

**Work Autonomy, Supervisor Support, and Work Engagement in Remote Workers: The  
Moderating Role of Self-Efficacy**

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## **Executive Summary**

The study is about the concept of work engagement and three possible facilitators of it. Work engagement is a mental state, characterized by heightened focus, dedication, and feeling immersed in one's work. The aim was to study if two characteristics of work, namely work autonomy and supervisor support are related to higher levels of work engagement. Also, the personal characteristic self-efficacy was tested to see if it positively relates to higher levels of work engagement. Self-efficacy refers to one's belief about their ability to accomplish something. Both job-characteristics and the personal characteristic can be positively related to work engagement according to scientific literature. The study also investigated whether self-efficacy moderates the relationships between work autonomy and work engagement, as well as supervisor support and work engagement.

In total, 80 employees from the remote-first company comforte AG took part in the study by filling out an online survey consisting of four sets of multiple-choice questions. These measured their perception of work engagement, work autonomy, supervisor support, and self-efficacy. Results showed that higher levels of self-efficacy correlated with higher levels of work engagement. Note that this is a correlational study meaning that we cannot interpret the results as self-efficacy causing work engagement. The other predicted links between work autonomy and work engagement, supervisor support and work engagement as well as the moderating role of self-efficacy could not be found.

We wanted to better understand what makes remote workers engaged at work. Therefore, we investigated work autonomy and supervisor support as well as self-efficacy to see if they could be facilitators of their work engagement. The only relationship we found was that of higher levels of self-efficacy related to higher levels of work engagement. Ergo, raising remote working employees' self-efficacy may result in them being more engaged at

work. We presented some suggestions for Comferte AG and other organizations working remotely. These included establishing development plans with regular feedback sessions, tailored to the specific employee and provided by the supervisor. It is important to involve the worker in the decision about the frequency and the priority point of the feedback plan. In addition, mentorship programs could be a good way to increase the levels of self-efficacy of both the mentor and the learner by accomplishing the difficult task of transferring knowledge and of mastering new skills. This could increase learners self-efficacy by helping them overcome complex problems. Mentors should be compensated with time allocation and recognition. This could be especially beneficial for the engineering department of Comferte AG because it could help retain highly technical and product-specific knowledge, as older employees retire. These suggested courses of action (feedback and mentorship) are relatively cost-effective ways to increase people's self-efficacy sustainably. Additionally, self-efficacy training programs on the organization's learning platform can be suggested to all employees.

### **Abstract**

Keeping employees engaged as remote work becomes more popular is often one of the many challenges brought upon organizations choosing to work remotely. By testing antecedents of work engagement according to the Job Demands Resources model, the present study probes the role of perceived work autonomy, perceived supervisor support, and perceived self-efficacy in their relationship to perceived work engagement. The study was conducted among employees of a primarily remotely working software development company. The personal characteristic perceived self-efficacy was investigated as a potential moderator for the relationships between perceived work autonomy and perceived work engagement, and perceived supervisor support and perceived work engagement. Using a cross-sectional design, an online survey was distributed to the entire workforce to assess the independent variables that consist of job characteristics, personal characteristic, and the dependent variable perceived work engagement. Analyzing results of  $N = 80$  employees with a multiple regression analysis revealed a significant impact of perceived self-efficacy on work engagement. The other assumed main effects of perceived work autonomy and perceived supervisor support on work engagement, were not found. Neither were the moderating effects of self-efficacy on the associations between work autonomy, supervisor support, and work engagement. We demonstrate the importance of personal resources such as self-efficacy in facilitating work engagement among remote workers, which is in line with the JD-R. Self-efficacy and its potential for remotely working organizations is discussed with advice for practical application. Conceptualization of perceived work autonomy and perceived supervisor support and implications related to the remote work context are discussed.

*Keywords: work engagement, Job Demands Resources model, perceived work autonomy, perceived supervisor support, perceived self-efficacy*

Organizations across industries and scientists in the occupational psychology community have increasingly recognized the importance of work engagement for the happiness of the employee (Othman et al., 2018) and for achieving positive organizational work outcomes (Harter et al., 2003). This may be difficult in times when performing one's work outside the typical organizational boundaries of time and location, so-called remote work (Olson, 1983). Reasons for this are for instance increased family-work conflicts and distracting environments (Galanti et al., 2021).

Nevertheless, remaining agile and competitive in the talent acquisition market means being able to offer what employees currently value, for instance, remote work possibilities (Dahik et al., 2020; Ozimek, 2020). Therefore, companies are well off facilitating remote work, when possible, while simultaneously helping their employees stay engaged in the remote work context. Possibly by providing job-characteristics that are already established antecedents of work engagement (Sardeshmukh et al., 2012). This motivates researching work engagement and its antecedents in the remote work context (Mäkikangas et al., 2022).

We sought out to probe established antecedents of work engagement in the remote-first software development company *comforte AG*, where most people work remotely the majority (>50% of weekly contract hours) of the time. In doing so we contribute with first insights to the knowledge base to be used for the development of organizational practices fostering the positive mental state work engagement in employees of remote work organizations.

## **Work Engagement**

Work engagement can be described as a state in which one is “absorbed” by one’s work (Bakker et al., 2008; Schaufeli et al., 2002). It is a psychological state of mind that is

characterized by heightened focus, vigor, and facilitation of work performance. Bakker and Demerouti (2008) describe work engagement as composed of three dimensions, namely vigor (mental state characterized by energy, resilience, readiness to exert effort and perseverance in difficult situations), dedication (pride and enthusiasm, feeling of inspiration and that work is meaningful) and absorption (being mentally captivated by one's work). Taken together, these three aspects make up a person's perceived level of work engagement.

As can be inferred from the definition of work engagement, it is a positive state of mind for the employee to be working in. (Attridge, 2009; Bakker et al., 2008; Bakker & Demerouti, 2008; Priya & Vijayadurai, 2014; Schaufeli et al., 2002). A less immediate yet relevant benefit of work engagement for the individual is its contribution to personal development and growth (De Spiegelaere et al., 2016). Organizations have vested interest in enhancing work engagement among their employees due to its association with company performance (Ghani et al., 2019; Heyns et al., 2022). Attridge (2009) supports this argument by presenting significant correlations between work engagement-enhancing practices and financial performance. Work engagement has also been linked with employee productivity, customer satisfaction, company profit, and reduced employee turnover (Attridge, 2009; Harter et al., 2003; Heyns et al., 2022). In conclusion, both individual employees and the organization as a whole benefit from having high levels of work engagement in the workforce (Attridge, 2009; Bakker et al., 2008; Ghani et al., 2019; Harter et al., 2003; Heyns et al., 2022; Schaufeli et al., 2002).

### **JDR model**

An often-used theoretical model to predict work engagement is the Job Demands Resources (JD-R) model. The model distinguishes between job demands and job resources. The former refers to aspects of a job that can place a burden on the employee (e.g.,

responsibilities, high workload, etc.). Resources refer to organizational, physical, psychological, and social aspects of a job that mitigate the negative impact of job demands on people's work engagement. (Sardeshmukh et al., 2012). The model describes two pathways. One by which high job demands lead to negative outcomes such as job strain, work stress, and burnout. (Bakker et al., 2004). The adverse effects of high job demands can be mitigated by equipping people with job resources. The second pathway illustrates that job resources are linked to higher levels of work engagement. By supporting employee's well-being, motivation, and health through the providing of resources, organizations facilitate work engagement (Huynh et al., 2011). The present study will focus on the second, motivational pathway (Bakker & Demerouti, 2017).

