

Fostering employee well-being via a job crafting intervention



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ABSTRACT

This study examined the impact of an intervention based on Job Demands-Resources (JD-R) theory. We hypothesized that the intervention would influence participants' job crafting behaviors, as well as their basic need satisfaction. Further, we hypothesized a positive impact on participants work engagement. In addition to the proposed intervention effects, we expected that job crafting would have a positive relationship with work engagement, through basic need satisfaction. The study used a quasi-experimental design with an experimental group and a control group. Teachers completed measures pre- and post-intervention. Results of analyses of variance were largely in line with our predictions. In the intervention group, job crafting, basic need satisfaction, and work engagement increased over time. In the control group, no significant changes were found on all variables. In addition, the results of the analysis confirmed the hypothesized mediation. We discuss the implications of these findings for both JD-R theory and practice.

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1. Introduction

Over the last decade, the pace of technological and economical change has been accelerating. These advances have an impact on the jobs of employees all over the world. Such changes may have both positive and negative implications for employees. On the one hand, it offers opportunities to develop new skills in their work environment. On the other hand, such changes may also be negative because of the increasing complexity of work (World Economic Forum, 2016). In work and organizational psychology, both positive (e.g., work engagement) (Hakanen, Bakker, & Schaufeli, 2006; Simbula, Guglielmi, & Schaufeli, 2011; Tadic, Bakker, & Oerlemans, 2013) and negative facets of work (e.g., job stress) (Garrick et al., 2014; Howard & Johnson, 2004) are subject of research. A theory that can help us understand and predict the impact of work on employee well-being is Job Demands-Resources (JD-R) theory (Bakker & Demerouti, 2014).

JD-R theory provides a theoretical framework about how job demands, resources, psychological states and outcomes are associated. Further, the theory gives insights in how it can be applied in practice to foster employee well-being. Research has shown that engaged employees work harder and are more innovative than their non-engaged colleagues (Konermann, 2012). In addition, several studies have shown that engaged employees perform better (Bakker & Bal, 2010; Halbesleben & Wheeler, 2008). Because of these findings, organizations are interested in fostering employees' work engagement. Although the research evidence for the proposed relations within JD-R theory is accumulating, intervention studies that apply the theory to practice are still scarce.

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Can work engagement indeed be increased by interventions focused on optimizing job demands and (personal and work-related) job resources, as JD-R theory (Bakker & Demerouti, 2014) suggests? The central aim of the present study is to assess the impact of a Job crafting intervention – aimed at optimizing job demands and resources – on participants' work engagement. This study aims to contribute to the literature on positive organizational interventions by testing an intervention using a quasi-experimental pre-test, post-test control-group design. Additionally, the study aims to contribute to JD-R theory by examining whether work engagement can be promoted by a job crafting intervention embedded in the JD-R framework. Our investigation may illustrate how employees can stay engaged in their work by mobilizing their most important job resources.

2. Theoretical background

2.1. Job demands-resources theory

With the turn of the 21st century, researchers in the field of organizational psychology became more and more interested in the positive side of work and no longer merely focused on negative work aspects like job stress and burnout. The positive psychology movement inspired researchers all over the world to develop new models and theories, including Job Demands-Resources (JD-R) theory (Bakker & Demerouti, 2014). Over the past decade, JD-R theory has been used to understand and predict employee well-being in a wide range of occupations (for reviews, see Bakker & Demerouti, 2014; Bakker, Demerouti, & Sanz-Vergel, 2014). One key assumption of JD-R theory is that all work characteristics can be classified into two categories: job demands and job resources. Job demands are aspects of the job that require effort and are therefore associated with certain physiological and psychological costs (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). In the context of teaching, work pressure, dealing with pupil misbehavior, and facing emotionally demanding situations are examples of effortful job demands. Job resources refer to those aspects of the job that are functional in achieving work goals. Therefore they can be used to reduce the impact of job demands and the associated costs. Besides, job resources also have the potential to stimulate personal growth, learning, and development (Bakker & Demerouti, 2014). Within the educational setting of this study examples of job resources are supervisory support (i.e., by the principal of the school), role clarity, social support from colleagues, and constructive feedback from pupils and/or their parents.

JD-R theory proposes that work environments elicit two independent psychological processes – a health impairment process and a motivational process. The health impairment process starts with high job demands that may exhaust employees' energetic resources and lead to fatigue and health problems (Hakanen et al., 2006). In contrast, the motivational process starts with job resources that have motivational potential and lead to high work engagement and low levels of cynicism (Demerouti & Bakker, 2011). Previous studies have suggested that several job resources like colleague support, performance feedback, and supervisory coaching lead to work engagement (Bakker, 2011). By optimizing job demands and job resources in the work environment, organizations can follow a top-down approach to facilitate and stimulate work engagement. However, using a bottom-up approach, employees may also take the initiative themselves to optimize their job. This proactive behavior is also known as job crafting.

2.2. Job crafting

Job crafting refers to the process by which employees change elements of their jobs and relationships with others to change the meaning of their work and the social environment at work (Wrzesniewski & Dutton, 2001). The latter authors propose that employees can craft their job using each of three different strategies: employees can craft the amount or type of tasks; they can change their relations with other people (e.g. how often or how long they interact with colleagues and clients); and employees can change their cognitions about their job.

