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EDITORIAL

Interventions Aimed at Enhancing Employee Well-being: Current State of Knowledge and Next Challenges

LAURENȚIU P. MARICUȚOIU
Department of Psychology, West University of Timișoara

Introduction

The concern for employee well-being has grown steadily in the past 40 years. Some of the early theories of the '70s and '80s (e.g., the *Job Characteristics Model* - Hackman & Oldham, 1975; the *Stress, Appraisal and Coping theory* – Lazarus & Folkman, 1984; the *Conservation of Resources Theory* – Hobfoll, 1989) are seen as the foundations for the present perspectives that dominate the literature on stress and well-being (e.g., the *Job Demands Resources Theory* – Bakker & Demerouti, 2017; the *Broaden and Build theory* – Frederickson, 2001). This increased interest regarding the understanding of employee well-being generated thousands of research studies that tested and refined the theories mentioned above. Numerous meta-analyses of cross-sectional (e.g., Alarcon, 2011; Halbesleben, 2010) and longitudinal data (Lesener, Gusy, & Wolter, 2019) generally confirmed the main assumptions of these theories.

At the first glance, research on employee well-being was on the right track towards explaining what makes people feel good or not-so-good at work. However, things started to change when researchers and practitioners started to use these models and theories to develop and to test interventions aimed at improving occupational well-being. Although initial meta-analyses that estimated the overall effectiveness of stress interventions were optimistic regarding the magnitude of the effect size (e.g., Richardson & Rothstein, 2008), more recent work tempered this trend. Systematic reviews of the controlled trials reported small-to-medium effects of the interventions aimed at reducing burnout (Maricuțoiu, Sava, & Butta, 2016) or aimed at enhancing work engagement (Vîrgă, Maricuțoiu, & Iancu, 2019). Furthermore, similarly small effect sizes were reported by meta-analyses that estimated the effectiveness of the interventions that focused on variables specific to the research field (e.g., interventions focused on enhancing psychological capital - Lupșa. Vîrgă, Maricuțoiu, & Rusu, 2019; or interventions focused on job crafting behaviors – Oprea et al., 2019). These recent findings created a gap between the solid evidence regarding the theoretical developments and the evidence regarding the effectiveness of the interventions.

When conducting an intervention aimed at enhancing employees' well-being, researchers and practitioners enroll participants in the program and guide them through the intervention protocol that was developed based on a particular theoretical perspective. Most face-to-face interventions were conducted on groups of employees (Maricuțoiu et al., 2016), while online interventions usually involve guiding

Correspondence concerning this article should be addressed to Laurentiu P. Maricutoiu, West University of Timișoara, Bv. Vasile Pârvan 4, 300223, Timișoara, Romania. Email: laurentiu.maricutoiu@e-uvt.ro

participants through the intervention using an online platform developed for delivering this type of services (Vîrgă et al., 2019). Regardless of the delivery method (i.e., face-to-face or online), interventions focused on changing the employees' level of understanding and employees' attitude towards own well-being, which in turn should change their workplace behaviors and, consequently, should lead to enhanced well-being. This stepwise sequence of changes is problematic for two main reasons.

The need for a broader perspective in developing interventions

Firstly, it is reasonable to expect that the effect of the intervention diminishes from one step to another. New attitudes do not always generate new behaviors, and new behaviors are not always enhancing employees' well-being. To address this problem, researchers started to incorporate elements of behavioral theories in their interventions. For example, Constantini and her collaborators (2020) successfully used elements of the *Theory of Planned Behavior* (Ajzen, 1991) to help participants in a job crafting intervention. Their results are encouraging, and the findings of this study should persuade researchers to identify methods and strategies to manage the process that diminishes the effect of any intervention. Therefore, some research questions that could be worth addressing by future research studies include:

- What are the mechanisms that might reduce the diminishing effects? Are there any mediator variables (e.g., intentions to use the new information) between the new information and the new behaviors?
- Can we reduce the diminishing effects using behavioral theories such as the *Theory of Planned Behavior* (Ajzen, 1991) or the *Technology Acceptance Model* (citare)?
- When developing interventions, can we account for participants' attitudes towards the intervention content, to enhance the use of the new behaviors?

The psychosocial context of the interventions

Most evidence regarding workplace well-being is focused exclusively on the employee and overlooks the psychosocial context. However, recent evidence regarding the importance of the psychosocial context is gaining importance. For example, recent reviews suggested that working partners share significant well-being variance (Matei, Maricuțoiu, & Vîrgă, 2021) and pointed out that one's general well-being should be analysed in relation with the partner's general well-being. More specific workplace evidence also emphasised the importance of the psychosocial context. For example, research studies showed that supervisors' agreeableness level is associated with high levels of subordinates' burnout (Hunter et al., 2013) and with high levels of subordinates' job insecurity (Petrișor et al., 2021). These examples supported the idea that employee well-being variables have large ammounts of shared variance with variables that describe the psychosocial enviroment (i.e., supervisors' personality, supervisors' behaviors, or partner's well-being).

The second problem regarding the present intervention paradigm is that interventions are focused almost exclusively on the employee and are less concerned with the psychosocial context. In the dominant intervention paradigm, the main change mechanism assumes that employees should develop new strategies for dealing with stressors (e.g., coping skills, interpersonal strategies that help them enhance job resources). This is problematic because the intervention only addressed the personal strategies that can help the employee and does not address the cause of the employee stress. After learning new personal and interpersonal strategies, the participants continue to work in the same, unchanged, and stressful workplace.

Initially, the stress-related interventions aimed at increasing the employee's personal resources (e.g., knowledge, coping

mechanisms, psychological capital variables). As these interventions showed limited efficacy (Maricuțoiu et al., 2016; Lupșa et al., 2019; Vîrgă et al., 2019), researchers focused on instructing employees to act in a proactive manner to increase their job resources. Job resources are job characteristics that help the employees in dealing with the demands of their workplace (Bakker & Demerouti, 2017), therefore their development should logically lead to enhanced employee well-being. The most frequently studied job resources are: autonomy in taking decisions, feedback, social support (e.g., from the colleagues or from the supervisor), team cohesiveness. As one might observe, all these job resources require interactions with other employees or with supervisors: autonomy is approved by supervisors, feedback requires someone to provide it, while social support and team cohesiveness cannot be understood outside the psychosocial context of the employee. So far, most strategies used to increase job resources are unilateral: the employee is instructed to seek job resources (e.g., autonomy, feedback, or support) but it is unclear whether the supervisor or the co-workers are able (or sometimes willing) to provide these resources.

Based on previous arguments, the next steps in developing and implementing interventions should investigate:

- What are the interpersonal mechanisms that allow the significant persons from the employee psychosocial context (i.e., the partner, the supervisor) to have an influence on the employee well-being?;
- Are there similar interpersonal mechanisms for increasing and for decreasing the employee's well-being?
- To what extent these mechanisms can be used to enhance the effectiveness of the interventions?
- To what extent these mechanisms can be used to preserve the effectiveness of the interventions for longer periods?
- How can the significant persons from the employee psychosocial context (i.e., the partner, the supervisor) can help when it comes to enhancing employee's job resources ?

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RESEARCH ARTICLE

Employee Intrapreneurship Scale: Adaptation and Validation in the Romanian Working Population

LUCA TISU*
Department of Psychology at the West University of Timişoara, Romania

ZSELYKE PAP*
Department of Psychology at the West University of Timişoara, Romania

DELIA VÎRGĂ
Department of Psychology at the West University of Timişoara, Romania

Abstract

The present article includes two studies that have tested the reliability and validity of the Romanian adaptation of the Employee Intrapreneurship Scale (EIS). Intrapreneurship is a relatively novel concept describing proactive behaviors through which employees contribute to the growth and development of organizations they are employed in. The factorial structure and gender invariance of the EIS have been tested in the first sample, including 307 employees with diverse occupational backgrounds. The factorial structure was cross-validated in a second sample, including 122 employees with a similar composition. The second study also established convergent validity of the scale through testing its' associations to risk-taking, innovativeness, and proactive personality. Discriminant validity was tested using the Average Variance Extracted (AVE) procedure. The results have confirmed a factor structure whereby employee intrapreneurship is composed of two latent indicators: strategic renewal and corporate venturing. Reliability indices and factor loadings have shown a consistent and valid measure of intrapreneurship at the employee level. Furthermore, the concept showed significant positive associations to other constructs in the nomological network, and the AVE indicated satisfactory discriminant validity. Overall, these studies provide a psychometrically valid measure to be used in intrapreneurship research in Romanian organizations.

Keywords

Employee Intrapreneurship Scale, intrapreneurship, CFA, scale adaptation, validity

Introduction

Recent years have seen an unprecedented focus on bottom-up employee influences in organizations (Bakker & Demerouti, 2017), highlighting the active and proactive ways employees positively contribute to their work processes and outcomes (Bakker & van Woerkom, 2018; Bălăceanu et al., 2021). Organizations are increasingly looking for employees who go beyond simple execution of daily tasks to create, innovate and generate ideas that help the organization grow and maintain competitive advantage (Antoncic & Antoncic, 2011; Park et al., 2014). Such behaviors have been recently gathered under the employee intrapreneurship concept (Gawke et al., 2017; Gawke et al., 2019), describing employees who venture into new business opportunities while strategically renewing aspects of the organization to help its' growth and development. The concept of

*First two authors had equal contributions. Their order is random

Correspondence concerning this article should be addressed to Delia Vîrgă, Department of Psychology, West University of Timișoara, Bv. Vasile Pârvan 4, 300223, Timișoara, Romania. Email: delia.virga@e-uvt.ro

intrapreneurship is and rooted in the literature on entrepreneurship (Blanka, 2019), with a clear distinction regarding the degree of independence of individuals (i.e., entrepreneurs are highly independent and decide for their own organizations while intrapreneurs are dependent on an organizations' goals and objectives decided by its' leaders). Both intrapreneurship and entrepreneurship focus on maintaining competitiveness in the market, resisting competition, developing businesses, and innovating. Still, they operate in different organizational frameworks, face different challenges regarding resources and funding, and face obstacles at different levels (Cadar & Badulescu, 2015).

Despite the rising popularity of the employee intrapreneurship concept (Blanka, 2019), a psychometrically validated measure of intrapreneurial behaviors is still lacking in Romania. To address this gap, we conducted two studies to adopt the recently developed Employee Intrapreneurship Scale (EIS; Gawke et al., 2019) to the Romanian working population. In the first study, we have examined the factor structure of the EIS and its' invariance across gender, followed by a second study focused on establishing construct validity through examining the relationships of the construct to other relevant variables in its nomologic network: innovativeness (Janssen, 2000), risk-taking (Rauch et al., 2009), and proactive personality (Bateman & Crant, 1993). Through these studies, we provide researchers in Romania with a valid measure in their scientific ventures into intrapreneurship, thereby facilitating consistent terminology and operationalization among scholars (Gawke et al., 2019).