### **Work autonomy**

One potential resource that is a well-established predictor of work engagement is work autonomy (Galanti et al., 2021; Sardeshmukh et al., 2012), which, if put in a single sentence can be described as the individual freedom to work in the way one prefers. Work autonomy can refer to different aspects of freedom at work or it can thematize the overall work autonomy as experienced by the employee (Breugh 1985). In the present study we consider employee's perception of their general autonomy at work as work autonomy (Brady, 1990). Employees provided with higher levels of perceived work autonomy have elevated levels of perceived work engagement (Malinowska et al., 2018). This is because employees who have work autonomy generally enjoy work to a higher degree, which increases their intrinsic motivation (Malinowska et al., 2018) as described in the JD-R model, in turn leading to more work engagement (Bakker & Demerouti, 2017). The link between work engagement and work autonomy has often been found in employees (Malinowska et al., 2018; Sardeshmukh et al., 2012; Swanberg et al., 2011) and some first studies have suggested high

levels of work engagement are possible in remote work, in part due to increased work autonomy (Galanti et al., 2021; Syrek et al., 2021). In conclusion, a respectable body of research shows that work autonomy is a resource in terms of the JD-R model that has a beneficial influence on employees' work engagement (Galanti et al., 2021; Malinowska et al., 2018; Muecke et al., 2020; Sarinah et al., 2018; Swanberg et al., 2011; Thomas & Feldman, 2014).

### **Supervisor Support**

Another often studied job resource important for work engagement is perceived supervisor support (N. Othman & Nasurdin, 2012; Vera et al., 2015). It can be defined as the extent to which subordinates feel that their supervisors care about their well-being and career development, and value their work contributions (Langford et al., 1997; N. Othman & Nasurdin, 2012). In practical terms, supervisor support can entail providing feedback, asking about someone's well-being, demonstrating that the subordinate's work is valued by expressing gratitude, and facilitating their attainment of resources needed to work effectively.

It has been found that subordinates of supportive supervisors display higher levels of work engagement by exerting more effort and showing more motivation as a way to reciprocate the received support (Heyns et al., 2022; N. Othman & Nasurdin, 2013; Sawasdee et al., 2020) compared to employees experiencing lower levels of support. (Attridge, 2009). Another way supervisor support contributes to work engagement is by fostering intrinsic motivation (Heyns et al., 2022). According to the self-determination theory, intrinsic motivation is rooted in one's feelings of competence, autonomy, and relatedness (Ryan & Deci, 2000). Generally, supportive supervisors strengthen these feelings in their subordinates. Consequently, it can be stated that supervisor support can be an influential resource for

promoting employee's work engagement (Attridge, 2009; Heyns et al., 2022; N. Othman & Nasurdin, 2013; Sawasdee et al., 2020; Vera et al., 2015).

### **Self-Efficacy**

Next to job characteristics, it has been described that also personal characteristics can function as resources in the JD-R model (Fernet et al., 2012; Ghani et al., 2019). Personal characteristics can impact work engagement directly, but they can also strengthen or weaken already existing associations between work characteristics and outcome variables (Charoensukmongkol & Puyod, 2020) such as work engagement (Zhu et al., 2009). With regard to job resources, most argumentation in psychology is based on the assumption that behavior results from an interplay of environmental and personal factors. To illustrate this, the JDR argues that personal resources can strengthen the buffering effect of job resources in preventing high job demands resulting in burnout and can strengthen the positive impact of job resources on work engagement (Schaufeli & Taris, 2013; Van Den Broeck et al., 2011)

One example of such a personal characteristic is perceived self-efficacy which is one's personal belief of own capability to mobilize cognitive and motivational resources to accomplish something (Hsu et al., 2017). In their research Warner et al. (2011), conceptualize self-efficacy as a trait-like construct that refers to a person's belief about their general, or task-specific competence to achieve certain effects with their actions. Here we investigated employees' general perceived self-efficacy related to their work.

There is a positive link between self-efficacy and work engagement as self-efficacious people are more absorbed in their work, resulting in greater effort investment (Mäkikangas et al., 2022; Sarinah et al., 2018). Ghani et al. (2019) describe the positive influence of self-efficacy on work engagement within the framework of the J-DR. If employees possess self-

efficacy, they are more likely to be engaged, as they have a personal resource that keeps them focused on their goals in demanding times, which facilitates work engagement.

Beyond that, as described above according to the JDR model the personal characteristic self-efficacy may also moderate the associations between the above-mentioned job-resources: work autonomy and supervisor support and work engagement (Liu et al., 2017; Thakur & Kumar, 2015;). Self-efficacy has been found to moderate the associations between work resources and work outcomes (Thakur & Kumar, 2015). A moderating role of self-efficacy has been investigated in the relationship between work control and negative consequences of work stress (Jimmieson, 2010), between work control and personal initiative (Speier & Frese, 2009), between job autonomy and innovative behavior (Orth & Volmer, 2017), and between work autonomy and job strain (Nauta et al., 2009). To our knowledge, not much research investigated the role of self-efficacy on the links between work autonomy and work engagement as well as supervisor support and work engagement.

However, a first study by Liu et al. (2017) provided empirical support for the moderating role of self-efficacy on the association between supervisor support and work engagement. They found a moderating effect of self-efficacy on the relationship between perceived organizational support, operationalized as the perception of one's employer's concern about one's well-being at work, and work engagement. According to Liu et al. (2017), people who are lower in self-efficacy are more malleable to job characteristics and more sensitive to the lack of support, in terms of their work engagement.

In conclusion, self-efficacy is a personal characteristic that facilitates work engagement directly and that can moderate the interrelation between job characteristics and work outcomes. Self-efficacy has been shown to moderate the interrelation between supervisor support and work engagement Liu et al. (2017). As far as we know, no studies

have investigated if the positive effect of autonomy on work engagement is moderated by self-efficacy.

### **Research goal, and research question**

The present study is conducted at a remote-first company (comforte AG) where most employees work remotely the majority of the time. We defined working remotely as performing your work tasks outside of the office the majority of the time (>50% of weekly contract hours; Crawford et al., 2011). The present research adds to the scientific literature in that it investigates the above-mentioned relationships in the new setting of a remote-first company. In doing so, the study addresses the Mäkikangas et al. (2022) mentioned neglect of work engagement in the remote work literature. In addition, the present study may offer organizations, that work remotely, insight about how to maintain their workforce engaged through job characteristics and personal characteristics in this context. To this end, the proposed research intends to answer the question of to what extent work autonomy and supervisor support are related to work engagement, and whether the associations are moderated by personal self-efficacy in employees working remotely.

### **Hypotheses**

Taking the before-mentioned associations into account, the following hypotheses are put forward. H1: It is hypothesized, that remote workers who experience more autonomy, also have higher levels of work engagement H2: Based on the literature around supervisor support we hypothesize that remote workers who experience more supervisor support, also have higher levels of work engagement H3: Furthermore, it is hypothesized that people high in self-efficacy are more engaged at work. H4: A moderation effect of self-efficacy on the work autonomy work engagement relationship is hypothesized, such that the association

between work autonomy and work engagement is stronger with higher levels of self-efficacy.