Following a job redesign perspective and using JD-R theory, Tims, Bakker, and Derks (2012) proposed an alternative approach of job crafting. These authors conceptualized job crafting as the proactive, bottom-up changes individuals make in their levels of job demands or job resources. Through job crafting, employees can improve the fit between their personal needs and abilities on the one hand and their job characteristics on the other. Tims et al. (2012) propose four job crafting dimensions: increasing social job resources (e.g., seeking social support among colleagues); increasing structural job resources (e.g., creating opportunities to develop oneself at work); increasing challenging job demands (e.g., starting new projects); and/or decreasing hindering job demands (e.g., reducing workload). The bottom-up moulding of job demands and resources initiated by employees themselves plays a substantial role in the most recent version of JD-R theory (Bakker & Demerouti, 2014).

Recent studies revealed that employees who take the initiative themselves to optimize their job demands and job resources in the work environment, facilitate and stimulate their own work engagement. A study by Bakker, Tims, and Derks (2012) among 95 dyads of employees working in various organizations revealed that employees' job crafting behavior was predictive of their work engagement. In addition, a recent longitudinal job crafting study (Tims, Bakker, & Derks, 2015) among 288 participants showed similar positive relations between employees' job crafting behavior and their work engagement.

Although job crafting concerns employee's self-initiated actions to adapt their job demands and resources, job crafting may be facilitated or supported by management. The feedback employees receive on their job crafting actions may either create more possibilities for job crafting or may inhibit job crafting to occur in the future (Wrzesniewski, 2003). Job crafting behavior can also be supported through interventions (Bakker & Demerouti, 2014; Van den Heuvel, Demerouti, & Peeters, 2012; Van Wingerden, Derks, & Bakker, 2017; Van Wingerden, Derks, Bakker, & Dorenbosch, 2013). Van den Heuvel et al. (2012) showed that a job crafting intervention could successfully stimulate police officers to proactively adapt their level of job demands and

job resources. Although the intervention evaluated by Van den Heuvel et al. (2012) did not affect all proposed outcomes, their study illustrated that job crafting can be a promising tool to optimize employees' work environment. In addition, a qualitative intervention study among teachers by Van Wingerden et al. (2013) revealed that participants indicated that they became aware of the importance of proactively crafting their job. Further, an intervention study among teachers testing three different positive organizational interventions (of which one was a job crafting intervention), revealed participants' job crafting behavior significantly increased after the intervention (Van Wingerden et al., 2017). Although these studies suggest that job crafting interventions based on JD-R theory are promising, more insights and evidence are needed to understand the potential of these interventions for employees and organizations. We argue that through the job crafting exercise in the current Job crafting intervention, participants will learn they can optimize their own work environment. Thus, we hypothesize:

Hypothesis 1. *Participants' job crafting behaviors increase after the Job crafting intervention (T2) both compared to their level prior to the intervention (T1) and compared to a control group.*

2.3. Basic need satisfaction

Another influential theory by which we can understand employee motivation and well-being is self-determination theory (SDT; Deci & Ryan, 1985). Self-Determination theory (SDT) proposes that the satisfaction of basic needs represent the motivational mechanism that energizes and directs employees' behavior and promotes well-being and development (Deci & Ryan, 1985). According to Deci and Ryan (2000), all human beings share basic and universal psychological needs, which are defined as "those nutritions that must be procured by a living entity to maintain its growth, integrity and health" (p. 326). SDT postulates that there are three basic psychological needs: the need for autonomy, the need for belongingness, and the need for competence. The need for autonomy is defined as people's inherent desire to experience ownership of their behavior and to act with a sense of volition (Deci & Ryan, 2000). This sense of volition can be achieved through having the opportunity to make personal choices. The need for belongingness is defined as the human striving for intimate relationships and the desire to achieve a sense of belongingness (Baumeister & Leary, 1995; Deci & Ryan, 2002). The need for competence refers to an individuals' desire to feel capable and effective in interacting with the environment and to bring about desired outcomes (Deci & Ryan, 2000).

In the context of work, need fulfillment can lead to positive outcomes for both individuals and organizations in terms of increased employee well-being (Ilardi, Leone, Kasser, & Ryan, 1993; Lynch, Plant, & Ryan, 2005; Silman, 2014). In the context of education, teachers' basic need satisfaction has been found to be predictive of work engagement (Silman, 2014). Research revealed that employees' basic need satisfaction can be fostered via interventions when the intervention design contains elements that make participants experience competence, autonomy and belongingness (Sailer & Mandl, 2015). For example, the need for competence can be satisfied by providing performance feedback during the intervention. The need for autonomy can be satisfied by offering participants individual choices; and the need for belongingness can be met through interventions at the team level, and through interactions between participants.

