2.41)
Work ability index (total score)	38.97 (5.85)	39.15 (5.74)	38.51 (6.16)
General health (total score)	69.62 (17.27)	69.38 (18.10)	70.26 (15.00)
Clinical characteristics (Δ)[d]			
Δ BMI (kg/m²)	-1.41 (2.18)	-1.34 (1.80)	-1.59 (2.96)
Δ MetS-Z score (unit)	-0.32 (0.59)	-0.28 (0.54)	0.60 (0.56)
Δ Anxiety severity (sum score)	-1.13 (3.04)	-1.10 (2.97)	-1.20 (3.22)
Δ Work ability index (total score)	1.53 (5.22)	1.90 (4.82)	0.56 (6.05)
Δ General health (total score)	8.14 (15.14)	11.46 (27.24)	8.67 (13.69)
Work characteristics (follow-up)[c]			
Shift work			
Non-shift work	204 (83%)	150 (85%)	54 (79%)
Shift work	41 (17%)	27 (15%)	14 (21%)
Work hours			
Full-time	233 (95%)	169 (95%)	64 (94%)
Part-time	12 (5%)	8 (4%)	4 (6%)
Contractual working time (h)		35.18 (6.42)	
Leadership responsibility			
Non-leadership responsibility		149 (85%)	
Leadership responsibility		27 (15%)	
Job tenure (years)		26.10 (10.88)	
Study group in pilot study			
Exercise group	118 (48%)	91 (51%)	27 (40%)
Control group	127 (52%)	86 (49%)	41 (60%)

Note. Data are *n* (%) or mean (*SD*); [a]Data were collected at baseline of the pilot study (RCT); [b]The metabolic syndrome severity z-score (MetS-z) is a continuous measure derived from sex- and ethnicity-specific equations using the values of waist circumference, triglycerides, HDL cholesterol, systolic blood pressure, and fasting glucose (Haufe et al., 2019); The score (*M*=0, *SD*=1) provides information on how high the individual risk for metabolic syndrome or its severity is compared to the population; [c]Data were collected at 12-month follow-up of the pilot study (RCT); & [d]Delta values are calculated from the difference between the clinical values at follow-up and those at baseline.

RESULTS

We approached a total of 245 female and male employees over the age of 18 years, of whom 177 completed the surveys (response rate=72.2%). A total of 176 participants were included in the main analysis after adjusting for one case with missing data in several core variables of the survey (overall response rate=71.8%).

Table 1 shows the characteristics of survey respondents and non-participants. Exploring both subsamples, the Wilcoxon-Mann-Whitney test initially revealed a statistically significant difference in age between respondents and non-participants, U=4757.500, Z=-.541, p≤.05. However, the result did not withstand the Bonferroni-Holm significance level correction. Similarly, contingency analysis showed a significant effect between gender and survey study participation [$\chi^2(1)$=4.27, p≤.05, φ=0.13] that did not remain significant after applying a Bonferroni-Holm correction. Another Wilcoxon-Mann-Whitney test, calculated to examine whether anxiety severity varied among study participants depending on whether they were assigned to the exercise group or control group during the previous lifestyle intervention, also revealed no significant group differences.

Descriptive Statistics and Inter-Correlations

Table 2 displays *M*, *SD*, *Min*, *Max*, and Spearman's rank-order correlations of all study variables used in the main analysis. In correlation analysis, anxiety was significantly associated with all study variables. The correlation coefficient for anxiety and work ability (r=-.53, p≤.01) was at a high level. Moderate correlations were found for the associations with general health status and job characteristics. Thus, anxiety

Table 2. Means (*M*), standard deviations (*SD*), minimum (*Min*), maximum (*Max*), and intercorrelations of study variables

	M	*SD*	*Min*	*Max*	1	2	3	4	5	6
1 Anxiety	4.16	3.31	0	15	-					
2 Work ability	39.13	5.74	22	49	-.53**	-				
3 General health	69.39	18.15	25	100	-.44**	.60**	-			
4 Goal uncertainty	2.57	0.74	1	5	.21**	-.12	-.22**	-		
5 Autonomy (s)	3.65	0.97	1	5	-.20**	.16*	.07	-.26**	-	
6 Autonomy (d)	3.60	0.95	1	5	-.17*	.15*	.18*	-.21**	.65**	-
7 Autonomy (m)	3.63	0.94	1	5	-.20**	.15	.22**	-.15	.57**	.75**

Note. *n*=176; Standardised regression coefficients are displayed; s: Work scheduling autonomy; d: Decision-making autonomy; m: Work methods autonomy; & *p≤.05; **p≤.01.