H5: It is also hypothesized that self-efficacy moderates the supervisor support to work engagement relation such that the association between supervisor support and work engagement is stronger with higher levels of self-efficacy.

## **Methods**

### **Participants**

The population of the current study is remote workers in the remote first software development company *comforte AG*. Working remotely at least 50% of the working hours weekly (Olson, 1983) was used as an inclusion criterion. Employees were recruited by sending out a companywide email and two weekly reminders. Of the 170 employees of the company, 103 responded (60.59%) and provided informed consent (see Attachment A). Out of these 103 participants, 23 are excluded on the grounds of either not meeting the inclusion criteria ( $n = 3$ ), not completing the study, which was described as a way to withdraw consent ( $n = 19$ ), or withdrawing their consent actively ( $n = 1$ ) at the end of the survey. This resulted in a total sample of 80 employees. Institutional ethical approval was granted for this study via the Radboud University Light track option (ECSW-LT-2023-5-10-43587). Participants were mostly male (72.5%) compared to female (26.25%). One participant preferred not to say (1.25%). Seven people were between 18-28 (8.75%), 20 people were 29-39 (25%), 20 people were 40-50 (25%), 23 people were 51-61 (28.75%), 8 people were 62-72 (10%) and two people were 73-83 (2.5%). Seven participants (8.8%) work in Marketing and Product management, 29 (36.3%) in Sales, 38 (47.5%) in Engineering (incl. ITI), and six (7.5%) (in Other (incl. general management, legal, people & culture). Participants were not reimbursed for partaking in the study. Before conducting the research, a priori power analysis was conducted. With a medium effect size of  $f^2 = 0.1377$  (Mazzetti et al., 2017), power set at

0.8, and five predictors in an f-test, we concluded a sample of 84 participants would be needed. This was the minimum number of participants we aimed for.

## **Procedure**

Participants were sampled via convenience sampling. A link to the online Qualtrics ([www.qualtrics.com](http://www.qualtrics.com)) survey (see Appendix B) used in this study was distributed via the internal email system as an email addressing all employees. Data collection went on for three weeks. After reading the information letter (see Appendix B-1) participants actively gave informed consent (see Appendix B-2) to participate in the study. Before answering the questionnaires, participant's demographic data was collected, and the inclusion criteria (working =>50% remote) was checked. Thereafter, the questionnaires were answered. All questionnaires were administered in their original language (English). Responses were collected anonymously, and participants were debriefed (see Appendix B-10) about the study. Participating in the study took approximately five minutes.

## **Materials**

### ***Perceived work engagement***

To measure perceived work engagement, the Ultra short Measure for Work Engagement (Schaufeli et al., 2017) is administered. The UWES-3 consists of three items, each measuring one of the dimensions of work engagement, vigor, dedication, and absorption. An example item is "I am immersed in my work". It is scored on a seven-point Likert scale ranging from "Never" to "Every day". "Never" was coded as 1 and "Every day" as 7. Higher scores indicate more perceived work engagement. The scale has good reliability (Cronbach's alpha is .94; Schaufeli et al., 2017) and validity in earlier research (Soto et al.,

2022). Also, in the current study the reliability was good (Cronbach's alpha = .71). Scores from the items pertaining to work engagement were summed and divided by the number of items in the scale (3) to calculate an average score of perceived work engagement. This score was then standardized. Higher scores represent more perceived work engagement.

### ***Perceived work autonomy***

Perceived work autonomy was measured using the Work Autonomy Scale (WAS) by Breugh, 1985. The scale consists of nine items equally divided into three dimensions of perceived autonomy: method-, scheduling- and criteria autonomy (Breugh, 1999). The WAS has strong reliability and validity. For instance, the WAS positively correlates to other measures of job autonomy and job involvement (Breugh, 1999). Also, in the current study reliability was confirmed (Cronbach's alpha = .84). Example items are "I am allowed to decide how to go about getting my job done (the methods to use)." and "I have control over the scheduling of my work.". The items were answered on a seven-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree". Hereby, "Strongly Disagree" was coded as 1 and "Strongly Agree" as 7. Scores from the items assessing work autonomy were summed and divided by the number of items in the scale (9) to calculate an average score of perceived work autonomy (Brady et al., 1990). This score was then standardized. Higher scores represent higher levels of perceived work autonomy

### ***Perceived supervisor support***

To assess perceived supervisor support, the four items concerning supervisor support from Rhoades et al., (2001) Perceived Organizational Support Scale (POS) were administered. The POS has been established as reliable with internal reliability of 0.90 (Soulén, 2003) and good discriminatory validity (Rhoades et al., 2001). The subscale of the POS pertaining to supervisor support has previously been used separately (Soulén, 2003). In

the current study, reliability was also good (Cronbach's alpha = .863). The sub-scale has four questions, for instance, "My supervisor cares about my opinions." and a five-point Likert scale ranging from "strongly disagree" to "strongly agree". Hereby "strongly disagree" was coded as 1 and "strongly agree" as 5. The fourth question "My supervisor shows very little concern for me." was reverse coded. Scores from the items about supervisor support were summed and divided by the number of items in the scale (4) to calculate an average score of perceived supervisor support. This score was then standardized. A higher score on the scale indicates higher levels of perceived supervisor support.

### ***Perceived self-efficacy***

Perceived self-efficacy was measured with the short occupational self-efficacy scale (OSS6; Rigotti et al., 2008). The survey consists of 6 items such as "Whatever comes my way in my job, I can usually handle it." and is scored on a six-point Likert scale ranging from "completely untrue" to "completely true". The answer option "completely untrue" was coded as 1 and the option "completely true" was coded as 6. Scores from the answers to items belonging to the OSS6 were summed and divided by the number of items (6) to compute an average score of perceived self-efficacy. Thereafter, the score was standardized. The scale has been reported to have an internal consistency of 0.85 and test-retest reliability of 0.82 (Peng et al., 2021). In the present research, the reliability is also good (Cronbach's alpha = .86). A higher score on this scale represents higher levels of perceived self-efficacy.

## **Data Analysis**

### ***Data Analyses***

A sensitivity analysis was conducted to find out the minimum effect size detectable ( $f^2 = 0.27$ ) to achieve a power of 80. This means the effect size ( $f^2 = 0.27$ ) is the size of the

effect we can reliably detect, given the sample size of  $n = 80$ , alpha of .05, and power of .80. The conducted sensitivity analysis revealed that the present study has sufficient power, as the effect size of the regression analysis ( $f^2 = .303$ ) is larger than that of the sensitivity analysis ( $f^2 = .207$ ).

In the present research, perceived work engagement operationalized as a continuous variable, served as the dependent variable. Perceived work autonomy, perceived supervisor support, and perceived self-efficacy, all operationalized as continuous predictors, were the independent variables. Self-efficacy was also investigated as a potential moderator for the work autonomy – work engagement, and the supervisor support - work engagement interrelations. See Appendix A for a visual representation of the conceptual model. This data was analyzed using bivariate correlation analysis and multiple linear regression analysis in SPSS.

Assumptions of multiple linear regression were checked (see Appendix C). Normal distribution of errors, linearity, autocorrelation, normality, multicollinearity, and homoscedasticity were met. However, the assumption of multivariate normality was not met.