We propose that employees' basic needs satisfaction may also be enhanced when they are stimulated to optimize their own work environment. Employees may optimize their work environment by adapting their job demands and resources through job crafting. They may for example ask their supervisor to give feedback on their performance, seek social support from their colleagues, or try to increase their challenges and opportunities for professional development. By crafting their job, employees may satisfy their own basic needs. Because the intervention design contains these ingredients, we hypothesize:

Hypothesis 2. *Participants' level of basic need satisfaction increases after the Job crafting intervention (T2) both compared to their level prior to the intervention (T1) and compared to a control group.*

2.4. Fostering work engagement

Employees' work engagement is characterized by having a sense of energetic and effective connection with work activities and the feeling of being able to deal with the demands of their job. Schaufeli and Bakker (2004, p. 295), more specifically, defined work engagement as "the positive, fulfilling and work-related state of mind that is characterized by vigor, dedication, and absorption". Vigor is characterized by high levels of energy and mental resilience while working. Engaged employees are willing to invest considerable effort in their work, and persist in the face of difficulties. Dedication refers to being involved in one's work and experiencing a sense of significance and joy. Finally, absorption is characterized by being fully concentrated and immersed in one's work. Engaged individuals often forget about time and their environment when they are at work. Employees who are engaged are healthier than their less-engaged colleagues and experience more active, positive emotions (Bakker & Demerouti, 2014).

JD-R theory suggests that work engagement can be fostered through interventions by targeting at the most important job demands and resources. Since the intervention design of this study is aimed at making participants aware of their job demands and resources, and supports participants to optimize the work environment, we hypothesize that the job crafting intervention will improve teachers' work engagement. We therefore hypothesize:

Hypothesis 3. *Participants' level of work engagement significantly increases after the job crafting intervention (T2) both compared to their level prior to the intervention (T1) and compared to a control group.*

In addition to the proposed intervention effects, our theoretical arguments suggest that job crafting influences work engagement through basic need satisfaction. According to [Schaufeli and Bakker \(2004\)](#) need satisfaction can explain the association between job resources and engagement. Since job resources promote personal growth ([Bakker & Demerouti, 2014](#)) and need satisfaction is a necessary condition for individuals to thrive (cf. [Deci & Ryan, 2002](#)), we argue that the stimulating influence of job resources on work engagement can be explained by need satisfaction (see also, [Van den Broeck, Vansteenkiste, De Witte, & Lens, 2008](#)). Employees who proactively craft their job by adapting their job demands and resources engage in self-determination and may consequently satisfy their basic needs. By satisfying their basic needs, employees will become more engaged at work. We therefore propose that the relationship between job crafting (in the form of increasing job resources) and work engagement is mediated by basic need satisfaction. Thus, we hypothesize

Hypothesis 4. *Job crafting has a positive relationship with work engagement, through basic need satisfaction (mediation).*

3. Method

3.1. Participants and procedure

The sample consisted of 65 female (92%) and 6 male teachers (8%). This gender-skewed distribution is representative of this specific occupational group ([Merens, Hartgers, & Van den Brakel, 2012](#)). The mean age of the participants was 47 years ($SD = 11.86$), and 94% had successfully finished a higher vocational education or university education for teaching professionals. Of the 71 teachers, 41 took part in the job crafting intervention, while 30 were part of the control group. The intervention group consisted of 39 female teachers (95%), their mean age was 47 years ($SD = 11.08$), and 97% had completed a higher vocational education or university education for teaching professionals. The control group consisted of 26 female teachers (87%), mean age was 45 years ($SD = 12.70$), and 91% had completed a higher vocational education or university education for teaching professionals. The teachers all shared the same ethnic background (white, Caucasian). The majority of the participants stated that they were married or living with a partner (85%), whereas a minority indicated that they were single and living alone (15%). The participants worked at four different Dutch Christian schools for primary education. Although the schools were different, they were all located in small cities (in the same state) and were similar in terms of demographic characteristics. According to the Dutch school register published by the Dutch Ministry of Education, the four schools were labeled “good quality education in a safe learning environment”. The participants executed the same tasks (teaching and mentoring pupils) designed around similar team structures. For practical reasons, participants in the intervention group and the control group were grouped by location, resulting in a quasi-experimental design. By following this procedure, we avoided contamination effects, where members of the experimental groups influence members of the control group or vice versa ([Cook & Campbell, 1979](#)). Of the 71 teachers, 41 took part in the job crafting intervention, while 30 were part of the control group. Data has been collected in accordance with the ethical guidelines of the American Psychological Association and the Dutch Association of Psychologists. As such, (1) participation was completely voluntary, (2) data collection through a self-report survey is exempted from an institutional ethics committee's approval, and (3) the respondents did not receive any monetary compensation for their contribution. Informed consent was given by clicking on the “Finish” button on the last page of the survey.

There were two measurements in time. The first measurement took place two weeks before the start of the intervention; the second measurement two weeks after the intervention was completed. In line with other intervention studies, a research design with a post measurement shortly (but not immediately) after the intervention was chosen ([Rasquin, Van de Sande, Praamstra, & Van Heugten, 2009](#); [Van den Heuvel et al., 2012](#)). The organization allowed the participants to fill in the questionnaires during their workday. All 71 participants completed both questionnaires (100% response rate). The managing director introduced the first online questionnaire in an email containing instructions and an explanation of the procedure, while also explaining the anonymity of the data. The online questionnaires were hosted by the university, and the managing director did not receive any information about individual outcomes. One week before the start of the intervention, the participants received additional information about the program and content of the intervention. Two weeks after the intervention was completed, the participants were asked to fill in the second questionnaire.