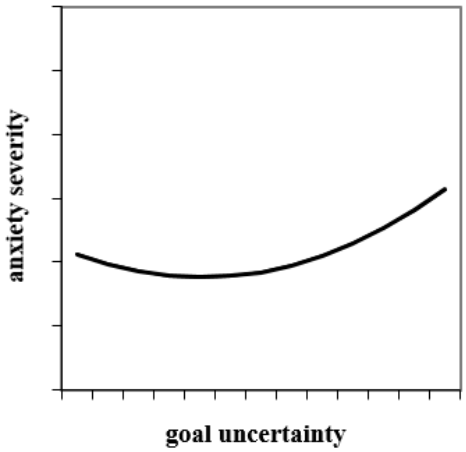

Figure 1. Graphical representations of the non-linear relationship (*n*=176, centered variables)

correlated positively with goal uncertainty (*r*=.21, *p*≤.01) as well as negatively with general health (*r*=-.44, *p*≤.01), work scheduling autonomy (*r*=-.23, *p*≤.01), decision-making autonomy (*r*=-.22, *p*≤.01) and work methods autonomy (*r*=-.22, *p*≤.01). Goal uncertainty showed significant negative correlations with both work scheduling autonomy (*r*=-.26, *p*≤.01) and decision-making autonomy (*r*=-.21, *p*≤.01) but not with work methods autonomy (*r*=-.15, *p*=.07). The corresponding correlation coefficients were mainly at a moderate level.

Tests of Hypotheses

To test hypothesis 1, which proposes a U-shaped relationship between goal uncertainty and anxiety, we specified three models. In the first step, anxiety was only regressed on the control variables, namely work ability and general health (residuals). We then entered goal uncertainty as a linear predictor in a second step, followed by the squared goal uncertainty term in the last step. Supporting hypothesis 1, we found a positive curvilinear relationship between goal uncertainty and anxiety. Including squared goal uncertainty as a predictor resulted in a significant regression coefficient (β=.16, *p*≤.05) and better model fit (ΔAIC=-4.715). To conclude that the relation between goal uncertainty and anxiety indeed followed a U-shape, we further examined the necessary condition that the implied extreme point is within the data range (Lind and Mehlum, 2010; Sigman, 2002). Accordingly, we estimated the value of goal uncertainty at which the effect on anxiety flips sign and compared it with the observed data range of goal uncertainty. We calculated the implied minimum point by using the formula $\hat{x}^{min}$=-(β/2γ) with β representing the regression coefficient of goal uncertainty as a linear predictor and γ representing the regression coefficient of squared goal uncertainty (Lind and Mehlum, 2010). Results showed the minimum point at $\hat{x}^{min}$=-.55, which is within the observed data range [-1.57; 2.43]. The assumption of a U-shaped relationship between goal uncertainty and anxiety was thus confirmed (hypothesis 1) (**Figure 1**).

Hypothesis 2 states that job autonomy is negatively related to anxiety. We conducted separate sets of analyses for work scheduling, decision-making, and work methods autonomy as distinct independent variables. Once again, anxiety was initially regressed on work ability and general health (residuals). Goal uncertainty and the respective autonomy facet were entered in the second step as linear predictors. The results are displayed in step 2 of **Table 3**, respectively. Neither work scheduling autonomy (β=-.08, *p*=.228) nor decision-making autonomy (β=-.01, *p*=.864) or work methods autonomy (β=-.04, *p*=.473) were significantly related to anxiety. Hypothesis 2 could not be confirmed.

To examine whether the curvilinear relation between goal uncertainty and anxiety is moderated by job autonomy (hypothesis 3), we ran sets of analyses in which each facet of job autonomy was handled as a separate moderating variable. As shown in **Table 3**, we entered work ability and general health (residuals) in the first step. We then added goal uncertainty and the respective facet of job autonomy as linear predictors to the model. In the third step, the linear interaction term consisting of goal uncertainty and the respective facet of job autonomy was entered. Next, the squared goal uncertainty term was included in the model, before, in the fifth and last step, the interaction term between squared goal uncertainty and the respective facet of job autonomy was added. Contrary to our expectations, the coefficient of the interaction term between squared goal uncertainty and work scheduling autonomy was not significant (β=-.07, *p*=.414), so as the interaction term between squared goal uncertainty and decision-making autonomy (β=-.07, *p*=.386) as well as the interaction term between squared goal uncertainty and work methods autonomy (β=-.05, *p*=.558). Hypothesis 3 could not be confirmed.