Definition and theoretical background

Employee intrapreneurship is defined as a specific type of agentic and strategic employee behavior that consists of employee venture behavior and employee strategic renewal behavior (Gawke et al., 2017; Gawke et al., 2019). Corporate venturing includes the creation and integration of new businesses, or portions of new businesses via equity investments, into the overall business portfolio of an organization (Narayanan et al., 2009). When employees venture, they create and/or invest resources in new business opportunities for the organization, such as proactively establishing new collaborations to reach new markets or offer better services (Park et al., 2014). Strategic renewal captures employee behaviors whereby they seek opportunities and advantages that can enhance the organizations' competitive ability and good reactivity to internal (i.e., changes in the organization) and external (i.e., market volatility) developments (Gawke et al., 2019).

Recently, Gawke and colleagues (2019) have developed and psychometrically validated the EIS to assess employee intrapreneurship behaviors at the individual level in organizations. They argued that a behavior-based measurement approach to intrapreneurship places the construct in the broader category of strategic proactive work behaviors (for an overview, see Parker & Collins, 2010), which can facilitate our scientific understanding of this phenomena by bringing it closer to frequently invoked theories in the occupational health and well-being literature. For example, proactive employee behaviors have gained terrain in Job Demands-Resources Theory (Bakker & Demerouti, 2017) in the form of job crafting (Tims & Bakker, 2010), proactive vitality management (Op den Kamp et al., 2018), and strengths use (van Woerkom et al., 2016). JD-R theory is creating more and more space for bottom-up employee influences in organizations (Bakker & Demerouti, 2017, 2018), and intrapreneurship behaviors could represent such proactive actions that are not only beneficial for employee well-being (Pandey et al., 2020) but also directly benefit the organization as a whole (Antoncic & Antoncic, 2011; Blanka, 2019).

To achieve a reliable measure that allows accurate inferences, we need to consider a potential gender bias revealed in previous literature. In general, men seem to be more likely to become intrapreneurs (Park et al., 2014). This has been found not only in empirical studies with smaller samples but also in an extensive international study including several countries (Bosma et al., 2010). Adachi and Hisada (2017) have pointed

to related demographical and psychological factors to explain the lower likelihood of women engaging in intrapreneurship. According to them, women tend to be more risk-averse and often find themselves in more disadvantageous positions in organizations. Having children also reduces the likelihood of women engaging in intrapreneurship (Adachi & Hisada, 2017). Gawke and colleagues (2019) have also reported significant associations between gender and both dimensions of the EIS. However, for accurate conclusions regarding possible gender effects, we first need to assure that the observed differences are not emerging from the measurement process. Therefore, in this study, we have investigated the gender invariance of the scale to test for such potential bias in the responses to the EIS.

Nomological network of employee intrapreneurship: relationships to innovativeness, risk-taking, and proactive personality

Employee innovativeness refers to work behaviors that create, introduce, and apply new ideas within a work role, team, or organization to increase performance at the individual, team, or organizational level (Janssen, 2000). Janssens' conceptualization of innovativeness includes idea generation, promotion, and realization, closely related to intrapreneurship behaviors but conceptually distinct because not all intrapreneurship behaviors represent innovations (Gawke et al., 2019). While intrapreneurship can include development and opportunity creation that does not necessarily imply creating novel processes, services, or products (Gawke et al., 2019), it inherently represents attitudes and actions that challenge the status quo and encourage innovation. Evidence stemming largely from qualitative studies (Camelo et al., 2011; Marvel et al., 2007) indicates that intrapreneurial employees are the most involved in the creation, promotion, and implementation of breakthrough innovations for their company. In the initial development study of the EIS, Gawke and colleagues (2019) have found moderate positive associations between innovativeness and both EIS factors. Based on these results, we hypothesize the following:
H1: Innovativeness is positively associated with strategic renewal behavior (H1a) and venture behavior (H1b).

Risk-taking can be conceptualized as initiating bold actions and allocating significant personal and organizational resources in intrapreneurial projects under uncertainty of an outcome (Rauch et al., 2009). Positive and fruitful the expectations of the results of corporate venturing and strategic renewal maybe, taking proactive steps towards improvement is inherently associated with the risk of losing resources, failing in new ventures, and damaging ones' reputation and status (Gawke et al., 2019). Thus, those who engage in intrapreneurship are most likely more prone to rake risks and go ahead in the face of uncertainty. Pandey and colleagues (2020) have shown that intrapreneurial employees possess more psychological capital in the form of hope, optimism, self-efficacy, and resilience, making them more engaged in their work. Hopeful employees with a positive outlook on the future who trust their capabilities and are resilient in the face of failure are less risk aversive and approach ventures with more courage (Youseff-Morgan & Petersen, 2019). The positive association between intrapreneurship and risk-taking has also been empirically demonstrated by Gawke and colleagues (2019), which leads to the formulation of the following hypotheses:
H2: Risk-taking is positively associated with strategic renewal behavior (H2a) and venture behavior (H2b).

Proactive personality has been defined as a stable tendency to initiate and carry out changes in the environment (Bateman & Crant, 1993). In Bates and Crants' original conceptualization, highly proactive employees excel at identifying opportunities, fixing things that do not work properly, challenging the status quo, enjoying making constructive change, seeing ideas turn into reality, and turning problems into opportunities by tackling them head-on. Such personal predispositions are at the core of intrapreneurship because, without the strong

personal initiative to make things better, employees would be less likely to venture and create new opportunities (Gawke et al., 2019). De Jong and colleagues (2011) have argued that proactive personality is at the core of intrapreneurship alongside innovativeness and risk-taking and have found moderate positive associations between the two. In an extensive literature review, Neessen and colleagues (2019) have found that proactive actions and characteristics are strongly linked to intrapreneurship in the literature, rendering intrapreneurial behaviors as bottom-up positive influences based on the proactive personal initiative of the employee. This leads to the formulation of the following hypotheses:

H2: Proactive personality is positively associated with strategic renewal behavior (H2a) and venture behavior (H2b).

Method

Two studies were conducted to validate the Romanian Employee Intrapreneurship Scale (EIS) and establish its' relationships to relevant constructs in its' nomological network. In Study 1, the factorial structure and the psychometric properties of the EIS were assessed using a sample of Romanian employees (N = 307). Construct validity of the Romanian version of the EIS was tested in Study 2 by analyzing relationships between the EIS components (strategic renewal behavior and venture behavior) with other related variables (i.e., innovativeness, risk-taking, proactive personality) using data from the second sample of Romanian employees (N = 122). Study 2 also tested the robustness of the factorial structure, providing insights into the quality of the EIS across different work contexts.

The Romanian version of the EIS **(see Appendix 1)** was generated using the standard back-translation technique (Brislin, 1970) by two independent specialists who were proficient English speakers. The first specialist translated the instrument from English to Romanian, and the second specialist translated the Romanian version back to English. The two versions were compared to verify similarity, yielding excellent correspondence. Thus, the translation was considered appropriate.

Participants and procedures for Study 1

Data were collected from Romanian employees using the snowball-sampling technique. Participants were contacted via email using the researchers' network of collaborators from previous studies. They were invited to participate in this study and recommend one to three colleagues who could be contacted as potential participants for the study. This approach led to a final sample consisting of 307 Romanian employees. Respondents' age ranged between 20 - 60 years old (M = 35.25, SD = 8.52), with the majority being women (72.6%). The sample was heterogeneous in terms of industries, with respondents employed in various sectors, such as sales, hospitality, medical services, or information technology and communication. Most respondents were working in the private sector (86.3%). Participants were informed about the aim and scope of the study before starting the online survey. They were provided an informed consent form, highlighting data confidentiality and their right to retreat from the study. No incentives were offered for participation.

Participants and procedures for Study 2

An identical snowball sampling procedure was employed to collect data from the second sample of Romanian employees. The final sample for Study 2 consists of 122 Romanian employees. Their age range is between 18 and 59 years old (M = 36.37, SD = 10.02). Most respondents are female (52.5%), 54.9% are married, and 61.5% have a Bachelor's degree. Their mean work experience is 14.51 years (SD = 11.33), and the industries in which they activate are heterogeneous, ranging from the automotive industry or financial services to software development.

Again, participants were contacted via email and invited to complete the online survey while also asked to recommend further potential participants. On the first page of the survey, an informed consent form was presented, informing participants about the aim of the study, data confidentiality, and the right to retreat from the study at any point. Participants received no incentives for participation.

Measures

All instruments have been presented to participants in Romanian after being translated through the same standard back-translation procedure (Brislin, 1970) as the EIS. Reliability coefficients can be found in Table 4.

Employee intrapreneurship was measured with the EIS (Gawke et al., 2019). The instrument consists of 8 items with response options ranging from 1 (= *never*) to 7 (= *always*). The scale comprises two distinct factors – *strategic renewal behavior* (e.g., "I conceptualize new ways of working for my organization") with an α = .91, and *venture behavior* (e.g., "I undertake activities to reach new market communities for my organization"), with an α = .88.

Innovativeness was captured with nine items from Janssen (2000), rated on a 1 (= *never*) to 7 (= *always*) scale. The instrument consists of three dimensions – idea generation (e.g., "Generating original solutions for problems"), idea promotion (e.g., "Mobilizing support for innovative ideas"), and idea realization (e.g., "Transforming innovative ideas into useful applications"), each with three items.

Risk-taking was assessed with three items from Van den Brink et al. (2004). Response options ranged from a 1 (= *strongly disagree*) to 5 (= *strongly agree*) Likert scale. A sample item is "I usually take risks to gain a potential advantage".

Proactive personality was measured with the 10-item version Proactive Personality Scale (Bateman & Crant, 1993). Answers were rated on a 1(= *strongly disagree*) to 7 (= *strongly agree*) Likert scale. An example item is "I am constantly looking for new ways to improve my life".

Data Analysis

Study 1

In Study 1, we tested the psychometric properties of the Romanian version of the EIS through confirmatory factor analysis (CFA). Following Gawke et al. (2019), we compared a one-factor model (M1), where all eight items load on a single construct, with a two-factor model with correlated factors (M2), where the first four items load on the strategic renewal behavior dimension and the last four items on the venture behavior dimension. We also employed a multi-group CFA (MGCFA; Hirschfeld et al., 2014) to assess measurement invariance across gender for the best-fitting model. Specifically, we tested a *configural model* (M_{config}), evaluating whether the best-fitting model yielded the same number of factors and configuration of item loadings across both groups. Next, we assessed the *metric invariance* (M_{metric}), where nesting upon the configural model, we constrained all factor loadings to be equal across gender. Afterward, building upon the metric model, we verified *scalar invariance* (M_{scalar}), where all intercepts were constrained to be equal across groups. Lastly, building upon the scalar model, we tested *strict invariance* (M_{strict}), where the factor loadings, intercepts, and residual errors were constrained to be equal across gender.