3.2. Job crafting intervention

The job crafting intervention was based on the original Michigan Job Crafting Exercise (JCE; [Berg, Dutton, Wrzesniewski & Baker, 2008](#)) and operationalized using the principles proposed by JD-R theory ([Bakker & Demerouti, 2014](#)). Specifically, the job crafting intervention consists of exercises and goal setting aimed at increasing social job resources, increasing challenging job demands, and increasing structural job resources. Because earlier studies suggest that decreasing hindering job demands is unrelated ([Tims et al., 2012](#)) or negatively related to work engagement ([Petrou, Demerouti, Peeters, Schaufeli, & Hetland, 2012](#)), we did not include this job crafting strategy in the intervention.

In this job crafting intervention, we follow the principles of proactive goal-setting ([Parker, Bindl & Strauss, 2010](#)). A proactive goal is something to be achieved in the future. [Parker et al. \(2010\)](#) state that in proactive goal-setting, the motivation to achieve a goal depends on: (a) the assessment of whether one can achieve the future goal, (b) the reason or importance to achieve it, and (c) whether one feels supported – or “energized” – to achieve the goal. [Parker and colleagues \(2010\)](#) further describe four phases

that are important to setting and pursuing proactive goals: becoming aware of a desirable future work situation (envisioning); setting concrete and realistic goals (goal generation); describing the ways and means to achieve the goal (planning) and actually pursuing the goal (striving). The goals that employees set themselves should be geared to the short term. They should be feasible goals (generation) that can be achieved by training in a job crafting intervention in which job fits or job misfits can be visualized (envisioning). Through training, the generally formulated goals can be refined and discussed in a group setting and in terms such as the ways and means necessary to achieve the goal. Specific job crafting activities can be proposed and participants themselves can take note of them (planning). After this, participants put the plans into action in order to achieve their goals (striving).

The job crafting intervention consisted of three training sessions over a period of six weeks: the first and second session took place on one day, while the third session of half a day took place four weeks later (see also Fig. 1). The practical examples incorporated in the training, and the text and pictures in the workbook, were contextualized to the work environment of employees in the educational sector. The program involved six core elements and took place over a total of 12 h, divided over two meetings over a period of six weeks.

During the job crafting intervention, the participants went successively through six steps. The first step (person analysis) was to assess their personal strengths, motives, and their relatedness and contribution towards their team. By asking participants to also think about their relatedness to each other and their team contribution, the training program deviates slightly from the original Job Crafting Exercise (Berg et al., 2008) in which this aspect is not explicitly explored. The team members gave each other feedback about their individual strengths and qualities in relation to their job. In addition, the participants shared their opinions about the competences of the team. They looked back on their team achievements and shared the things they are proud of. The second step (job analysis) involved summarizing all the participants' current tasks/duties and place them in order of the amount of time they required, from little to medium to a lot of time. The participants made an overview of their job tasks based on three categories: tasks they spent most of their time on, tasks they had to do often, and tasks that they had to do sometimes. They also indicated whether they did the task individually or together with colleagues and labeled their tasks in terms of urgency and importance. The participants wrote the outcomes on a piece of brown paper to visualize their job overview.

In the third step (job + person analysis), participants matched their strengths and motives with their tasks/duties. The intent of the analysis was to make participants aware of work tasks that reinforce personal strengths and motives and thereby align what they are good at with what they like to do at work. In the fourth step, the participants were challenged to formulate possible meaningful changes in their work situations. In line with the principles of the JD-R model, the participants were asked to discuss what they could change in their work to increase their job resources (social and structural) or to increase their challenging job demands. The self-formulated job crafting activities that resulted from the participants' analysis and the discussion was then saved in their personal job crafting action plan. The job crafting plan contained participants' job crafting goals and the actions they aimed to take to increase their resources and challenges. The participants implemented their job crafting plan in their own work setting in the subsequent four weeks. This strategy is equivalent to the principles of proactive goal-setting (Parker et al., 2010). The four-week period was chosen for both theoretical and practical reasons. In line with the principles of proactive goal-setting (Parker et al., 2010), the goals that employees set themselves should be geared to the short term. A period of four weeks is short enough to be focused and at the same time long enough for the participants to encounter an adequate number of situations in which they can craft their job by adapting their job demands and/or resources.