DISCUSSION

The purpose of this study was to contribute to the literature on worksite health promotion by exploring the associations between the job stressor of perceived goal uncertainty, the

Table 3. Results of moderated hierarchical multiple regression analyses

	Model 2		Model 3		Model 4	
	β	AIC	β	AIC	β	AIC
Step 1		349.31		349.31		349.31
Work ability	-.58**		-.58**		-.58**	
General health (r)	-.13*		-.13*		-.13*	
Step 2		343.89		345.36		344.86
Uncertainty	.16*		.17*		.17*	
Autonomy (s)	-.08					
Autonomy (d)			-.01			
Autonomy (m)					-.04	
Step 3		342.64		346.72		345.91
Uncertainty × autonomy (s)	-.11					
Uncertainty × autonomy (d)			-.05			
Uncertainty × autonomy (m)					-.06	
Step 4		339.83		342.62		341.90
Uncertainty (sq)	.13*		.15*		.15*	
Step 5		341.13		343.83		343.54
Uncertainty (sq) × autonomy (s)	-.07					
Uncertainty (sq) × autonomy (d)			-.07			
Uncertainty (sq) × autonomy (m)					.05	

Note. *n*=176; Standardised regression coefficients and Akaike information criterion (AIC) are displayed; r: Standardised residuals from auxiliary regression; s: Work scheduling autonomy; d: Decision-making autonomy; m: Work methods autonomy; sq: Squared; & *$p \leq .05$; **$p \leq .01$.

work-related resource of perceived autonomy, and anxiety severity in employees with metabolic syndrome. Using moderated hierarchical multiple regression analyses, three research questions were considered: Is there a U-shaped relationship between goal uncertainty and anxiety severity? Does high job autonomy predict low anxiety levels, and third, does job autonomy represent a necessary condition of the curvilinear relationship between goal uncertainty and anxiety?

Our analysis revealed a curvilinear effect, indicating a slightly U-shaped relationship between goal uncertainty and anxiety. Accordingly, employees with low or high levels of goal uncertainty were more likely to report high levels of anxiety, whereas those experiencing moderate levels of goal uncertainty showed lower anxiety scores. This finding is consistent with previous research. For example, a study of nearly 1,700 workers conducted by Warr (1990) found significant nonlinear relationships between job demands and aspects of affective well-being, particularly work-related anxiety and depression. De Jonge and Schaufeli (1998) similarly demonstrated that moderate levels of job stressors benefit workers' well-being, while low or high levels of corresponding stressors are associated with more severe anxiety. A recent study of Polish employees also showed that demanding supervision, a job characteristic conceptually close to goal uncertainty, has an inverted u-shaped relationship with affective well-being (Borkowska and Czerw, 2022). The observation that falling below or exceeding an apparently optimal level of goal uncertainty is related to higher levels of anxiety continues to be consistent with empirical findings (Gerich and Weber, 2020; Webster et al., 2011) suggesting that the same stressor can have both positive and negative effects on affective well-being depending on how it is appraised.

We conclude that a moderate level of goal uncertainty could be optimally stimulating. It might be seen as a challenging work experience and therefore be associated with positive affective states. Extreme stress levels, conversely, could lead to hyper- or hypoactivation, which is why they are rather appraised as uncomfortable and associated with higher anxiety. For example, individuals exposed to a high degree of goal uncertainty do not receive work-related information that is crucial for performing work tasks. As they are unable to achieve work goals, not only activation but also anxiety increases (Diestel and Schmidt, 2012; Rodell and Judge, 2009). Employees who are exposed to very low goal uncertainty, by contrast, may feel bored. They cannot contribute their knowledge or skills, for example, by independently collecting missing information. Insufficient intellectual challenge may in turn trigger negative effects such as anxiety. This assumption is supported by research showing that boredom is positively related to anxiety and depression (Sommers and Vodanovich, 2000).