We used R software (R Core Team, 2020) and the lavaan package (Rossell, 2012) to analyze the data, employing maximum-likelihood estimation. Model fit was evaluated using five fit indices: the chi-square statistic ($\chi 2$), the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Values of .90 or higher for CFI and TLI and values equal or lower than .08 for RMSEA and SRMR were used as cut-off values for acceptable fit (Marsh et al., 2005). To assess differences between the four measurement invariance models, we explored change (Δ) in values of CFI (Chen, 2007). Values of .01 or lower indicate measurement invariance (Bălăceanu et al., 2021; Chen, 2007).

Study 2

In Study 2, for cross-validation, we conducted another CFA ($M3_{adj}$) replicating the adjusted two-factor model ($M2_{adj}$) from Study 1 and compared it to a one-factor model (M3). We relied on the same indicators and cut-off indices as in Study 1 to assess model fit (CFI and TLI > .90; SRMR and RMSEA < .08; Marsh et al., 2005). Next, we generated the validity model (M_{var}), where all Study 2 variables were

included in a single CFA. Thus, in the validity model (M_{var}), strategic renewal behavior, venture behavior, innovativeness, risk-taking, and proactive personality were included as latent variables. This model served to assess aspects of the construct validity of the EIS – convergent validity based on the latent correlations between the variables and discriminant validity using the average variance extracted (AVE) procedure outlined by Fornell and Larcker (1981) (see also Bălăceanu et al., 2021; Gawke et al., 2019). By this, we demonstrate the construct validity of the EIS on different levels described by the American Educational Research Association, American Psychological Association, & National Council on Measurement in Education (2014). Specifically, we assess convergent validity at level *d*, providing external validity information through the evidence of relations with relevant constructs from the nomological network of intrapreneurship. We address criterion validity at level *c*, focusing on the factorial distinctiveness of the two-scale dimensions. All operations were carried out in R software (R Core Team, 2020) using the lavaan (Rossell, 2012) package.

Results

Study 1

Reliability analysis

Descriptive statistics and reliability coefficients for Sample 1 are presented in Table 1. The mean for the strategic renewal behavior dimension was M = 4.53 (SD = 1.57). For venture behavior, M = 3.45 (SD = 1.78), indicating that respondents have medium-to-high levels of strategic renewal behavior and medium levels of venture behavior. The correlation between individual items and their afferent dimensions was high, all coefficients surpassing the values of .80. Cronbach's alpha coefficients for the two EIS dimensions ranged from good (venture behavior - α = .88) to excellent (strategic renewal behavior - α = .92), indicating very good internal consistency.

Table 1. *Descriptive statistics and reliabilities for EIS items and dimensions for Sample 1*

Variables	Descriptive statistics		Internal consistency	
	M	SD	*r*	*α*
Strategic renewal behavior				
I undertake activities to realize change in my organization.	4.48	1.67	.88*	.88
I undertake activities to change the current products/services of my organization.	4.19	1.83	.85*	.90
I contribute ideas for strategic renewal for my organization.	4.59	1.83	.92*	.85
I conceptualize new ways of working for my organization.	4.87	1.78	.89*	.87
Total	4.53	1.57		.91
Venture behavior				
I undertake activities to set up new business units.	3.06	2.01	.86*	.84
I undertake activities to reach new market or communities for my organization.	3.40	2.16	.90*	.81
I undertake activities that result in new departments outside of my organization	3.27	2.08	.85*	.84
I actively establish new collaborations with experts outside of my profession	3.82	2.11	.81*	.87
Total	3.45	1.78		.88

Note. $N = 307$, * $p < .001$, M = Mean, SD = standard deviation, *r* = correlation between item score and total score, *α* = reliability coefficient if an item is removed

Confirmatory factor analysis

Table 2 summarizes the results of the conducted CFA. The one-factor model (M1) yielded poor fit indices, while the two-factor model (M2) yielded almost acceptable fit indices. Considering these results, we employed modification indices to assess whether the two-factor model (M2) could be adjusted to improve model fit. The modification indices analysis results suggested the correlation of residuals for two items from the strategic renewal behavior dimension. Upon verifying the two suggested items, we noticed they had a similar wording (item 1: "I undertake activities to realize change in my organization" and item 2: "I undertake activities to change the current products/services of my organization"). Based on this consideration, we decided to employ the suggested modification to the model and test an adjusted two-factor model ($M2_{adj}$) where the first four items load on the strategic renewal behavior dimension, the last four items load on the venture behavior, the two dimensions are correlated (M2), and the two indicated item residuals are correlated. The adjusted two-factor model ($M2_{adj}$) shows acceptable fit indices ($\chi 2(35) = 86.02$, $p < .001$, CFI = .97; TLI = .97; RMSEA = .07, 90% CI [.05 - .09], SRMR = .04). The adjusted two-factor model (M2adj) results are represented graphically in Figure 1. All standardized factor loadings were above the threshold of .32 (Tabachnick & Fidel, 2001). Next, we proceed to test measurement invariance across gender based on the adjusted two-factor model.

Table 2. *Multi-group confirmatory factor analysis and invariance test results for EIS (Study 1)*

Model	Model description	χ2	Df	CFI	TLI	RMSEA [90% CI]	SRMR	Δχ2	Δdf	ΔCFI
Study 1										
M1	One-factor model	334.80**	20	.81	.74	.23 [.21 - .25]	.09			
M2	Two-factor model	67.47**	19	.97	.96	.09 [.07 - .12]	.04	267.33**	1	
$M2_{adj}$	Adjusted two-factor model	86.02**	35	.97	.97	.07 [.05 - .09]	.04	248.78**		
Measurement invariance										
M_{config}	Configural model	123.27**	70	.97	.97	.07 [.05 - .09]	.04			
M_{metric}	Metric model	132.02**	76	.97	.97	.07 [.05 - .09]	.05	8.75	6	.001
M_{scalar}	Scalar model	145.75**	84	.97	.97	.07 [.05 - .09]	.06	13.73	8	.003
M_{strict}	Strict model	172.95**	94	.96	.96	.07 [.06 - .09]	.06	27.21*	10	.009

Note. $N = 307$, * $p < .01$, ** = $p < .001$; M2adj and M2 are compared to M1. In M2 and M2adj the two factors are correlated.

Measurement invariance testing

The four measurement invariance models – configural model (M_{config}), metric model (M_{metric}), scalar model (M_{scalar}), and strict model (M_{strict}) show acceptable fit indices for gender invariance, as shown in Table 2. The configural model yields the best fit indices ($\chi 2(70) = 123.27$, $p < .001$, CFI = .97; TLI = .97; RMSEA = .07, 90% CI [.05 - .09], SRMR = .04), slightly decreasing for the other three invariance models. However, the chi-square difference test based on which we compared the models indicates a significant difference only between the scalar model (M_{scalar}) and the strict model (M_{strict}) ($\Delta\chi 2(10) = 27.21$, $p < .01$), with no difference between the other compared models. Furthermore, upon

inspecting the CFI difference between models, results of the ΔCFI indicate a decrease lower than .01 between each of the compared models (configural model with the metric model, a metric model with the scalar model, and scalar model with the strict model; see Table 2). This result shows that the instrument is invariant across gender (Bălăceanu et al., 2021; Chen, 2007).

Summarizing, the results of the conducted CFA and MGCFA in Study 1 indicate good reliability and psychometric properties for the EIS scale, as well as invariance across gender.

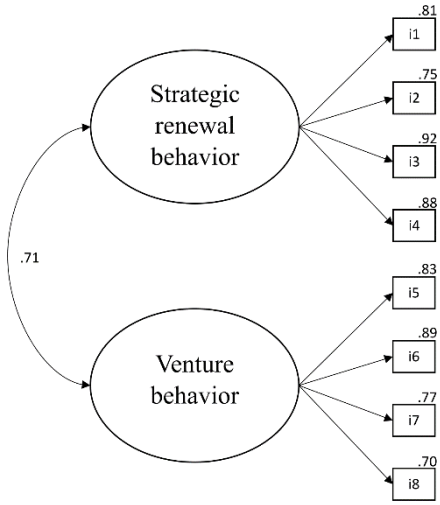

Figure 1. $M2_{adj}$ – adjusted two-factor model

Study 2

Cross-validation of psychometric properties and validity model

As depicted in Table 3, results of the CFA indicate poor fit indices for the one-factor model (M3) and excellent fit indices for the adjusted two-factor model ($M3_{adj}$; $\chi 2(18)$ = 24.29, $p > .05$, CFI = .99; TLI = .98; RMSEA = .05, 90% CI [.01 - .10], SRMR = .04). The chi-square difference test also shows significant differences between the two models ($\chi 2(2)$ = 100.94, $p < .001$). Furthermore, the factor loadings for each construct were above the minimum threshold of .32 (Tabachnick & Fidel, 2001). Thus, the two-factor EIS demonstrates good psychometric properties in the second sample as well. Furthermore, the validity model (M_{val}) also displays satisfactory indices (see Table 3). Thus, we continued with the investigation of convergent and discriminant validity for the scale.

Table 3. *Fit indices for the confirmatory factor analysis regarding cross-validation, convergent, and discriminant validity (Study 2)*

Model	Model description	χ2	df	CFI	TLI	RMSEA [90% CI]	SRMR	Δχ2	Δdf
M3	One-factor model	125.23*	20	.79	.71	.21 [.17 - .24]	.09		
$M3_{adj}$	Adjusted two-factor model	24.29	18	.99	.98	.05 [.01 - .10]	.04	100.94*	2
M_{val}	Validity model	647.73*	391	.90	.89	.07 [.06 - .08]	.06		

Note. $N = 122$, * $p < .001$; M3adj is compared to M3. In M3adj the two factors are correlated.