Multivariate normality was checked with the maximum distance value for the Mahalanobis maximum value (25.281). The critical Chi-Square value for  $df = 5$  with a 95% confidence interval is 11.07 meaning that the assumption is violated. Upon investigating the eight extreme values in the dataset it was decided to not exclude them from the analysis because they make out 10% of the sample.

Pearson's correlation analysis was conducted to examine the correlation between the variables of interest. Second, the hypothesized moderated model was tested in a single linear regression model. Work autonomy, supervisor support, and self-efficacy were the predictors,

and self-efficacy was also investigated as a moderator for the other two predictors. The dependent variable was work engagement.

## Results

### Preliminary Analyses

Pearson's correlations and descriptive statistics are shown in Table 1. Preliminary correlational analysis shows only self-efficacy was significantly correlated with work engagement ( $\beta = .461, p < .001$ ). People reporting higher levels of self-efficacy also report higher levels of work engagement.

**Table 1**

*Descriptive Statistics and Pearson's Correlations of all Study Variables*

Variable	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>	1	2	3
Work engagement	3.33	7	6.28	0.67			
Work autonomy	2.67	7	5.72	0.78	.03*		
Supervisor support	1.75	5	4.27	0.79	.17	.25*	
Self-efficacy	3.50	6	5.12	0.55	.39**	.31*	.32*

*Note: \* =  $p < .05$ ; \*\* =  $p < .01$ ,  $N = 80$  for all variables.*

### Main Analysis

In Table 2 results of regression including work engagement as the dependent variable, work autonomy, supervisor support, and self-efficacy as predictors, and self-efficacy as a moderator for the work autonomy and work engagement as well as the supervisor support and work engagement associations, can be found. The total regression model was significant and together the predictors explained 23% of the variance ( $R^2 = 0.23, F(5,74) = 4.5, p < .001$ ).

Within the model, work autonomy was not significantly related to work engagement when controlling self-efficacy, supervisor support, and the interactions,  $\beta_1 = -0.119$ ,  $SE = 0.099$ ,  $CI [-.3160 - .0771]$ ,  $p = .230$ . This means that people who report higher levels of work autonomy do not necessarily report higher levels of work engagement. Supervisor support was not significantly related to work engagement when controlling for work autonomy, self-efficacy, and interactions,  $\beta_2 = 0.129$ ,  $SE = 0.960$ ,  $CI [-2.9591 - .2042]$ ,  $p = .182$ . This means that people who perceive higher levels of supervisor support do not necessarily report higher levels of work engagement. Self-efficacy is a significant predictor of work engagement when controlling for work autonomy, supervisor support, and the interaction effects,  $\beta_3 = 0.559$ ,  $SE = 0.139$ ,  $CI [-3.9182 - 0.041]$ ,  $p < .001$ . This means that people who report higher levels of self-efficacy also report higher levels of work engagement.

Regarding the investigated moderation effects, the interaction effect of work autonomy and self-efficacy on work engagement was not found to be significant  $\beta_4 = 0.219$ ,  $SE = 0.154$ ,  $CI [-.0875 - .5245]$ ,  $p = 0.159$ . This means that the link between work autonomy and work engagement is not necessarily moderated by self-efficacy. The interaction effect of supervisor support and self-efficacy on work engagement is not found to be significant  $\beta_5 = 0.284$ ,  $SE = 0.157$ ,  $CI [.0276 - .5965]$ ,  $p = 0.73$ . This means that the link between supervisor support and work engagement is not necessarily moderated by self-efficacy. A table with the results can be found in Appendix D.

## **Discussion**

In the present research, three antecedents of work engagement, namely perceived work autonomy, perceived supervisor support, and perceived self-efficacy were investigated using the job demands-resources model (Bakker & Demerouti, 2017; JD-R). To this end, we set out to answer the following research question: “To what extent work autonomy and

supervisor support are related to work engagement, and whether the associations are moderated by personal self-efficacy in employees working remotely.” The present correlational study, with a cross-sectional design, was conducted in a new (remote work) context. More specifically, in a remote-first software development company. Positive relations between the aforementioned antecedents and work engagement, as well as the moderation effects, were expected to emerge in the current sample of remote workers. We administer one online survey with four measurements assessing employees’ perceived level of work autonomy, supervisors support, self-efficacy, and work engagement. Multiple regression analysis revealed that self-efficacy is significantly related to work engagement. However, the other hypothesized relationships as well as the moderating role of self-efficacy on these relations could not confirmed by the data of the present study.

## **Theoretical implications**

### ***Perceived Work Autonomy***

The suggested link between perceived work autonomy and work engagement was not found. This is not in line with our first hypothesis, which stated that remote workers, who experience more autonomy, also report higher levels of work engagement. It is also in contrast to the prevalent consensus in the literature (Saragih, 2011; Sardeshmukh et al., 2012; Sarinah et al., 2018; Swanberg et al., 2011).

One potential explanation may be found in the conceptualization of autonomy. We investigated work autonomy as a global factor as suggested by earlier scholars (Brady et al., 1990; Sims et al., 1976). However, some argue that work autonomy could be further distinguished in three sub-dimensions. Firstly, *Work method autonomy* refers to the decision power over the methods to be used and way of working. Secondly, *Work scheduling autonomy* refers to the control over sequencing, timing, and scheduling of work. Thirdly,

*Work criteria autonomy* refers to the extent to which employees can modify work objectives and evaluation points. (Breugh, 1985; Breugh, 1999; Nicholson, 1984). Therefore, it could be argued that the part of autonomy that is particularly effective may vary among individuals so that only some of the dimensions of work autonomy are important for them to fully engage in their work. It may have been the case that method autonomy is a more influential aspect of work autonomy than the other two. There is some first indication in the literature that method autonomy may be the only dimension of the work facets predicting work engagement when compared to the other facets (De Spiegelaere et al., 2016). Therefore, it may be a lack of distinctiveness regarding subdimensions in the operationalizing of perceived work autonomy that prevents us from concluding any effect of perceived work autonomy on work perceived engagement.

Furthermore, employees may differ in their need for autonomy, meaning that the optimal level of work autonomy could vary between people (Kubicek et al., 2017). Another possible explanation is that autonomy may be beneficial for employees, only up to a certain point (Warr, 2007), or even harmful, depending on other job- and on personal characteristics, and their constellation with work autonomy (Kubicek et al., 2017). The amount of autonomy provided by the employer in combination with differences in constellation of job- and individual characteristics, may account for our results diverging from earlier studies.

### ***Perceived Supervisor Support***

No support for a link between perceived supervisor support and perceived work engagement was found. This is not in line with our second hypothesis, which stated that remote workers, who have higher levels of perceived supervisor support, also report higher levels of work engagement. It is also not in line with earlier literature (Attridge, 2009; Heyns et al., 2022; Othman & Nasurdin, 2013; Sawasdee et al., 2020; Vera et al., 2015).