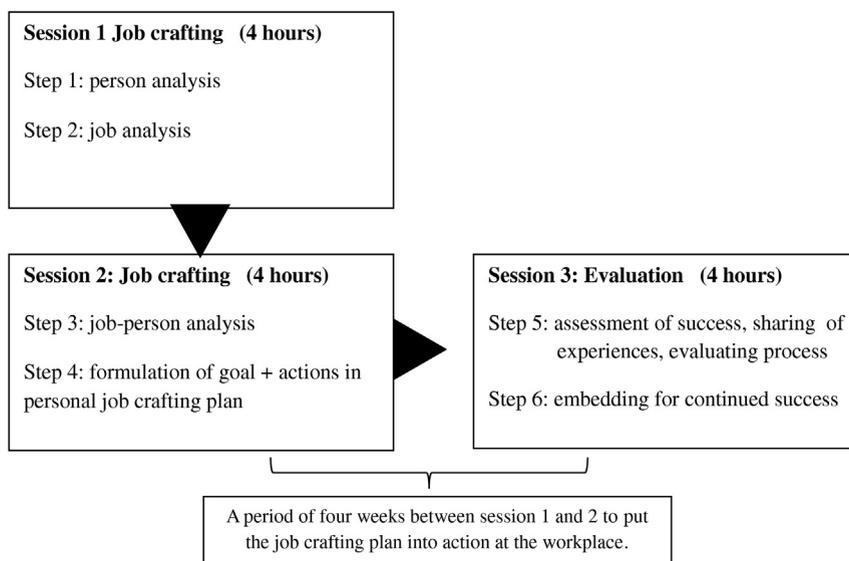


Fig. 1. Job crafting Intervention design.

In the third session participants assessed the extent to which the self-initiated job changes had been successful over a four weeks period (step 5). These individual assessments of the success of participants' activities offered the opportunity in the last step (step 6) to see the benefits of the successful activities and the obstacles to job crafting. By explicitly stating which job crafting activities resulted in which benefits, and which organizational or personal barriers they faced in job crafting, the participants shared what they had learned. The participants also discussed what they would need in the future to maintain the fit between their personal competencies, preferences, and the job. At the end of the intervention, the participants had experienced and learned what they could do to increase their job resources and challenges at work. Fig. 1 presents the design of the job crafting intervention.

3.3. Measures

The questionnaires were identical for all participants and both measurements in time. The internal consistency reliability for all measures in the original studies are presented in the description of each scale below, the internal consistency reliabilities of the present study are presented on the diagonal in Table 1.

Job Crafting was measured using three subscales of the validated Job Crafting questionnaire developed by Tims et al. (2012). Each subscale consisted of five items. Examples are: "I ask colleagues for advice" (increasing social job resources, $\alpha = 0.77$), "When an interesting project comes along, I offer myself proactively as project co-worker." (increasing challenging job demands, $\alpha = 0.75$), and "I try to develop my capabilities." (increasing structural job resources, $\alpha = 0.82$). Participants could respond to these statements using a five-point scale, ranging from (1) never to (5) very often. Research by Tims et al. (2012); Tims, Bakker, and Derks (2013) has shown that the job crafting scale has good factorial, convergent, divergent, and predictive validity.

Work-Related Basic Need Satisfaction (W-BNS) was measured with the eighteen-item W-BNS scale (Van den Broeck, Vansteenkiste, De Witte, Soenens, & Lens, 2010). The validated instrument consists of three subscales to assess autonomy need, belongingness need and competency need. Here is an example for each subscale: "I feel free to do my job the way I think it could best be done" (autonomy, $\alpha = 0.81$), "At work I feel part of a group" (belongingness, $\alpha = 0.82$), and "I feel competent in my job" (competency, $\alpha = 0.85$). Participants could respond to these items using a five-point frequency scale, ranging from 1 (totally disagree) to 5 (totally agree). Van den Broeck and colleagues reported evidence for the three-factor structure of the scale. In addition, the authors provided evidence for the discriminant validity and the reliability of the three need satisfaction subscales as well as their criterion-related and predictive validity.

Work engagement was measured with the validated nine-item Utrecht Work Engagement Scale (UWES; Schaufeli, Bakker, & Salanova, 2006). Example items are: "At work, I am bursting with energy" (vigor, $\alpha = 0.77$), "I am enthusiastic about my job" (dedication, $\alpha = 0.85$), and "I am immersed in my work" (absorption, $\alpha = 0.78$). Participants used a seven-point frequency scale, ranging from (0) never to (6) always. Schaufeli and colleagues (Schaufeli & Bakker, 2010; Schaufeli et al., 2006) have provided clear evidence for the factorial, convergent, discriminant, and predictive validity of the UWES. In addition, many studies conducted in various countries have indicated that the reliabilities of the subscales and the overall scale are good.

Table 1
Means, standard deviations, correlations and Cronbach's alpha of the study variables.