Hypothesis testing

To assess Hypotheses 1a through 3b regarding EIS's convergent validity, we relied on the latent correlation between the study's variables (see also Gawke et al., 2019). The results are presented in Table 4. Innovativeness was positively associated with both strategic renewal behavior (H1a; $r = .57$, $p < .001$) and with venture behavior (H1b; $r = .53$, $p < .001$), thus conferring support to Hypotheses 1a and 1b. In line with Hypotheses 2a and 2b, we also found risk-taking to be positively associated with strategic renewal behavior (H2a; $r = .52$, $p < .001$) and venture behavior (H2b; $r = .42$, $p < .01$). Lastly, results supported Hypotheses 3a and 3b as well, with proactive personality being positively associated with strategic renewal behavior (H3a; $r = .39$, $p < .01$) and venture behavior (H3b; $r = .38$, $p < .01$).

Furthermore, the EIS also demonstrates discriminant validity, with the AVE of the two EIS components being higher than the maximally shared variances with any of the study's variables (Farrell, 2010; Fornell & Larcker 1981). Specifically, the AVE of the strategic renewal behavior component was .73, while the AVE of the venture behavior component was .77. Altogether, based on Study 2, the Romanian version of the EIS displays convergent and discriminant validity.

Table 4. *Descriptive statistics, reliability coefficients, and latent correlations between Study's 2 variables*

Variable	M	SD	1	2	3	4	5
1. Strategic renewal behavior	4.10	1.58	(.72)				
2. Venture behavior	2.44	1.46	.66**	(.86)			
3. Innovativeness	4.60	1.33	.57**	.53**	(.96)		
4. Risk-taking	3.39	0.49	.52**	.42*	.50**	(.73)	
5. Proactive personality	5.49	0.72	.39*	.38*	.72**	.58**	(.86)

Note. $N = 122$, * $p < .01$, ** $p < .001$. Cronbach's alpha values are displayed on the main diagonal. Latent correlation coefficients were extracted from the validity model.

Discussion

The image of proactive, idea-generating, and solution-oriented employees going over and beyond what is to create what is possible has slowly become an ideal for organizations that realize the strategic value and competitive advantage that such workers bring to their businesses (Antoncic & Antoncic, 2011; Park et al., 2014). In this context, research is focusing with an increasing intensity on employee intrapreneurship (Gawke et al., 2017), which is a construct with much promise, but in need of proliferation and more conceptually and theoretically consistent research (Blanka, 2019). To bring this new concept into the grasp of researchers and HR practitioners in Romania and provide a psychometrically sound instrument that guides research in the domain of employee intrapreneurship, we adapted and validated the Employee Intrapreneurship Scale (EIS, Gawke et al., 2019) in two samples of the Romanian working population.

Our studies have shown that the factorial structure of the instrument is solid, intrapreneurship actions being represented by two highly correlated latent indicators, strategic renewal, and corporate venture behaviors. Thus, the factorial analyses showed that the Romanian adaptation has fully replicated the factorial structure proposed and demonstrated by Gawke and collaborators (2019) in the development study of the instrument. Furthermore, there are no differences in understanding intrapreneurship behaviors among men and women, the scale being invariant across gender. Our studies also show evidence of construct validity based on the relationships between intrapreneurship and other concepts in the nomological network. As suggested by previous literature, scores on the EIS were positively related to employees'

innovativeness, risk-taking propensity, and proactive personality (Neessen et al., 2019). The direction and magnitude of these associations are comparable to those found by Gawke and colleagues (2019) and provide further empirical support for the relationships between the EIS and related constructs.

Theoretical and practical implications

Despite the growing interest in the concept, intrapreneurship still lacks clear classifications of related concepts, which has been explained through diverse theoretical reasoning (Blanka, 2019). The behavior-based measurement approach offered by the EIS anchors employee intrapreneurship in the proactivity literature (Gawke et al., 2019) and opens up theoretical integration through the JD-R theory (Bakker & Demerouti, 2017). Employee intrapreneurship could represent a strategic proactive work behavior within multi-level JD-R theory (Bakker & Demerouti, 2018), related to other proactive actions (e.g., proactive vitality management, strengths use, job crafting) through which employees have a positive bottom-up influence over their work, organization, and well-being.

From a practical point of view, the EIS validated in a Romanian population provides consultants and human resource specialists with a science-based tool to measure and identify intrapreneurship among employees. Identifying and measuring difficulties, problems, and dysfunction in organizations can help eliminate problems and negative aspects in practice, but supplementing these with measurements that correctly identify positive aspects such as employees' initiative and proactive contribution, can bring a truly positive contribution to organizational functioning.

Limitations and future research directions

Some limitations need to be addressed and kept in mind in the interpretation of our results. While our research did not follow an objective of establishing possible antecedents and effects, the use of self-reported single-source data has its' limitations that we have to take into consideration when interpreting the empirical relationships between the EIS and the other constructs in this study. The directionality in the relationship between proactive personality and intrapreneurship behaviors is intuitive (although those engaging in intrepreneurship over time may build more proactive personalities). Still, the relationships to risk-taking and innovativeness are so far purely associative, both statistically and theoretically. A second limitation resides in the lack of additional variables unrelated (discriminant) to intrapreneurship or other instruments measuring intrapreneurship (convergent). Different variables testing for discriminant and convergent validity would have yielded a stronger test and could have directed future research towards other relevant correlates to investigate.

Another limitation that we bring to the readers' attention is the non-probabilistic sampling technique used to collect the data. Snowball sampling helped us reach employees online, without the difficulties of on-site data collection in companies; however, this technique implies the risk of respondents suggesting others who are similar in their intrapreneurial tendencies, hence skewing the results (Etikan et al., 2015). Nonetheless, we carefully checked the distributions of both EIS dimensions, and since these were fairly normally distributed, the concern of biased sampling is partly lifted in this research.

Research in this domain, especially with the conceptualization of employee intrapreneurship as proposed by the EIS, has a myriad of exciting future directions in discovering antecedents, consequences, and the full nomological network of intrapreneurship. The two broad themes include investigating the individual-level and organization-level correlates of intrapreneurship (Blanka, 2019). At the organizational level, previous research suggests that when employees perceive the employing organization as innovative, risk-taking, and proactive on the market, they tend to follow suit and engage in more intrapreneurship behaviors (Do & Luu, 2020). Furthermore, when the organization provides a working environment, procedures, equipment, and colleagues that employees are

delighted with, intrapreneurship tends to increase alongside satisfaction reports (Antoncic & Antoncic, 2011). At this level, the insightful future scientific inquiry could show how organizational climate (e.g., innovative climate) and culture can predict intrapreneurship and/or moderate its' associations to relevant outcomes. We have seen cross-sectional associations at the individual level between personal predispositions towards proactivity, innovativeness, risk-taking, and self-reported intrapreneurship as measured by the EIS. Future longitudinal and intervention research needs to go beyond these initial associations and establish temporal and causal direction, as well as the more distal predictors of intrapreneurial tendencies. Insight into early predictors could equip educational policy and strategy with relevant information into what factors to develop during school to raise adults fit for a job market that is less and less structured and more and more focused on initiative and bottom-up dynamics in organizations.

Conclusion

We presented two studies to adapt and validate the EIS to the Romanian population. We advance research on intrapreneurship in Romanian organizations through these studies by providing a tool that can bring conceptual and operational consistency to the field. This instrument can be helpful for researchers who wish to construct a better scientific understanding of corporate venturing and strategic renewal behaviors that employees proactively enact to help their organizations grow and develop.

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APPENDIX 1

Employee Intrapreneurship Scale – Romanian Version

Mai jos sunt opt afirmații despre activitatea dumneavoastră la locul de muncă. Citiți cu atenție fiecare afirmație şi însemnați cifra care considerați că indică cel mai bine modul dumneavoastră de a acționa în situațiile date.	Niciodată	Rareori	Ocazional	În mod regulat	Deseori	Foarte des	Întotdeauna
1. Desfășor activități pentru a realiza schimbări în organizația mea.	1	2	3	4	5	6	7
2. Desfășor activități pentru a schimba produsele/serviciile actuale ale organizației mele.	1	2	3	4	5	6	7
3. Contribui cu idei pentru schimbarea strategică a organizației mele.	1	2	3	4	5	6	7
4. Mă gândesc la noi modalități de lucru pentru organizația mea.	1	2	3	4	5	6	7
5. Desfășor activități pentru a înființa noi departamente sau sucursale/filiale.	1	2	3	4	5	6	7
6. Desfășor activități pentru a contacta noi piețe sau comunități pentru organizația mea.	1	2	3	4	5	6	7
7. Desfășor activități care au un impact în departamente noi în afara organizației mele.	1	2	3	4	5	6	7
8. Stabilesc în mod activ colaborări cu experți din afara profesiei mele.	1	2	3	4	5	6	7

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RESEARCH ARTICLE

Equity Sensitivity and Justice-Related Work Outcomes: Incremental Validity over Big Five Personality Traits

SERGIU M. CONDREA
University of Bucharest, Faculty of Psychology and Educational Sciences

BOGDAN T. OPREA
University of Bucharest, Faculty of Psychology and Educational Sciences

AMALIA MIULESCU
University of Bucharest, Faculty of Psychology and Educational Sciences

Abstract

One individual difference that emerged over the years is equity sensitivity. It was posited that this construct may be a central factor in predicting work outcomes in reactions to inequity. However, its conceptual overlap with already established dimensions of personality has been insufficiently taken into consideration so far. The present study examines the incremental validity of equity sensitivity in predicting counterproductive work behaviors and perception of organizational justice over the Big Five personality traits. The study sample consisted of 223 Romanian working adults. Results showed that, although equity sensitivity had a significant relationship with counterproductive work behaviors after controlling for the Big five personality traits, its incremental validity was small, with little practical utility. Moreover, the incremental validity of equity sensitivity in predicting justice dimension above the Big-Five personality dimensions was not supported. Theoretical and practical implications of equity sensitivity for personnel selection are discussed.

Keywords

equity sensitivity, Big Five, counterproductive work behaviors, organizational justice, incremental validity

Introduction

Equity sensitivity is a personal characteristic reflecting how people respond to situations of inequity (Huseman, Hatfield, & Miles, 1987). It represents people's tolerance for under-reward or over-reward in their transactions with the organization and relevant others (King, Miles, & Day, 1993). This individual difference has been studied in association with various attitudes and behaviors at work (Huseman et al., 1987), research indicating relationships with both counterproductive work behaviors and perceptions of organizational justice (Bourdage, Goupal, Neilson, Lukacik, & Lee, 2018; Scott & Colquitt, 2007). Given these findings, some authors have suggested that this construct may be a central factor in selection and employee incentive strategies (Miles, Hatfiled, & Huseman, 1989). However, equity sensitivity is associated with already established

Correspondence concerning this article should be addressed to Sergiu M. Condrea, Faculty of Psychology and Educational Sciences, University of Bucharest, Bulevardul Panduri, nr. 90, București, 050663, Email: condrea.m.sergiu-mihail.m19@s.fpse.unibuc.ro

dimensions of personality from the Five-Factor Model (Bing & Burroughs, 2001; Scott & Colquitt, 2007) and Big Five traits also predict counterproductive work behaviors and perceived organizational justice (Berry, Ones, & Sackett, 2007; Törnroos et al., 2019). Because it was suggested that this construct may be a central factor in the workplace (i.e., related to important work outcomes; Miles et al., 1989; Grant, 2013), these statements should be supported by data, being crucial to establish whether equity sensitivity can be considered a valid predictor of organizational outcomes.