A possible explanation is that whether the supervisor support results in more work engagement may be contingent on the relationship between supervisor and subordinate (Aselage & Eisenberger, 2003). Earlier studies investigating perceived supervisor support to work engagement link support were not conducted in a remote work context, but instead *mostly* in the healthcare sector hospitals/ among nurses (Attridge, 2009; Othman & Nasurdin, 2013; Vera et al., 2015) and the pharmaceutical industry (Heyns et al., 202; Sawasdee et al., 2020) thus some degree of physical proximity can be assumed. In our study context employees often never meet their supervisors in person. Given the importance of proximity for relationships between supervisor and subordinates at work (Bentein et al., 2010; Eva et al., 2019) due in part to more feedback accessibility, it may be that in our study, there was a disconnection between employee and supervisor (Ma et al., 2023). Thus, some aspects of perceived supervisor support, possibly important for work engagement, might have been lacking. An example thereof could be feedback, which is an important part of supervisor support (Eastburg et al., 1994). It may be that the feedback aspect of supervisor support is especially important for the supervisor support to work engagement link and that this aspect was missing in the context of our study, although another aspect of supervisor support may be high. Thus, in a remote setting, subordinates may experience the supervisor as less present and so not seek them out as easily for feedback and other forms of support (Mickwitz & Suojala, 2020; Thakur & Kumar, 2015; Warner et al., 2011).

### ***Perceived Self-Efficacy***

It was found that more self-efficacy was related to higher levels of work engagement. This is in line with our third hypothesis. The result is consistent with previous research on self-efficacy as an antecedent of work engagement (Ghani et al., 2019; Mäkikangas et al.,

2022; Sarinah et al., 2018). This indicates that perceived self-efficacy might predict work engagement, also among remote workers.

There are several ways that perceived self-efficacy can be a useful resource to help people feel engaged at work. A particularly relevant way, to facilitate work engagement, within the population of interest in this study, is to make sure they perceive themselves to possess high levels of self-efficacy and so are more likely to initiate behavior that can lead to the attainment of mastery experiences (Sherer et al., 1982; Xiao, 2021) which are occasions on which people overcome difficulties to achieve a goal or complete a task. The attainment of these might facilitate employees' work engagement by raising their perceived self-efficacy levels of employees (Hu et al., 2014). This can be particularly true in the present context, where almost half of the sample (47%) were software engineers, most of which constantly work on solving complex problems to improve or develop the company's data security products. This also relates to people high in self-efficacy exerting more effort and being more persistent in times of adversity or of high job-demands (Sarinah et al., 2018) since their perseverance and effort exertion helps them achieve mastery experiences more often and so facilitate their work engagement.

Regarding the fourth hypothesis, which thematized self-efficacy as a moderator between work autonomy and work engagement, no support for this hypothesis could be found in our study. This is not in line with earlier research (Thakur & Kumar, 2015). One possible explanation is that there is no interrelationship between the suggested variables. More specifically, the data suggest the assumed relation between perceived work autonomy and perceived work engagement, may not be moderated by self-efficacy. However, even though the study was properly powered, it is still a correlational design, thus results are to be interpreted with caution.

Regarding the fifth hypothesis, which thematized self-efficacy as a moderator between perceived supervisor support and perceived work engagement, no support for this hypothesis could be found in our study. This is not in line with earlier research (Liu et al., 2017). One possible explanation is that there is no interrelationship between the suggested variables. More specifically, the data suggest the assumed relation between perceived supervisor support and perceived work engagement, may not be moderated by self-efficacy. Here again, it must be noted that the study is still a correlational design, thus results are to be interpreted with caution.

A possible explanation, regarding both the fourth and the fifth hypothesis not being confirmed, may be the lack of interpersonal similarity of the current sample in terms of being all white-collar employees working for the same company and experiencing similar job-characteristics overall. More precisely, in terms of which department they work in, 83.8% of the sample either works in the engineering or the sales department. Thus, the possible lack of heterogeneity and differences in job-characteristics among the workers may have led to type the absence of a moderation effect of self-efficacy (Xanthopoulou et al., 2007). Adding to this idea, earlier research concluding a moderating role of self-efficacy incorporated a variety of job-characteristics and specific subdimensions of job-characteristics (Krishnan et al., 2018) while our study investigated the overall effect of only two job characteristics (Thakur & Kumar, 2015). Future research may probe these hypotheses in different contexts and combinations of variables. Particularly, further job-characteristics may be involved and different population types could be compared.

### **Practical implications**

One important implication of our study is that employees' perception of their self-efficacy may matter in the workplace, particularly in terms of being engaged in the work. The

present research supports that personal characteristics, more specifically self-efficacy may be a solid force in predicting work engagement, also in the remote work context. Perceived self-efficacy might be especially important to promote employees' work engagement when perceived work autonomy and perceived supervisor support are experienced by the employees, yet still do not result in more work engagement.

Common ways to foster self-efficacy are development plans, goal setting, and feedback. While work autonomy is provided, feedback, an important part of supervisor support can fall short in remote working companies (Kubicek et al., 2017). Feedback is, however, not only important for making employees perceive support from their supervisor (Attridge, 2009; Sandars, 2009), but it is also an important tool for fostering individual employees' self-efficacy. The organization could consider tailoring individual feedback and development plans in a way to demonstrate supervisor support and foster self-efficacy over time. Furthermore, the company is advised to take individuals needs and preferences into account when creating the personal feedback and development plans. Therefore, in a participatory approach, these plans would best be created in joint synchronous collaboration between supervisor and subordinate (Schunk, 1985). It would then be crucial to follow up with each other, thus, the plan should address the frequency and priority points of the feedback.

Another way to improve self-efficacy is through vicarious learning (Wang & Ertmer, 2003). This type of learning entails learning from observing others and then trying to model their work. To this end, mentorships should be implemented, on a voluntary basis. Senior software engineers could be incentivized through, mainly time allocation and recognition, but public acknowledgement and bonuses should also be considered. The implementation does not have to be restricted to the engineering department, but it may be the best place to start given that it is where this could be needed the most and where it might take the most time to

generate results. This could lead to mastery experiences and be specifically relevant for comforte AG where senior software developers could teach younger developers the workings of their older software products. This would not only contribute to so-called mastery experiences for both, thus increasing work engagement, but it could also help the knowledge transfer between retiring and staying employees.

### **Limitations**

The present study had noteworthy limitations. Firstly, the design is that of a correlational study, thus prohibiting the inference of causality, and suggesting conclusions drawn from the results, to be interpreted with caution. Secondly, the conceptualization of work autonomy as one factor instead of operationalizing its different dimensions as separate factors may be disadvantageous for detecting the role of distinct autonomy aspects in predicting work engagement. Thirdly, our study exclusively applied self-report measures. Overestimations on self-report measures and a possible social desirability effect may have contributed to a discrepancy between the reported value and the actual level of the variables. We can only make our inferences from subjective reflections that are present at the time of measurement. The results, thus, do not account for daily deviation in the perceived level of the variables investigated. In other words, the measures may not reflect the overall perception of employees, but the level perceived on that particular day of filling in the survey.

### **Future research**

Future studies should consider the different facets and define work autonomy in a way that suits both context and the expected sample size. It is argued that implementation, context, and constellation of job-characteristics (type of organization, work method,

workforce, and company culture) play an important role in predicting how impactful the perceived work autonomy provided to employees will be in terms of their work engagement.

Due to the suspected loss of informal types of feedback in remotely working companies, future researchers may be well off also paying attention to incorporating the role of feedback when investigating the benefits of perceived supervisor support on work engagement. Day-to-day variations in the perceived level of work autonomy, supervisor support, and work engagement could be counteracted in a longitudinal design. Future research is therefore advised to test the proposed relations of our study in a longitudinal design. Additionally, objective measures could be used to establish baseline levels of the discussed variables.