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age	46.79	11.86														
2. Gender	1.08	0.28	0.11													
3. Job crafting T1	3.07	0.42	0.06	0.00	(0.83)											
4. JC social job resources T1	2.51	0.61	0.08	0.13	0.75**	(0.82)										
5. JC challenging job demands T1	3.01	0.61	0.10	0.10	0.79**	0.27*	(0.73)									
6. JC structural job resources T1	3.68	0.43	0.08	0.03	0.79**	0.41**	0.53**	(0.65)								
7. Basic need satisfaction T1	3.97	0.61	0.13	0.09	0.28*	0.23	0.12	0.32**	(0.89)							
8. Work engagement T1	5.30	0.81	0.15	0.21	0.43**	0.26*	0.40**	0.33**	0.34**	(0.91)						
9. Job crafting T2	3.15	0.45	0.13	0.12	0.75**	0.58**	0.58**	0.57**	0.21	0.39**	(0.86)					
10. JC social job resources T2	2.56	0.59	0.17	0.00	0.61**	0.72**	0.34**	0.32**	0.11	0.32**	0.81**	(0.79)				
11. JC challenging job demands T2	3.14	0.60	0.07	0.19	0.66**	0.32**	0.71**	0.51**	0.18	0.33**	0.86**	0.48**	(0.78)			
12. JC structural job resources T2	3.75	0.41	0.09	0.11	0.58**	0.38**	0.38**	0.65**	0.27*	0.33**	0.83**	0.50**	0.66**	(0.61)		
13. Basic need satisfaction T2	4.09	0.57	0.07	0.09	0.30*	0.20	0.25*	0.24*	0.74**	0.37**	0.31**	0.19	0.27*	0.34**	(0.87)	
14. Work engagement T2	5.39	0.86	0.10	0.23	0.43**	0.25*	0.42**	0.33**	0.27*	0.76**	0.49**	0.32**	0.47**	0.45**	0.50**	(0.93)

* $p < 0.05$.
** $p < 0.01$.

4. Results

4.1. Descriptive statistics

The means, standard deviations, reliabilities, and correlations, between all study variables at both measurement points are displayed in Table 1. To determine that the data met the assumptions for MANOVA analysis, we first tested normality and homoscedasticity (equality of variance) of experimental errors. The analysis revealed that the data met the assumptions for normality and equality of variance, which allowed us to continue the analysis. Before testing the hypotheses, we first checked whether there were significant differences in the means of all variables at time 1 among the two groups. A multivariate analysis of variance was conducted to examine whether there were any significant differences in the T1 measurements of our study variables. The analysis revealed that there were no significant T1 differences among teachers at the two study sites ($F(5, 65) = 0.60$, ns).

4.2. Hypotheses testing

Our central prediction is that the job crafting intervention will positively influence job crafting (Hypothesis 1), basic need satisfaction (Hypothesis 2), and work engagement (Hypothesis 3). To test these hypotheses, we conducted repeated measures (RM) multivariate analyses of variance (MANOVA) with time (T1-T2) as a within-person factor and group (intervention group vs. control group) as a between-person factor. When the multivariate analysis revealed a significant effect, we proceeded with the univariate analyses. See Table 2 for the means and F-values of the study variables for both the intervention and control group.

4.2.1. Job crafting and basic need satisfaction

In Hypotheses 1 and 2, we proposed that participants' levels of job crafting behavior and basic need satisfaction would significantly increase after the job crafting intervention compared to their level prior to the intervention and compared to the control group. To test hypotheses H1 and H2 we conducted a 2 (Time) \times 2 (Group) RM MANOVA in which the three job crafting variables and basic need satisfaction served simultaneously as dependent variables. The results of the analysis revealed a significant time \times group interaction effect ($F(4, 68) = 11.01$, $p < 0.05$), showing that the changes in job crafting and basic need satisfaction scores were different in the two groups. We proceeded with the RM ANOVA for job crafting and basic need satisfaction separately. The results of the repeated measures ANOVA showed a significant increase of job crafting ($F(1, 69) = 4.44$; $p < 0.05$) within the intervention group from time 1 to time 2. No significant change was found for the control group ($F(1, 69) = 0.88$; ns) (see Table 2). In addition to overall job crafting behavior, we analysed the impact of the job crafting intervention on the three separate job crafting components. The results of the repeated measures ANOVA showed a significant increase of challenging job demands over time within the intervention group ($F(1, 69) = 9.67$; $p < 0.01$), and not for the control group ($F(1, 69) = 0.01$; ns). No significant changes were found for the other two job crafting components within both groups (see Table 2). These findings offer partial support for Hypothesis 1. Teachers increased their job crafting behaviors after the intervention, but did so only in the form of increasing their challenge job demands. The results of the repeated measures ANOVA showed that basic need satisfaction indeed increased over time in the intervention group ($F(1, 69) = 11.16$; $p < 0.01$), while no effects were found for the control group ($F(1, 69) = 1.22$; ns). Hence, these results provide support for Hypothesis 2.

4.2.2. Work engagement

Regarding work engagement (Hypothesis 3), we hypothesized that participants' levels would significantly increase after participating in the job crafting intervention. To test Hypothesis 3 we conducted a 2 (Time) \times 2 (Group) RM MANOVA in which work engagement served as dependent variable. The results of the analysis revealed a significant time \times group interaction effect ($F(2, 68) = 6.29$, $p < 0.05$), showing that the changes in work engagement scores were different in the two groups. We proceeded with the RM ANOVA for work engagement. The results of the repeated measures ANOVA revealed improved levels

Table 2

Means and F-values of the study variables for the intervention and control group.