Our study aims to explore the incremental validity of equity sensitivity in predicting important work outcomes (counter-productive work behaviors, distributive justice, procedural justice, interpersonal justice, and informational justice) above the Five-Factor Model. This research has both theoretical and practical contributions. From a theoretical perspective, it broadens our scientific understanding in the domain of individual differences at work. Given that the Five-Factor Model partially omits relevant dimensions of personality (e.g., Lee, Ashton, & de Vries, 2005), personality characteristics not covered by the Big Five model should be studied (Hough & Furnham, 2003). From a practical perspective, if there is an increment of equity sensitivity in explaining counterproductive work behaviors and organizational justice dimensions, practitioners in this field may consider assessing both personality and equity sensitivity in high-stakes situations (i.e., selection and promotion). At the same time, it is possible that the increase in predictive validity is too small to be worth the financial cost associated with the use of the measure. If equity sensitivity does not have incremental value over the Big Five in predicting organizational outcomes, measuring both personality and equity sensitivity in research and practice may be redundant.

The Nature of Equity Sensitivity

Equity theory (Adams, 1963; 1965) states that individuals seek to attain a sense of fairness in their dealings with the organization and relevant others. They are intolerant to situations in which their rewards (e.g., pay, titles) are either too small or too high in relation to their inputs (e.g., performance). In other words, when employees believe that their outcomes are smaller than the inputs, or that their outcomes are greater than the inputs, they experience distress. However, classical equity theory does not take into account how individual differences impact the way people perceive equity. Studies suggests that certain demographic and psychological factors affect how individuals allocate rewards for themselves and / or others and also how they respond to unfair treatment (Huseman et al., 1987). One of these variables is equity sensitivity. Individuals high in equity sensitivity are called “Benevolents”. They are more input-oriented (i.e., givers), and tolerate under-reward more easily (King et al., 1993). By contrast, “Entitleds” (i.e., individuals low in equity sensitivity), are more outcome oriented (i.e., takers), and have higher tolerance for over-reward situations (King et al., 1993). Finally, average scores on equity sensitivity reflect more “equity sensitive” individuals, i.e. those who comply most strictly to the idea of equity.

The Incremental Validity of Equity Sensitivity over the Big Five Model

Past studies reveal that equity sensitivity negatively predicts work deviance (Bourdage et al., 2018). Counterproductive work behaviors have also been associated with equity sensitivity (Scott & Colquitt, 2007). With regard to justice dimensions, equity sensitivity was related to the perception of procedural justice and interactional justice (Kickul, Gundry, & Posig, 2005; Scott & Colquitt, 2007). Studies considering more traditional personality predictors have shown that Conscientiousness, Agreeableness, and Emotional stability are strong predictors of counterproductive work behaviors (Berry et al., 2007; Dalal, 2005). Further, referring to justice perceptions influenced by characteristics of the perceiver, personality traits such as Extraversion, Neuroticism, Agreeableness, and Openness have been

associated with organizational justice (Barsky & Kaplan, 2007; Törnroos et al., 2019).

Although some empirical evidence on the association between equity sensitivity and personality traits exists (e.g., Bing & Burroughs, 2001; Bourdage et al., 2018; Scott & Colquitt, 2007; Woodley, Bourdage, Ogunfowora, & Nguyen, 2016), research regarding the role of both personality and equity sensitivity in predicting work outcomes is scarce. In this sense, one criticism that may arise against equity sensitivity refers to the lack of studies related to incremental validity. Thus, before studying the relevance of this construct in predicting important work outcomes, the incremental validity of equity sensitivity above the Big Five should be rigorously explored. If equity sensitivity is an important and relevant characteristic, its unique contribution in explaining additional variance in work outcomes should be emphasized. If equity sensitivity does not have incremental value over the Big Five in predicting organizational outcomes, measuring both personality and equity sensitivity in research and practice may be redundant, and measuring only personality may be a more efficient choice.

There are cases when organizations have adopted different predictors whose incremental validity over the more traditional and rigorously examined measures has not been proved (Salgado, Viswesvaran, & Ones, 2002). Some authors have suggested that one area for further examination is studying the incremental utility of equity sensitivity (e.g., Sauley & Bedeian, 2000). So far, only one study has explored the incremental validity of equity sensitivity in predicting work outcomes over the Big Five. Lee (2013) found that equity sensitivity still had a significant relationship with transformational leadership, after the model controlled for the five personality dimensions. Therefore, we propose the following research question.

Research question: Does equity sensitivity contribute additional variance in the prediction of justice-related work outcomes over the Big Five personality dimensions?

Method

Participants and Procedure

Participants were 223 Romanian working adults, with 168 females (71.7%) and 63 males. They came from a wide variety of occupations: 7.6% from health / social sector, 3.1% from defense, 17% from commerce, 4.9% from goods production, 8.5% from information and communication, 6.7% from finance and insurance, 11.2% from science and technology, 13.5% from education, and 27.5% from other fields. The mean age for the participants was 25.57 years (SD = 7.27), with a range of 18–63 years. 95 (42.6%) of employees had a tenure of less than one year, 73 (32.7%) of employees had a tenure between 1 and 3 years, 18 (8.1%) of employees had a tenure between 3 and 5 years, 19 (8.5%) of employees had a tenure between 5 and 10 years, and 18 (8.1%) of employees had a tenure of over 10 years in their current organization. Participants filled out the questionnaire through an online form and they were motivated to complete the form by the chance to win 30 euros. Measures were collected at one time point.

The post-hoc power analysis that we performed using GPower revealed that in order to test the incremental validity of equity sensitivity over and above Big Five traits, for a medium effect size f^2 = .15, α = .01 (we applied Bonferroni correction, as we tested 5 hypotheses) and a power 1 - β = .80, we would have needed 127 participants. Our final sample is bigger than the one calculated with GPower (Faul, Erdfelder, Buchner, & Lang, 2009), therefore increases the representativity and it made possible to detect even smaller effect sizes.

Measures

Personality was measured with the Romanian version of the Big-Five from IPIP (Goldberg. 1992). This scale consists of 10 items for each factor. Each item was rated on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). An example of an item (for Extraversion) is “I know how to captivate people”. Reliabilities reported by Iliescu, Popa, and Dimache (2015) in the Romanian adaptation of the IPIP, ranged from .65

(Openness to experience) to .82 (Neuroticism).

Equity sensitivity was measured with the Equity Preference Questionnaire (EPQ; Sauley & Bedeian, 2000). It consists of 8 positively keyed items and 8 negatively keyed items, measured via a five-point rating scale with values from 1 (strongly disagree) to 5 (strongly agree). An example of a positively keyed item is ‘‘I feel obligated to do more than I am paid to do at work.’’ An example of a negatively keyed item is ‘‘I prefer to do as little as possible at work while getting as much as I can from my employer’’. Researchers have found that Cronbach's alpha ranges from .80 to .86 (Miller, 2009; Shore & Strauss, 2008).

Counterproductive work behaviors were measured with the Counterproductive Work Behavior Checklist (CWB-C) 10-item version (5 items targeting the organization and 5 targeting people) proposed by Spector, Bauer, and Fox (2010). An example of an item is "I complained about insignificant things at work". The ratings were measured on a five-point scale from 1 (never) to 5 (daily). The coefficient alpha of the CWB-C reported by Spector et al. (2010) was averaged .78 for the agreement and frequency employee forms and .89 for the two supervisor forms.

Organizational justice was measured with the Organizational Justice Scale (Colquitt, 2001), which contains 20 items, on a 5-point scale from 1 (to a small extent) to 5 (to a large extent). The scale measures four justice dimensions, namely procedural, distributive, informational, and interpersonal justice. An example of an item (for distributive justice) is "Does your (outcome) reflect the effort you have put into your work?". Reliabilities reported by Colquitt (2001) are .92 for distributive justice, .78 for procedural justice, .79 for interpersonal justice, and .79 for informational justice.

Analytical Strategy

All statistical analyses were performed using lavaan (Rosseel, 2012) in R version 3.0.2 (R Core Team, 2016). For establishing the construct validity of the measures, we used Confirmatory Factor Analysis (CFA; Brown, 2015) for equity sensitivity, counterproductive work behaviors and justice dimensions, and Exploratory Structural Equation Modeling (ESEM; Asparouhov & Muthen, 2009) for personality measures. As "CFA approach of fixing many or all cross-loadings at zero may force a researcher to specify a more parsimonious model than is suitable for the data" (Asparouhov & Muthén, 2009, p. 398), we used a less restrictive approach in order to test the validity of the 50-item IPIP representation of the Goldberg (1992) markers for the Big-Five factor structure. Due to the constraints imposed by the CFA (being "too restrictive to make it a useful tool for personality research"; Borkenau & Ostendorf, 1990, p. 523), we considered Exploratory Structural Equation Modeling (ESEM; Asparouhov & Muthén, 2009) as a more appropriate choice. An important characteristic of ESEM is that it perfectly combines EFA and CFA analysis. Also, the presence of cross-loadings can be stated in the model (Asparouhov & Muthén, 2009). Another strategy that we adopted was the inclusion of correlates uniqueness (CU's). Following Marsh's (2013) approach, we added correlated uniqueness for negatively worded items. The rationale behind this procedure is that for self-report surveys there can be a potential artifact associated with item wording (Marsh, Scalas, & Nagengast, 2010). Equity sensitivity's incremental validity over personality factors in predicting work outcomes was conducted using structural equation modeling (SEM).

Results

The descriptive statistics (i.e., means, standard deviations, internal consistencies) and the inter-correlations among the measured variables are reported in Table 1.