Apart from job-characteristics, future research should investigate self-efficacy and personal resources in general. According to the JDR, they make up a substantial part of the factors, besides job-characteristics, that affect work engagement. Since the present study was done within the confines of one company, further research into self-efficacy as a facilitator of work engagement in remote work companies is suggested, to increase the external validity of the findings regarding self-efficacy.

## **Conclusion**

In conclusion, this study demonstrates the utility of the individual characteristic perceived self-efficacy, as a resource in the JD-R model, for facilitating work engagement among remote workers. Perceived work autonomy and perceived supervisor support, although highly present, do not necessarily result in higher levels of perceived work engagement. This study did not find that self-efficacy moderates the relationship between perceived job-characteristics (work autonomy and supervisor support). Possibly, there is no

such effect due to methodological shortcomings in our study. In sum, our study discusses perceived job resources and highlights the potential importance of the personal resource self-efficacy, in fostering work engagement, among remotely working employees. Suggestions for future research and practice include strengthening perceived self-efficacy and the consideration of context and operationalization. Practical conclusions revolved around boosting remote workers' perceived self-efficacy through ways of knowledge-sharing and development and so facilitating their engagement at work.

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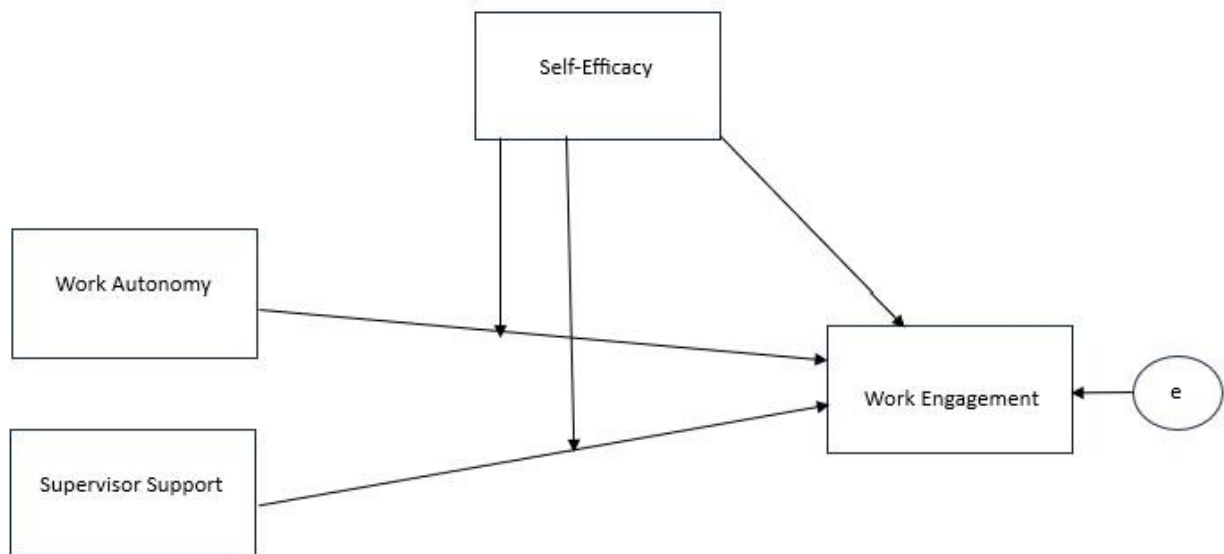
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Appendix A  
Conceptual model

Figure 1: Concept model



## **Appendix B**

### **Qualtrics study**

#### **Appendix B-1 Information letter**

Information Letter for participation in the scientific research: Work Autonomy, Supervisor Support, and Work Engagement in Remote Workers: The Moderating Role of Self-Efficacy

The present study is conducted by Loo Stening, a student in the master program in Psychology “Work, Organization and Health” at Radboud University, Netherlands. The research takes place at comfote AG under the supervision of a university supervisor and a manager from the company.

Organizations are understandably interested in information that can be useful for improving current practices. Therefore, certain outcome variables, for example, work engagement and possible facilitators of such are of interest. Having high levels of work engagement is beneficial for the employer and the employee as it fosters productivity, performance but also enjoyment at work. Work engagement can be facilitated by providing certain job characteristics such as the possibility to work autonomously and support from one’s supervisor. Nevertheless, individual characteristics, such as self-efficacy (the belief in one’s capability to evoke cognitive and motivational energy to complete a task) also contribute to the work engagement of employees.

New ways of working are emerging following the pandemic and the challenges it brought upon organizations. For instance, remote work has become a commonality rather than an

exception. Organizations are also starting to recognize the benefits for both employees and employers of permitting remote and autonomous work. The software developer comforte AG is a remote-first company. Thus, it provides the opportunity to investigate discussed associations among remote workers. The aim of the present research is to contribute to the scientific literature by studying the established associations in a novel (remote work) context, while also giving the basis for practical suggestions regarding job-characteristics.

We want to investigate the relationships described above among remote workers. For that reason, you can only participate if you are working most of your time (50% or more of your contract hours per month) remotely. If you do not work most of the time remotely I thank you for time and interest. You may now close this window.

The survey consists of three demographical questions and 22 statements to which you will indicate to what degree they apply to you. There are no correct or incorrect answers. For each question, please choose the one that is closest in your opinion. These 22 statements will be about the level of autonomy and social support from your supervisor that you perceive in your job as well as your work engagement and feeling of self-efficacy. It will take about 5 minutes to complete the survey. You will not receive a reimbursement for the study. The research has a minimal risk and complies with the ethical frameworks of the “Light Track” as drawn up by the Ethics Committee for Social Sciences (ECSS) of the Radboud University. The researcher has established this by completing the checklist belonging to the Light Track.

#### Use of your personal Data

The data for this study is collected anonymously. We will ask you about your age and gender so that we better can describe our group of participants (for example average age or distribution between the genders). We will also ask in which department you work (Sales, Marketing, Engineering, Other) so that we can better describe our group of participants. After

reading this, in the consent form you will actively agree to the collection, use and storage of the above-mentioned personal data. If you do not agree, you cannot participate in the study.

Radboud University is responsible for compliance with the General Data Protection Regulation (GDPR) when processing your personal data. The researcher ensures that your privacy and the conditions attached to it are safeguarded and he/she adheres to the Dutch code of conduct for scientific integrity and university policy regarding the storage and management of personal and research data when conducting this research. You have the right to withdraw your consent for the processing of your personal data at any time. Your personal data will then be deleted. You can find the Radboud University Privacy Statement at: <https://www.ru.nl/english/vaste-onderdelen/privacy-statement-radboud-university/>. If you have any questions about your privacy, please contact the Local Privacy Officer Faculty of Social Sciences ([enna.lujinovic@ru.nl](mailto:enna.lujinovic@ru.nl)). For general questions, please contact the office of the Data Protection Officer of Radboud University via [privacy@ru.nl](mailto:privacy@ru.nl). More information about your rights in the processing of your personal data can be found at <https://www.ru.nl/privacy/english/protection-personal-data/data-subjects-rights/> and on the website of the Dutch Data Protection Authority (<https://autoriteitpersoonsgegevens.nl/en>).