Contrary to our expectations, job autonomy was not a significant predictor of anxiety severity. This contradicts the widely proven health-promoting effect, according to which a high degree of job autonomy leads to a lower risk of mental disorders such as anxiety, depression, or burnout (Crawford et al., 2010; Griffin et al., 2002; Madsen et al., 2017; Nahrgang et al., 2011; Theorell et al., 2015; Wieclaw et al., 2008; Zurlo et al., 2018). A possible explanation for our null result is provided by several studies identifying nonlinear relationships between job autonomy and mental health outcomes. Thus, Stiglbauer and Kovacs (2018) verified a significant relationship between job autonomy and affective well-being, described as an inverted U-shape. Using cross-sectional and longitudinal data from elderly care workers, Kubicek et al. (2014) also reported curvilinear effects of job control. Compared to moderate job control, both low and high job control were associated with increased levels of irritation and depersonalization as well as decreased levels of dedication. However, as other research has not been able to empirically confirm this nonlinear effect (Clausen et al., 2022; de Jonge et al., 2000; Rydstedt et al., 2006), further possibilities should also be considered. Firstly, autonomy may not be an appropriate resource in our employee sample. Individual job autonomy may prove practically

ineffective for employees whose activities are dependent on upstream and downstream activities, as it is common in just-in-time production. Regarding this, there is already some evidence that the relationship between psychosocial working conditions and respective outcomes varies across occupational groups (Clausen et al., 2014; Bakker and Demerouti, 2007). Secondly, reverse causality should not be ignored. Jobs are, after all, chosen. When seeking a job, applicants usually match their qualifications with the job requirements. The fit between individual and job characteristics plays a crucial role in job choice and is demonstrably related to the perceived attractiveness of the company and the intention to accept a job offer (Carless, 2011). Given the length of job tenure (M=26.10, SD=10.88) in our sample, it's likely that participants are employed in jobs matching their anxiety level, so job autonomy is of minor importance for anxiety severity.

In testing the hypothesized moderation, we found the relationship between goal uncertainty and anxiety to be unaffected by job autonomy. The interaction effect demonstrated in previous studies (Jensen et al., 2013; Kim et al., 2021; Prem et al., 2016), according to which employees with high job autonomy suffer significantly less from anxiety under the condition of high job demands than employees with low job autonomy, could thus not be replicated. This result may imply that job autonomy is generally not particularly helpful in coping with goal uncertainty. As mentioned above, however, it should be noted that interdependencies in workflow may negate the benefits of working autonomy at the individual level. For example, an adaptive coping strategy in dealing with goal uncertainty pertains to initially running other work tasks whose requirements are clear and distinct. This enables employees to keep purposefully working on tasks and achieve (other) work-related goals, so that anxiety does not increase. Since large-scale production, such as the automotive industry, usually works just in time and individual process steps must be executed on time, we assume that there are fewer opportunities to autonomously influence work situations that are characterized by goal uncertainty.

Ultimately, the difficulties in identifying interaction effects in the present study may also be a consequence of the triple match principle, which was demonstrated in a study by de Jonge and Dormann (2006). It was shown that the probability of identifying interaction effects was linearly associated with the degree of agreement between the predictor, the moderator, and the criterion. Accordingly, moderating effects of resources on the relation between job stress and health-related outcomes are primarily to be expected if stressor, resource, and outcome originate from the same domain (e.g., physical, emotional, or cognitive). As an example, emotional support from colleagues (emotional resource) should very likely moderate the impact of dealing with difficult customers (emotional stressor) on emotional exhaustion (emotional strain).

LIMITATIONS AND FUTURE RESEARCH

As in any study, some limitations need to be mentioned. First, the main limitation concerns the cross-sectional design on which our study relied. Causal conclusions on the tested relationships are thus precluded. Future research should use longitudinal and experimental designs. Second, the results of the present study relate to a specific sample of predominantly male Volkswagen AG employees with metabolic syndrome. We acknowledge that our sample might restrict the generalization to the total population of employees. Future studies are clearly needed to collect and possibly compare data from other occupational samples, other areas of work, and healthy employees. Of note, common method bias does not restrict the results of our study, although the data collection relied on self-reports. Concerning this matter, evidence was provided that common method variance cannot cause artefacts in quadratic and interaction regression models (Siemsen et al., 2010). Still, future studies should use multiple data sources (e.g., coworkers or spouses) to additionally assess workplace characteristics and anxiety.

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Availability of data and materials: All data generated or analyzed during this study are available for sharing when appropriate request is directed to corresponding author.

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