Table 1. *Descriptive statistics and correlations between the variables included in the study*

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Organizational justice	3.91	.65	(.91)											
2. Procedural justice	3.62	.73	.81**	(.77)										
3. Distributive justice	4.10	.88	.71**	.48**	(.88)									
4. Interpersonal justice	4.28	.83	.73**	.40**	.32**	(.86)								
5. Informational justice	3.87	.92	.85**	.52**	.48**	.65**	(.86)							
6. Conscientiousness	3.79	.50	.21**	.18**	.19**	.09	.17**	(.70)						
7. Agreeableness	3.93	.49	.22**	.20**	.22**	.14*	.13*	.37**	(.70)					
8. Neuroticism	2.46	.64	-.26**	-.21**	-.16*	-.23**	-.20**	-.27**	-.30**	(.80)				
9. Openness	4.00	.52	-.01	.03	.02	-.04	-.06	.32**	.30**	-.08	(.71)			
10. Extraversion	3.59	.58	.13*	.14*	.14*	.02	.09	.28**	.25**	-.36**	.28**	(.76)		
11. Equity sensitivity	3.80	.55	.14*	.17**	.09	.09	.07	.39**	.43**	-.13*	.20**	.13*	(.82)	
12. Counterproductive work behaviors	1.67	.52	-.19**	-.05	-.13*	-.21**	-.22**	-.36**	-.33**	.21**	-.13*	-.07	-.24**	(.77)

Note. Numbers in parentheses represent Cronbach alpha values. SD = Standard deviation; *$p < .05$, **$p < .001$.

Confirmatory Factor Analysis and Exploratory Structural Equation Modeling

Table 2 includes the CFA analyses for equity sensitivity, counterproductive work behaviors, and justice dimensions and the ESEM analysis for the Big-Five factor structure. In order to establish our model's goodness of fit, we used the cut-off criteria provided by Hu and Bentler (1999).

The fit indices for the five-factor model (8 corelated errors were included in the model) showed an acceptable fit with the data (*CFI* = .90; *TLI* = .90; *RMSEA* = .04). Organizational justice's four-factor model displayed a good fit to the data (*CFI* = .96; *TLI* = .96; *RMSEA* = .05). The single factor model for counterproductive work behaviors (4 correlated errors were included) displayed a good fit to the data (*CFI* = .94; *TLI* = .92; *RMSEA* = .06). Finally, equity sensitivity's one-factor model (including 6 correlated errors) displayed an acceptable goodness of fit (*CFI* = .90; *TLI* = .88; *RMSEA* = .06).

Table 2. *Exploratory structural equation modeling and confirmatory factor analysis of the measures*

Measures	Framework	Model	λ² (df)	CFI	TLI	SRMR	RMSEA (90% CI)
Big Five	ESEM	5 factors (8 corelated errors)	4153.63* (1225)	.90	.90	.06	.04 (.03 - .04)
Organizational justice	CFA	4 factors	2043.11* (190)	.96	.96	.05	.05 (.04 - .06)
Counterproductive work behaviors	CFA	1 factor (4 correlated errors)	358.25* (45)	.94	.92	.06	.06 (.02 - .09)
Equity sensitivity	CFA	1 factor (6 correlated errors)	781.90* (120)	.90	.88	.07	.06 (.04 - .08)

Note. $\chi 2$ = Satorra-Bentler chi square; df = degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; SRMR = Standardized Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation. * p < .001.

The Incremental Validity of Equity Sensitivity over Big Five Personality Traits

Table 3 summarizes the results of the analyses examining the incremental validity of equity sensitivity over personality dimensions in predicting work outcomes measured in the current study. The Big-Five personality factors were included in the first step of the analysis. Further, in the second step of the analysis, equity sensitivity was added.

In the first step, our results indicate that the personality traits from the Big-Five model accounted for approximately 21.3% of the variance in CWB: R^2 = .213; $F(5, 215)$ = 11.62; p < .001. Adding equity sensitivity in step 2 explains an additional 1.7% of the variance in CWB (ΔR^2 = .017; p < .05). However, using an effect size calculator for hierarchical multiple regression (Soper, 2018) we showed that the effect size of the resulted increment in the explanatory power of the model was small (f^2 = .022). Further, the five personality traits accounted for approximately 7.9% of the variance in distributive justice: R^2 = .079; $F(5, 215)$ = 3.70; p < .01. Including equity sensitivity in the step 2 resulted in an insignificant increase in the model's explanatory power (ΔR^2 = .001; p > .05). Regarding procedural justice, the initially added personality traits accounted for approximately 8.1% of the variance in this variable: R^2 = .081; $F(5, 215)$ = 3.80; p < .01. Including equity sensitivity in step 2 did not result in a significant increase in the model's

explanatory power (ΔR^2 = .005; p > .05). Personality traits accounted for approximately 7.3% of the variance in interpersonal justice: R^2 = .073; F(5, 215) = 3.41; p < .01. Adding equity sensitivity in step 2 did not result in significant increase in the explanatory power of the model (ΔR^2 = .001; p > .05). Finally, approximately 8% of the variance in informational justice was explained by the personality traits from the FFM model: R^2 = .08; F(5, 215) = 3.51; p < .01. Equity sensitivity's inclusion in the step 2 did not result in any improvement in the model's explanatory power (ΔR^2 = 0; p > .05).

Table 3. *The SEM estimation of the equity sensitivity' incremental validity over personality traits*

Step	Independent variable	Counterproductive work behaviors			Distributive justice			Procedural justice			Interpersonal justice			Informational justice		
		β	R^2	ΔR^2	β	R^2	ΔR^2	β	R^2	ΔR^2	β	R^2	ΔR^2	β	R^2	ΔR^2
1	Neuroticism	.10	.213	-	-.07	.079	-	-.14	.081	-	-.22**	.073	-	.16*	.080	-
	Extraversion	.14			.05			.03			-.07			-.01		
	Openness	-.00			-.08			-.04			-.09			-.13		
	Agreeableness	-.24***			.17*			.14			.10			.08		
	Conscientiousness	-.30***			.12			.10			.05			.14		
2	Neuroticism	.10	.230	.017*	-.07	.080	.001	-.14	.086	.005	-.22**	.075	.001	-.16*	.080	.000
	Extraversion	.14*			.05			.03			-.07			-.01		
	Openness	-.00			-.08			-.04			-.09			-.13		
	Agreeableness	-.18*			.19*			.11			.09			.08		
	Conscientiousness	-.26***			.13			.08			.04			.14		
	Equity sensitivity	-.15*			-.05			.08			.05			.00		

Note. * p < .05; ** p < .01; *** p < .001.

Discussion and Conclusion

The current study explored the incremental validity of equity sensitivity in predicting counterproductive work behaviors and organizational justice dimensions (e.g., distributive, procedural, interpersonal, and informational) after controlling for the personality dispositions. Our results show that the incremental validity of equity sensitivity on work outcomes above the five-factor personality dimensions is limited. First of all, we only found support for the incremental validity of equity sensitivity in predicting counterproductive work behaviors over the Big-Five personality traits. Even so, the increase in validity was considerably small, providing little practical utility. Second, we did not find significant evidence regarding the incremental validity of equity sensitivity in predicting justice dimension above the Big-Five personality dimensions. Equity sensitivity explained a trivial proportion of variance in all four types of perceived justice, after we controlled for the personality dispositions.

Theoretical and Practical Implications

The present study contributes to the literature by enlarging our scientific understanding in the domain of personnel selection, by exploring the relevance of a personality construct, equity sensitivity, in predicting different job outcomes (Huseman et al., 1987). Over the years, a considerable attention was given to the role of personality in industrial-organizational psychology (Judge, Klinger, Simon, & Yang, 2008), one reason being the demonstrated validities of personality variables in the work context (Barrick & Mount, 1991; Ones, Viswesvaran, & Schmidt, 1993). In order to increase the validity of personality predictors, beside the Big-Five personality traits, we should consider additional personality dimensions that are likely to exist outside the domain of the Big Five (Hough & Furnham, 2003).

Equity sensitivity emerged as a personality variable that can explain individual differences in reactions to inequity. It was suggested that this construct may be a central factor in the workplace (Miles et al., 1989). Also, based partially on this construct, the Wharton professor Adam Grant developed a theoretical framework (i.e., Give and Take styles), that reached tremendous popularity in 2013 (Utz, Muscanell, & Göritz, 2014). He posited that Give and Take styles are related to important work outcomes. His book ("Give and Take – Why Helping Others Drives Our Success"; Grant, 2013) was cited by leading financial and management publications (Mäthner & Lanwehr, 2017) and his TED talk on this subject being one of the most popular. However, our findings cast doubt on the importance of equity sensitivity in predicting counterproductive work behaviors and justice dimensions, its impact and applicability in the workplace being reduced. In this sense, more studies should be provided regarding equity sensitivity's validity in predicting important work outcomes.

Our findings suggest that measuring both personality and equity sensitivity in research and some specific situations in practice (e.g., selection decisions) may be redundant. Consistent with William of Ockham principle ("Entities should not be multiplied without necessity"), including equity sensitivity in the personality (i.e., Big Five) and work-related outcomes panorama (i.e., counterproductive work behaviors and justice dimensions) is unnecessary. Even if equity sensitivity still had a significant relationship with counterproductive work behaviors after the model controlled for the Big Five personality traits, the explained percentage of variance in counterproductive work behaviors was so small, that, from an economic utility point of view, the financial cost associated with this measure in combination with the Big Five is not worth it. However, extreme scores on equity sensitivity measure could be an indicator for the risk of counter-productive work behaviors (Woodley & Allen, 2014).

Limitations and Future Research

This study also has some limitations. First, the number of job outcomes included in the study was relatively low. Thus, future studies should

explore the incremental validity of equity sensitivity in predicting other important work-related criteria (e.g., task performance, organizational citizenship behavior, job satisfaction, etc.), above the five factor dimensions. Second, we used self-reports questionnaires in order to measure our study variables. One risk associated with the self-report measure is common method bias (Tehseen, Ramayah, & Sajilan, 2017). However, Harman's Single-Factor Test (Chang et al., 2010) revealed a 11 factors solution, accounting for 41 % of the total variance. The one factor solution explained only 11% of the variance. One factor did not capture most of the variance. Therefore, our results suggest that common method bias is not an issue for the validity of this study. Yet, future studies may consider multiple sources of reporting in order to avoid this risk. Third, the sample on which the research was conducted was unbalanced, containing a high proportion of women and relatively young employees, which makes the generalization of conclusions problematic (Haladyna & Downing, 2004). Further research should be based on samples that reflect better the population on which the results are generalized.