#### Confidentiality and Processing of Your Data

The information you provide for the current research purposes is treated with the utmost care and is accessible to authorized staff only. The information that we collect will be anonymously collected, processed and stored. This means that later on the results cannot be traced back to you. The consequence of this is that we cannot inform you about your personal results after the study has been completed. However, we could inform you about the results of the study as a whole. If you wish to be informed about the results of this study, then please let me know via my email [loo.stening@ru.nl](mailto:loo.stening@ru.nl).

The research data that are collected in this study will be saved by me as student-researcher for the course Master thesis and Internship. To fulfil this course I have to submit the research data to the programme Psychology of the Radboud University during the course. The programme Psychology of the Radboud University keeps the data for educational purposes (for example, appraisal, verification and audits). The research data will be kept by me, the student-researcher until the course for which I conduct this study is completed. After that, the research data will be deleted by me from my own storage. The online consent form will be deleted by me at the same time as the research data. For education purposes, the programme Psychology of the Radboud University has to keep all products that students turn in during their studies (thus also the submitted research data) after the course has been completed at the Radboud University.

The consent form signed by you will be kept for 10 years upon completion of the research. Your anonymized research data will be stored for 10 years after the research has been completed.

Since the data we collect will be anonymously collected, processed and stored the results of this study cannot be traced back to you. You have the right to stop participating or withdraw your consent for the processing of your personal data at any time. Due to the fact that data is collected anonymously, withdrawing your data is possible till the end of the survey by not finishing the survey or on the last page, by indicating that you do not want that your data will be used for this research. This has no consequences for you.

Some persons and organizations must have access to your research data. This is necessary in order to test whether the research has been carried out properly and reliably. These persons and supervisory authorities inspecting your data for verification include: authorized persons within the Radboud University (for example a dean, director or data officer) and (inter) national supervisory authorities (for example the Dutch Data Protection Authority and the Netherlands Board on Research Integrity). They are held to inspect your data on a

strictly confidential basis. You will be asked to grant permission for this access. If you refuse to do so, you cannot participate in the study. The research data obtained will not be viewed from a medical/ clinical perspective. Therefore, your participation in the study cannot be considered a medical/ clinical test. Since the current study is completely anonymous, any scores that are worrying and/or that may be of personal clinical significance cannot be related back to you. If you are concerned about your health as a result of the questions, we advise you to contact your general practitioner.

#### Voluntary participation

Your participation in this study is entirely voluntary. If you decide not to participate, there will be no consequences. If, during filling out the survey, you wish to withdraw your consent and terminate your participation, you have every right to do so at all times. Again, there will be no adverse consequences for you.

#### Contact information

If you have any questions, comments or concerns about this study, please contact the researcher responsible for the Master Project at Radboud University: Loo Stening ([loo.stening@ru.nl](mailto:loo.stening@ru.nl))

With kind regards, Loo Stening [loo.stening@ru.nl](mailto:loo.stening@ru.nl)

Student Master Project Work, Organization, and Health Psychology Program Radboud University

#### **Appendix B-2 Consent form**

Q31 I herewith confirm that:

- I have been satisfactorily informed of the study in writing
- I have read the written information
- I have been given the opportunity to ask questions about the study
- my questions have been answered satisfactorily
- I have been given ample opportunity to think carefully about participating in the study
- I participate in the study entirely on a voluntary basis

I understand that:

- I have the right to withdraw my consent at any time during the filling out the survey by exiting the study (closing the window before completion) or by withdrawing consent on the last page of the survey without having to state reasons and without fear of adverse consequences

- I have the right to have my research data deleted up until the last page of the survey

- I have the right to withdraw my consent for the (further) processing of my personal data till the last page of the survey

- my personal data are processed in accordance with the applicable European privacy regulations

- my personal data are processed in accordance with the privacy statement of Radboud University (<https://www.ru.nl/english/vaste-onderdelen/privacy-statement-radboud-university/>);

I agree that:

- my personal research data within this research will be obtained for scientific purposes and will be available for verification, reuse and replication for 10 years

- the signed consent form with my personal data is kept for 10 years

- my personal data, which are obtained for administrative purposes only, will be kept

maximally till the end of the data collection. Administrative goals include sending invitation and reminder mails

- supervisory authorities may inspect my personal and research data for the purpose of auditing the research.

Q33 Please indicate your preference below.

- Yes, I agree to participate in this study (proceed with the study). (1)
- No, I do not want to participate in this study. (2)

### **Appendix B-3 Inclusion criteria**

Q43 Do you work at least 50% of your contract hours remotely (not in the office) per month?

- Yes (1)
- No (2)

### **Appendix B-4 Demographics**

Q37 Please answer the following demographic questions.

Q35 What is your gender?

- Male (1)
- Female (2)
- Other (3)

- Prefer not to say (6)

Q34 Which department do you work in?

- Sales (1)
- Marketing and Product Management (2)
- Engineering incl. ITI (5)
- Other incl. legal, general management, P&O (9)

Q40 What is your age in years?

- 18 - 28 (1)
- 29 - 39 (2)
- 40 - 50 (3)
- 51 - 61 (4)
- 73 - 83 (5)
- >83 (6)
- 62 - 72 (11)

Q44 In the following you will be presented with four rounds of statements. Please indicate to which degree you agree or disagree with the statements.

#### **Appendix B-5 Work autonomy scale (WAS)**

Q1.1 I am allowed to decide how to go about getting my job done (the methods to use).

- Strongly Disagree (1)

- Disagree (2)
- Disagree Slightly (3)
- Neither Agree Nor Disagree (4)
- Slightly Agree (5)
- Agree (6)
- Strongly Agree (7)

Q1.2 I am able to choose the way to go about my job (the procedures to utilize).

- Strongly Disagree (1)
- Disagree (2)
- Disagree Slightly (3)
- Neither Agree Nor Disagree (4)
- Slightly Agree (5)
- Agree (6)
- Strongly Agree (7)

Q1.3 I am free to choose the method(s) to use in carrying out my work.

- Strongly Disagree (1)
- Disagree (2)
- Disagree Slightly (3)
- Neither Agree Nor Disagree (4)
- Slightly Agree (5)
- Agree (6)
- Strongly Agree (7)

Q1.4 I have control over the scheduling of my work.

- Strongly Disagree (1)

- Disagree (2)
- Disagree Slightly (3)
- Neither Agree Nor Disagree (4)
- Slightly Agree (5)
- Agree (6)
- Strongly Agree (7)

Q1.5 I have some control over the sequencing of my work activities (when I do what).

- Strongly Disagree (1)
- Disagree (2)
- Disagree Slightly (3)
- Neither Agree Nor Disagree (4)
- Slightly Agree (5)
- Agree (6)
- Strongly Agree (7)

Q1.6 My job is such that I can decide when to do particular work activities.

- Strongly Disagree (1)
- Disagree (2)
- Disagree Slightly (3)
- Neither Agree Nor Disagree (4)
- Slightly Agree (5)
- Agree (6)
- Strongly Agree (7)

Q1.7 My job allows me to modify the normal way we are evaluated so that I can emphasize some aspects of my job and play down others.

- Strongly Disagree (1)
- Disagree (2)
- Disagree Slightly (3)
- Neither Agree Nor Disagree (4)
- Slightly Agree (5)
- Agree (6)
- Strongly Agree (7)

Q1.8 I am able to modify what my job objectives are (what I am supposed to accomplish).