	Intervention group		RM ANOVA		Control group		RM ANOVA
	(N = 41)		F-values	(η^2)	(N = 30)		F-values
	T1	T2			T1	T2	
Job crafting	3.12	3.23	$F(1, 69) = 4.44$, $p < 0.05$	0.043	2.99	3.04	$F(1, 69) = 0.88$, ns
JC social job resources	2.59	2.61	$F(1, 69) = 0.17$, ns		2.41	2.48	$F(1, 69) = 0.79$, ns
JC challenging job demands	3.03	3.25	$F(1, 69) = 9.67$, $p < 0.01$	0.059	2.97	2.97	$F(1, 69) = 0.01$, ns
JC structural job resources	3.75	3.81	$F(1, 69) = 1.11$, ns		3.59	3.67	$F(1, 69) = 1.52$, ns
Basic need satisfaction	5.60	5.82	$F(1, 69) = 11.16$, $p < 0.01$	0.040	5.51	5.59	$F(1, 69) = 1.22$, ns
Work engagement	5.29	5.52	$F(1, 69) = 6.75$, $p < 0.05$	0.031	5.32	5.21	$F(1, 69) = 1.18$, ns

Note. ns = not significant.

of work engagement within the intervention group ($F(1, 69) = 6.75; p < 0.05$). No significant change of work engagement was found within the control group ($F(1, 69) = 1.18; ns$).

Hypothesis 4 proposed a mediated relationship between the job crafting and work engagement through basic need satisfaction. To test this hypothesis, we examined the indirect effects using Hayes' PROCESS macro (Hayes, 2013) Model 4 with calculation of 1000 bias-corrected bootstrap 95% confidence intervals. We tested the indirect effect of job crafting behavior on work engagement through basic need satisfaction. The results of the bootstrap analysis showed that this indirect effect was significant for basic need satisfaction ($b = 0.48, SE = 0.19, p < 0.05$) and work engagement ($b = 0.46, SE = 0.19, p < 0.05$). These findings offer support for **Hypothesis 4**.

5. Discussion

The design of this study was based on theoretical assumptions from the JD-R theory (Bakker & Demerouti, 2014), which state that optimizing job demands and resources may contribute to employee engagement. To our knowledge, this is the first study showing employees' work engagement indeed can be fostered by a job crafting intervention. Earlier intervention studies aimed at enhancing employee work engagement showed that positive outcomes are not self-evident. A meta-analysis of 15 positive psychology interventions in organizations by Meyers, Van Woerkom, and Bakker (2013) revealed that only one of them (a 7-week resilience building program) successfully enhanced participants work engagement. In addition, a study by Ouwenel, Le Blanc, and Schaufeli (2013) among employees of different organizations revealed that an online intervention (containing goal setting assignments) was successful in enhancing positive emotions and self-efficacy but failed to show enhanced levels of work engagement. In contrast to intervention studies that have an individual focus and that take place in a classroom or online behind a computer, the current job crafting intervention took place in the employees' own work context, which facilitates transfer. Earlier research already revealed that learning at work is more effective than learning at an external location because direct links to the working situation can be made (Kessels, 1993), which amplifies the transfer (the actual application after the training of things learned) (Kessels, 2001).

According to JD-R theory (Bakker & Demerouti, 2014), work engagement is the outcome of employees' optimal balance between their job demands and resources. The specific type or amount of demands and resources that will lead to this optimal balance depends on individual needs and therefore differs from person to person. In the intervention, job crafting actions and/or goals were formulated by participants themselves, instead of receiving assignments that are part of the intervention script. With this approach, the job crafting intervention stimulates participants to optimize their work environment in line with their personal needs. By doing so, employees are in control of their own work engagement. In the next section, we discuss the most important contributions of our study.

5.1. Theoretical contributions

A first contribution of this study is that it offers evidence that employees' job crafting behavior can be increased through a job crafting training. This study expands earlier findings that job crafting behavior in organizations can be facilitated via interventions (Van den Heuvel et al., 2012; Van Wingerden et al., 2013). In contrast to the studies by Van den Heuvel et al. (2012) and Van Wingerden et al. (2013), this study revealed a significant increase of participants' job crafting behavior after a job crafting intervention compared to a control group. Our overall finding is consistent with Wrzesniewski (2003) who argued that although job crafting concerns employee's self-initiated actions, job crafting may be facilitated or supported by management. The analysis of the three separate job crafting components showed that increasing challenging job demands significantly changed at time 2 where increasing resources (social and structural) did not. Note that our sample consisted predominantly of teachers who work in direct contact with students most of their time, not in direct contact with colleagues. Therefore, they may have felt that they did not have opportunities to increase their social resources at work. For structural resources we have to take into account that it may take some time for participants to be successful in increasing their structural job resources. For example, to increase opportunities for professional development, there must be a possibility to join a masterclass or course.

Second, the outcomes revealed that participants' basic need satisfaction can be increased via a job crafting intervention. This is the first job crafting study, as far as we know, revealing increased levels of basic need satisfaction. Our findings are in line with findings by Sailer and Mandl (2015) who showed that a learning intervention may increase employees' basic need satisfaction when the intervention design contains elements that contribute to participants' experience of competence, autonomy and belongingness during the training session. Our intervention design not only contained elements that facilitated participants' experience of competence, autonomy and belongingness during the training sessions, but also afterwards in the workplace when they brought their job crafting plan into action. To increase their challenging job demands, participants may have started new projects and learned new skills, which contributed to their need for competence. In this new project participants may have worked together with their colleagues, fulfilling their need for belongingness. Experiencing that job crafting enabled participants to optimize their own work environment presumably satisfied the need for autonomy. Our findings expand SDT (Deci & Ryan, 2000) by revealing that basic need satisfaction is achieved not only as the result of the job resources that are available in the working environment as found in earlier research (Van den Broeck et al., 2008). Basic need satisfaction can be achieved by proactively mobilizing job resources and by increasing job challenges.