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RESEARCH ARTICLE

The Effectiveness of a Job Crafting, Strengths Use, and Deficit Correction Intervention: A Randomized Controlled Trial

LIUBIȚA BARZIN
Department of Psychology, West University of Timisoara

DELIA M. VÎRGĂ
Department of Psychology, West University of Timisoara

ANDREI RUSU
Department of Psychology, West University of Timisoara

Abstract

The present study evaluates the effectiveness of a mixed job crafting, strengths use, and deficit correction intervention on the proactive behaviors, work engagement, life satisfaction, and work-life balance of employees working in a home office setting. A two-armed (intervention vs. wait-list control group) randomized controlled trial with three measurement moments (pre-, post-intervention, and one-month follow-up) was designed to reach the study's goal. A sample of 80 participants part of a large multinational pharmaceutical company was randomly assigned to the intervention (n = 45) or wait-list control condition (n = 35). Mixed factorial analyses of variance showed that the combined job crafting, strengths use, and deficit correction intervention positively impacted life satisfaction (d = .47) and seeking challenging job demands (d = .44) in the short-term. There were no significant differences between the two groups regarding the other proactive behaviors, work engagement, or work-life balance. Moderator analyses revealed that autonomy and workload were moderators of the relationship between the intervention effectiveness and several outcomes (e.g., the intervention had a positive effect on the work-life balance of participants with low autonomy). Theoretical and practical implications are discussed.

Keywords

job crafting, strengths use, deficit correction, work engagement, life satisfaction, work-life balance, randomized controlled trial

Introduction

In order to succeed in a competitive environment, organizations must ensure a motivated workforce as it has been demonstrated that high work engagement leads to better work performance (Bakker, Demerouti & Sanz-Vergel, 2014; Gallup, 2020). Engaged employees are more energized and resilient when facing adversity; they are willing to go the extra mile in achieving work objectives and feel enthusiastic, deeply involved, and absorbed in their work (Schaufeli et al., 2002). Studies

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Correspondence concerning this article should be addressed to Delia Vîrgă, Department of Psychology, West University of Timișoara, Bv. Vasile Pârvan 4, 300223, Timișoara, Romania. Email: delia.virga@e-uvt.ro

have shown that one way to increase employee engagement is by designing and implementing different bottom-up interventions (Knight et al, 2019), such as job crafting (Thomas et al., 2020) or strengths-based (Bakker & van Wingerden, 2021) interventions. One of the frameworks under which bottom-up organizational interventions have developed is the Job Demands-Resources (JD-R) theory (Bakker & Demerouti, 2014; 2017). Employees can adjust their levels of job resources and job demands by engaging in job crafting, a proactive bottom-up strategy aimed at increasing structural job resources, social job resources, challenging job demands, or decreasing hindering job demands (Tims et al., 2012). Teaching employees how to craft their jobs in order to balance their job resources and job demands leads not only to work engagement but also to work performance (van Wingerden et al., 2017; 2017a).

Like in job crafting, employees can adjust their personal or job resources using their strengths at work, strengths use being another proactive bottom-up strategy through which employees can indirectly affect their work engagement and performance in a positive manner (Bakker & van Woerkom, 2018; Peláez et al., 2020). A strength can be defined as *"a natural capacity for behaving, thinking or feeling in a way that allows optimal functioning and performance in the pursuit of valued outcomes"* (Linley & Harrington, 2006, p. 88). Alongside strengths use, looking for opportunities to correct one's weaknesses, defined as deficit correction, is another proactive behavior that could energize employees and ensure a higher work engagement (van Woerkom et al., 2016). Deficits can be defined as *"ways of behaving, thinking, or feeling that do not come natural to an individual, which he or she does not enjoy doing, but in which he or she can achieve competent functioning if trained accordingly"* (Meyers et al., 2015, p. 52).

Given the complexity of the work environment and the development of today's new ways of working, characterized by flexibility in choosing the work schedule, workplace, and media technology tools (Demerouti et al., 2014), it proves to become a challenge for organizations to understand the broad spectrum of resources and demands that characterize each employee's work environment. At the same time, employees face their own challenges working in this new context as the line between work and personal life narrows. Learning how to balance job resources and job demands by using strengths or correcting deficits could lead to increased levels of work engagement, life satisfaction, and work-life balance. Therefore, the aim of the present study is to investigate this expectation by employing a randomized controlled trial designed to test the effectiveness of an intervention program that blends and capitalizes on job crafting, strengths use, and deficit correction.

Job Crafting and Job Crafting Interventions

From its first conceptualization as a form of ensuring a better person job-fit through task, relational and cognitive alteration of work boundaries (Wrzesniewski & Dutton, 2001), and more recently integrated within the JD-R theory as a method to balance job demands and resources (Bakker & Demerouti, 2014), job crafting behavior has been increasingly studied in organizations during past years. Meta-analysis results (Rudolph et al., 2017) show that overall job crafting behavior and separate forms of job crafting, except decreasing hindering demands, are associated with job satisfaction, work engagement, and in-role and contextual performance. Building on Tims et al.'s (2012) conceptualization of job crafting, Lichtenthaler and Fischbach (2018) differentiate between promotion-focused job crafting (increasing job resources and challenging job demands) and prevention-focused job crafting (reducing hindering job demands). They conclude that the first form of crafting is positively associated with job performance and health, whereas the second form is negatively associated with the two outcomes. Focusing on reduction-oriented job crafting, Demerouti and Peeters (2018) distinguish between optimizing demands, a job crafting form in which employees engage to make their work more efficient, and minimizing demands, a job crafting method used by employees to decrease the intensity of

their work. This new form of reduction-oriented job crafting was positively related to work engagement (Demerouti & Peeters, 2018), being also successfully used in an intervention that decreased participants' exhaustion levels, increased their safety behavior, and improved their attitudes towards change (Demerouti et al., 2020).

Another conceptualization of job crafting is given by Kooij et al. (2017), who studied job crafting in relation to strengths and interests. The authors defined two new types of job crafting: crafting towards strengths, the proactive changes employees initiate in order to make better use of their strengths at work, and crafting towards interests, searching for activities in line with one's interests, discovering that their intervention was effective in increasing the strengths crafting behavior among older workers. Kuijpers et al. (2020) studied a third form of crafting alongside crafting towards strengths and crafting towards interests, namely crafting towards development, defined as a proactive behavior in which the employee is looking for development and growth opportunities.

The majority of job crafting interventions are based on the Michigan Job Crafting Exercise (JCE; Berg et al., 2010) and operationalized based on JD-R theory principles (Knight et al., 2021; van Wingerden et al., 2017), but could also comprise elements of goal-setting theory (van Wingerden et al., 2017a, 2017b) or experiential learning theory (Demerouti et al., 2020). Most studies have focused on increasing structural job resources, social job resources, and challenging job demands (van Wingerden et al., 2016), while others have included decreasing hindering job demands as well (Knight et al., 2021). Concerning changes in job crafting behavior as a result of the intervention, regardless of the job crafting conceptualization, studies report mixed results, from no changes in any job crafting behavior (Kuijpers et al., 2020; van den Heuvel et al., 2015) to changes in some job crafting behaviors, but not in others (Demerouti et al., 2020; Kooij et al., 2017). Furthermore, the effects of job crafting interventions on work engagement and performance are also heterogeneous. Some studies register significant effects on work engagement (Thomas et al., 2020; van Mersbergen, 2012; van Wingerden et al., 2017b) and performance (Gordon et al., 2018; van Wingerden et al., 2017a), while others report non-significant results for at least one of the two outcomes (van Wingerden et al., 2017; 2017a). However, meta-analysis results reveal that job crafting interventions can positively impact overall job crafting behavior, seeking challenging job demands, decreasing hindering job demands, work engagement, and contextual performance (Frederick & VanderWeele, 2020; Oprea et al., 2019).

Strengths Use, Deficit Correction, Strengths-Based and Deficit Interventions

Applying the strengths-based approach in an organizational context has registered increasing attention in the past years (Bakker & van Woerkom, 2018; Ghielen et al., 2017; Quinlan et al., 2012). A recent literature review (Miglianico et al., 2020) describes the three schools of thought that have developed the definitions, measurements, and classifications of strengths, highlighting the fact that the majority of researchers consider strengths as natural attributes that can be developed in time and which tend to energize and foster individual performance. Strengths use has been associated with well-being, work engagement as well as self- and other-ratings of performance (Bakker & van Woerkom, 2018). Researchers discovered that the correlation between the use of strengths and the positive experiences at work increases when the number of applied strengths is higher, regardless of the strengths' content (Harzer & Ruch, 2013).

Designing and implementing interventions that help employees to identify, develop and use their strengths has positive outcomes both at individual and organizational level, as strengths interventions have proven to increase life satisfaction (Dubreuil et al., 2016; Forest et al., 2012; Harzer & Ruch, 2016), work engagement (Bakker & van Wingerden, 2021), and reduce employee turnover (Cable et al., 2013). Meyers and van Woerkom (2017) developed an intervention in which participants identified, developed, and used their strengths; as a result, their positive affect

increased in the short-term, while their levels of psychological capital increased in the short- and long-term. Using a similar design, van Woerkom and Meyers (2019) discovered that their intervention on educational professionals targeting the identification, development, and use of strengths was more effective in stimulating growth initiative for employees with low to medium initial levels of self-efficacy. Another strengths intervention implemented in an Italian pharmaceutical company used the FAMILY (framing, attitudes, meaningfulness, identity, leading self, yoked together) approach and registered significant increases in work engagement and employees' perceptions as valuable contributors within the organization (Constantini et al., 2019).

Although strengths interventions have been viewed as a response to the previous deficit approach, recent findings suggest that a balanced approach where both building on strengths and correcting deficits could be energizing and motivating for employees and even lead to effective performance (Quinlan et al., 2012; van Woerkom et al., 2016). Rust et al. (2009) developed an intervention program in which two groups, one working on two character strengths and one working on one character strength and one weakness, were compared with a control group. The results showed that the first two groups experienced more life satisfaction after the intervention than the control group. Moreover, there were no significant differences between the two experimental groups, the results suggesting that focusing on both weaknesses and strengths could increase, not reduce life satisfaction. Another study (Minhas, 2010 as cited in Quinlan et al., 2012) identified that working on unrealized strengths led to higher levels of work engagement and life satisfaction, but not to significant changes in psychological well-being, while working on realized strengths increased psychological well-being and work engagement, but not life satisfaction. Furthermore, although not in an organizational setting, Meyers et al. (2015) conducted two experiments in which university students were assigned to either a strength or a deficit intervention. While in the first experiment only the strengths group registered short increases in the personal growth initiative, in the second experiment that contained post-intervention assignments, personal growth initiative increased in both groups, with stronger effects in the strengths one.

Considering the above-mentioned findings, a holistic approach to employees' strengths and weaknesses seems to strengthen their well-being and work-related outcomes. Thus, the present study was developed for testing this assumption.