- Strongly Disagree (1)
- Disagree (2)
- Disagree Slightly (3)
- Neither Agree Nor Disagree (4)
- Slightly Agree (5)
- Agree (6)
- Strongly Agree (7)

Q1.9 I have some control over what I am supposed to accomplish (what my supervisor sees as my job objectives).

- Strongly Disagree (1)
- Disagree (2)
- Disagree Slightly (3)
- Neither Agree Nor Disagree (4)
- Slightly Agree (5)
- Agree (6)
- Strongly Agree (7)

**Appendix B-6 Perceived organizational support scale (POSS)**

Q2.1 My supervisor cares about my opinions.

- strongly agree (1)
- agree (2)
- neutral (3)
- disagree (4)
- strongly disagree (5)

Q2.2 My work supervisor really cares about my well-being.

- strongly agree (1)
- agree (2)
- neutral (3)
- disagree (4)
- strongly disagree (5)

Q2.3 My supervisor strongly considers my goals and values.

- strongly agree (1)
- agree (2)
- neutral (3)
- disagree (4)
- strongly disagree (5)

Q2.4 My supervisor shows very little concern for me

- strongly agree (1)
- agree (2)
- neutral (3)
- disagree (4)
- strongly disagree (5)

### **Appendix B-7 Occupational self-efficacy scale (OSS6)**

Q3.1 I can remain calm when facing difficulties in my job because I can rely on my abilities.

- completely true (1)
- true (2)
- somewhat true (3)
- somewhat untrue (4)
- untrue (5)
- completely untrue (6)

Q3.2 When I am confronted with a problem in my job, I can usually find several solutions.

- completely true (1)
- true (2)
- somewhat true (3)
- somewhat untrue (4)
- untrue (5)
- completely untrue (6)

Q3.3 Whatever comes my way in my job, I can usually handle it.

- completely true (1)
- true (2)
- somewhat true (3)
- somewhat untrue (4)
- untrue (5)
- completely untrue (6)

Q3.4 My past experiences in my job have prepared me well for my occupational future.

- completely true (1)
- true (2)
- somewhat true (3)
- somewhat untrue (4)
- untrue (5)
- completely untrue (6)

Q3.5 I meet the goals that I set for myself in my job.

- completely true (1)
- true (2)
- somewhat true (3)
- somewhat untrue (4)
- untrue (5)
- completely untrue (6)

Q3.6 I feel prepared for most of the demands in my job.

- completely true (1)
- true (2)
- somewhat true (3)

- somewhat untrue (4)
- untrue (5)
- completely untrue (6)

## **Appendix B-8**

Q4.1 At my work, I feel bursting with energy.

- Every day (1)
- A few times a week (2)
- Once a week (3)
- A few times a month (4)
- Once a month or less (5)
- A few times a year or less (6)
- Never (7)

Q4.2 I am enthusiastic about my job.

- Every day (1)
- A few times a week (2)
- Once a week (3)
- A few times a month (4)
- Once a month or less (5)
- A few times a year or less (6)
- Never (7)

Q4.3 I am immersed in in my work.

- o Every day (1)
- o A few times a week (2)
- o Once a week (3)
- o A few times a month (4)
- o Once a month or less (5)
- o A few times a year or less (6)
- o Never (7)

### **Appendix B-9 Option to withdraw at the end of survey**

Q45 We ask you again for your permission to use your research data.

- o Yes, my research data can be used for this study. (1)
- o No, my research data cannot be used for this study. (2)

### **Appendix B-10 Debriefing**

Q42 Dear participant,

Thank you for partaking in my study, Work Autonomy, Supervisor Support, and Work Engagement in Remote Workers: The Moderating Role of Self-Efficacy.

In this research project I sought to investigate if the levels of work autonomy, supervisor support and self-efficacy of employees that work remotely, correlate with their levels of work engagement. Work-engagement is a psychological state in which a person feels “absorbed” by their work and experiences heightened focus and energy. Employee’s levels of work engagement seem to correlate with both job performance and job satisfaction.

Characteristics of the workplace such as provided work autonomy (control over how and when to work) and support from one's supervisor, may impact a person's work engagement. Furthermore, personal characteristics may also contribute to one's level of work engagement. For instance, the belief about our capacity to mobilize cognitive and motivational energy to accomplish a task or something in general (self-efficacy), may also impact our level of work engagement.

By investigating job- and personal characteristics and how they correlate with work engagement, the aim is to gain theoretical insight about the impact of these variables among remote workers. These insights may then form the base for practical suggestions for remote work organizations. Suggestions can for instance revolve around how to apply discussed job characteristics (work autonomy and supervisor support) in an effective manner for remote workers.

You were asked to respond to four questionnaires assessing work-autonomy, supervisor support, self-efficacy and work engagement. The purpose of this is to have input for statistical testing of proposed associations.

Since data was collected anonymously it is not possible to inform you on individual results, but I can provide you with overall results of the study. If you are interested or have any other questions, please send me an email on [loo.stening@ru.nl](mailto:loo.stening@ru.nl).

Did this study unintentionally prompt unpleasant feelings, thoughts or insecurities for you or do you have any concerns about your well-being after completing this study? Then, please contact your general practitioner for an appointment.

Again, thank you for participating in my study.

Kind Regards, Loo Stening

Email: [loo.stening@ru.nl](mailto:loo.stening@ru.nl)

## Appendix C

### Assumption checking

Assumptions of a moderated multiple regression were checked using SPSS. The assumption of outliers was checked by observing the boxplot (see below). Two possible outliers were detected (39,45), out of which case number 45 has high probability of being an actual outlier. Observation of the dataset confirmed this. Therefore, additional analysis was conducted without the outlier which did not result in any noteworthy difference. Moreover, the outliers do not appear to be erroneously entered responses. Autocorrelation was checked with the Durbin-Watson test (2.061) and this assumption was met as well. Multicollinearity was checked by observing correlations between the predictors and concluding that all are  $< .7$ . Thus, the assumption is met indicating that none of the predictors correlate with each other. Homoscedasticity of the residuals was checked by assessing the scatterplot of std. Predicted values and std. residual values of work engagement scores. The assumption is not violated as dots are randomly scattered.

Independence of observations was checked with the Durbin-Watson value (2.081) which is within the acceptable range of  $>1$  to  $<4$ .

Normal distribution was checked with the histogram and regression line, both indicating normally distributed errors. No significant outliers were detected (std. residuals ranged from  $-2.868$  to  $2.099$  so all within the  $-3$  to  $3$  range of acceptance)

*As no drastic deviations are to be observed we can assume normality.*

## Appendix D

### Regression analysis Table

**Table 2**

*Multiple Regression Analysis for Work Autonomy, Supervisor Support, Self-Efficacy on Work Engagement*

	<i>Work Engagement</i>		
	<i><math>\beta</math></i>	<i>SE</i>	<i>p</i>
Work Autonomy	-.140	.116	.23
Supervisor Support	.152	.113	.182
Self-Efficacy	.461	.115	<.001
Self-Efficacy x Work Autonomy	.160	.099	.159
Self-Efficacy x Supervisor Support	.198	.102	.073
	$R^2 = .233$		
	F (5,74) = 4.5, $p = < .001$		