A third contribution of this study concerns participants' enhanced levels of work engagement after participating in the job crafting intervention. Although the intervention study by Van Wingerden et al. (2017) revealed job crafting (aimed at decreasing

hindering job demands) significantly increased after the intervention, participants' engagement was not affected. Our study showed that increasing challenging job demands contributes to employees' work engagement. These outcomes are in line with Bakker and Demerouti (2014) who stated that optimizing job demands and resources may lead to increased levels of employee engagement. These outcomes expand JD-R theory by showing a positive *causal* relation between (increasing) challenge demands and work engagement, where earlier studies already showed this link cross-sectionally (LePine, Podsakoff, & LePine, 2005; Tims et al., 2013). By offering empirical evidence that organizational interventions can foster work engagement, our findings strengthen JD-R theory (Bakker & Demerouti, 2014).

Fourth and finally, our findings revealed the proposed mediation between job crafting and work engagement via basic need satisfaction. The outcomes of the mediation analyses extend JD-R theory by showing that basic need satisfaction may explain the relationship between optimizing job demands and resources and work engagement. Employees who proactively craft their job by adapting their job demands and resources engage in self-determination and consequently satisfy their basic needs. By satisfying their basic needs, employees become engaged at work. Our findings are in line with SDT, which assumes that the satisfaction of one's basic needs stimulates motivation and is positively associated with individuals' optimal functioning (Deci & Ryan, 2000). In addition, these findings reveal empirical evidence for Schaufeli and Bakker's (2004) claim that need satisfaction can explain the association between job resources and work engagement. Our findings also extend SDT by showing that basic need satisfaction can be enhanced when employees themselves adapt their own work environment instead of their managers. Thus, job crafting may lead to real self-determination. This study has shown that an intervention based on the principles of JD-R theory and SDT can be successfully put into practice in the educational field and foster teachers' well-being.

5.2. Limitations and avenues for future research

Although this study provides evidence for most of the hypotheses, four limitations of our research need to be mentioned. The first limitation of this study concerns the research design. A disadvantage of the chosen quasi-experimental research design without random assignment of each individual participant to conditions is that intervention effects could be the result of differences between the groups at the beginning of the intervention instead of being the result of the intervention. Therefore, a control group and a pre-test were added to the research design. It is relevant to note that by using this design, we did avoid contamination effects where members of the experimental groups may influence members of the control group or vice versa (Cook & Campbell, 1979). Although the locations were different, they are all located in urban areas and are similar in terms of demographic characteristics. The employees also execute the same working activities, which are designed around similar team structures.

A second limitation involves the homogeneity of our sample. Although we found positive outcomes for teachers' job crafting behavior, need satisfaction and work engagement, we do not know the extent to which we can generalize these findings. Our sample consisted of primary school teachers only. Future studies should try to replicate our study among employees of other occupational groups who work in other industries. In addition, future studies may also investigate whether some individuals, based on their characteristics, are more likely to benefit from job crafting interventions than others. Third, we cannot rule out the possibility of reverse causation since we did not temporally separate variables that are part of the mediation. In this study we use two measurement points in time, future studies should try to test this mediation using three time points. Fourth, we only used quantitative research methods, future research may also use qualitative research methods like structured interviews. Using both quantitative and qualitative research methods may shed a light on the experiences of the participants and may reveal how the intervention is useful to them. Further, customers and the works council may be involved in the intervention. They are important stakeholders who can make a contribution by sharing their experiences and ideas on how employees, customers and the organization as a whole can benefit from employees' work engagement.

5.3. Practical implications and conclusion

A practical implication of the outcomes of this study is that investing in positive organizational interventions may be worthwhile. Within the context of education, our results show that investing time and money in organizational interventions can positively impact employees' work engagement. The job crafting intervention showed that it is possible to activate employees' proactive job crafting behavior and foster their basic need satisfaction and work engagement. Senior management should acknowledge the importance of facilitating and stimulating employees to optimize their resources and their challenging demands. They should also be aware of their role in relation to employees' job crafting behavior. Since the feedback employees receive on their job crafting actions may either create more possibilities for job crafting or inhibit job crafting behavior in the future (Wrzesniewski, 2003), managers can make a difference.

Besides offering interventions and feedback, organizations can also use surveys to examine whether employees experience sufficient resources and challenges at work. Based on the outcomes of the surveys, individualized reports could be made including personalized feedback and suggestions on how employees themselves could optimize their resources and challenges at work. Employees can also stimulate each other by sharing their good practices in optimizing their work environment. Increasing employees' work engagement through job crafting interventions may help them to deal with the high workload and emotional demanding situations in their work and stimulate them to stay enthusiastic about their profession and satisfied with their work.

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