The Present Study

The systematic review on work engagement interventions performed by Knight et al. (2019) suggests that job crafting interventions that address both personal and job resources could be more effective than those focusing on either personal or job resources. This assumption is in line with the JD-R theory (Bakker & Demerouti, 2014), in which job and personal resources positively influence each other and lead to higher levels of work engagement. A relevant JD-R intervention was designed by van Wingerden et al. (2016) and aimed to increase personal resources (hope, resilience, optimism, and self-efficacy), job resources and challenging job demands, registering positive effects on both work engagement and performance. Furthermore, the first study that simultaneously compared a job crafting intervention, a personal resources intervention, and a combined job crafting and personal resources intervention has been conducted by van Wingerden et al. (2017). The results showed that while work engagement increased only for the employees who attended the personal resources intervention, only the combined job crafting and personal resources intervention led to increases in employees' in-role performance levels.

Typically, strengths-based interventions are designed to increase personal resources. For example, van Woerkom and Meyers (2019) identified increased levels of general self-efficacy after teaching participants how to identify and use their strengths. Another study by Bakker and van Wingerden (2021) developed a strengths use intervention

addressing assertiveness, self-efficacy, and resilience, concluding that the intervention effectively increased participants' personal resources, strengths use, and work engagement. Kooij et al. (2017) consider that employees craft their jobs to align them with their personal resources, namely strengths and interests, to which Kuijpers et al. (2020) later add development. Building on their conceptualization of job crafting, we believe that employees use their strengths or deficits to craft their jobs. For example, a person with sociability as a strength could use it to ensure higher levels of social job resources such as peer support or mentoring or even in searching for job challenges to ensure more interesting work and higher work engagement. Similarly, a person could correct a weakness by seeking social resources, for example, coaching or supervisory support. This is in line with crafting towards development, defined as a proactive behavior in which the employee is looking for development and growth opportunities, including working on deficits (Kuijpers, 2020).

Our study focuses on assessing the effectiveness of a combined job crafting, strengths use, and deficit correction intervention on the proactive behaviors, work engagement, life satisfaction, and work-life balance of employees working in a home office setting. We believe that employees will feel more confident and engaged in crafting their jobs when using their strengths or correcting their deficits. To our knowledge, this is the first study that combines strengths use, job crafting, and deficit correction elements in a single intervention under the umbrella of the JD-R theory (Bakker & Demerouti, 2014; 2017). We argue that a holistic approach of the three proactive behaviors could lead to even stronger effects than previously reported. As displayed in Figure 1, to test the effectiveness of the proposed program we focused on two categories of dependent variables: (1) main outcomes – the proactive behaviors tackled through the intervention program (i.e., job crafting, strengths use, and deficit correction behaviors); and (2) secondary outcomes – the work engagement, life satisfaction, and work-life balance of the employees. Therefore, we formulated the following hypotheses:

Primary outcomes hypotheses

Hypothesis 1: Employees' levels of job crafting behaviors, i.e., seeking structural job re-sources (1a), seeking social job resources (1b), and seeking challenging job demands (1c), will significantly increase after the mixed intervention (T2 and T3), both compared to their level before the intervention (T1) and compared to the wait-list control group.

Hypothesis 2: Employees' levels of strengths use will significantly increase after the mixed intervention (T2 and T3), both compared to their level before the intervention (T1) and compared to the wait-list control group.

Hypothesis 3: Employees' levels of deficit correction will significantly increase after the mixed intervention (T2 and T3), both compared to their level before the intervention (T1) and compared to the wait-list control group.

Secondary outcomes hypotheses

Hypothesis 4: Employees' levels of work engagement will significantly increase after the mixed intervention (T2 and T3), both compared to their level before the intervention (T1) and compared to the wait-list control group.

Hypothesis 5: Employees' levels of life satisfaction will significantly increase after the mixed intervention (T2 and T3), both compared to their level before the intervention (T1) and compared to the wait-list control group.

Hypothesis 6: Employees' levels of work-life balance will significantly increase after the mixed intervention (T2 and T3), both compared to their level before the intervention (T1) and compared to the wait-list control group.

Finally, interventions have considered several possible moderators of the interventions' effectiveness over the desired outcomes. One of the moderators that has been recently studied in relation to job crafting interventions is workload (Knight et al., 2021; Kuijpers et al., 2020). The authors discovered that employees are more likely to get involved in the intervention if they have a high

workload (Kuijpers et al., 2020), and an increased workload would lead to decreasing hindering job demands crafting. In contrast, a low workload would target the acquisition of more resources (Knight et al., 2021). Building on the limits of their study, the authors (Knight et al., 2021; Kuijpers et al., 2020) suggest that alongside workload, another possible moderator worth investigating could be the level of control or autonomy employees have to cope with the demands. In a daily diary study, Petrou et al. (2012) identified that active jobs (high in work pressure and high in job autonomy) are associated with job crafting behaviors (higher seeking resources and lower reducing demands). Studies also suggest that employees who experience high autonomy within their jobs are more likely to engage in job crafting activities (van Wingerden et al., 2017; 2017b). Hence, in the present study we also considered workload and autonomy as possible moderators of the intervention's effectiveness and addressed the following research questions:

Research question 1: Will the effectiveness of the intervention on (4a) job crafting, (4b) strengths use, (4c) deficit correction, (4d) work engagement, (4e) life satisfaction, and (4f) work-life balance be moderated by autonomy?

Research question 2: Will the effectiveness of the intervention on (5a) job crafting, (5b) strengths use, (5c) deficit correction, (5d) work engagement, (5e) life satisfaction, and (5f) work-life balance be moderated by workload?

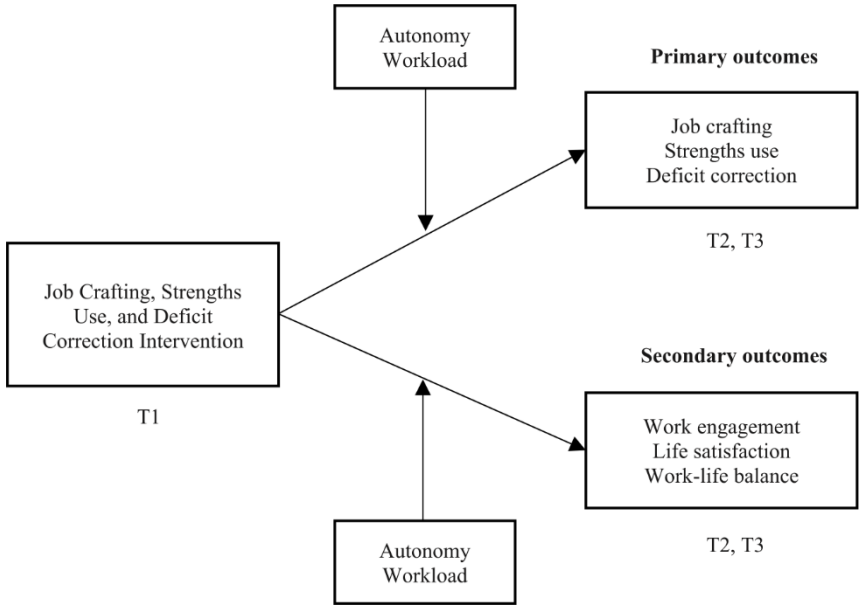

Figure 1. Research model

Method

Trial Design

In order to test the effectiveness of the proposed intervention program, we used a randomized controlled trial with a factorial designed: (1) two independent arms (intervention group vs. wait-list control group), and (2) three measurement moments (pre-test – one week before the intervention; post-test – one week after the intervention; and follow-up test – four weeks after the post-test). Participants were randomly assigned between groups with an unbalanced ratio (biased in favor of the intervention to overcome presumed higher attrition – see

Randomization section for details). The trial was guided by the CONSORT standards (Boutron et al., 2017). Study ethical approval was granted by the Board of Research and Creation of the West University of Timisoara (24846/ 31.05.2021).

The study took place over 12 weeks. Participants received an e-mail containing a link to fill in the outcome questionnaires at each of the three measurement occasions. As all the collected information was anonymous, employees used a unique code for all questionnaires to ensure the possibility of linking the information reported by each participant in the pre-test, post-test, and follow-up. The intervention started one week after the initial measure. The post-test questionnaire was sent one week after the end of the intervention, leaving eight weeks between the two measurement points, while the follow-up questionnaire was completed one month after the post-test. Figure 2 contains an overview of the research design.

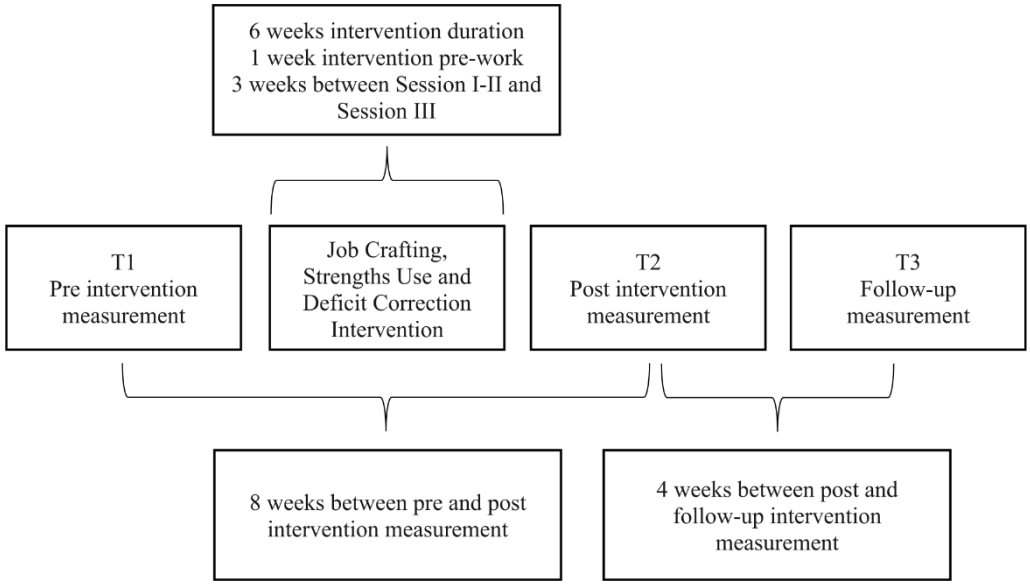

Figure 2. Overview of the research design and flow

Participants

The sample consisted of employees working within the global shared services departments of a large multinational pharmaceutical company. Because of the COVID-19 pandemic, the employees temporarily worked in a home office setting for about a year prior to the study deployment. Upon the approval of the department managers, an online meeting was organized with all the employees of the target departments with the scope of presenting the project and enrolling the participants. Since participation was voluntary, the employees received the information that they could withdraw from the task at any moment. We used two types of incentives to motivate employees' participation throughout all intervention stages. First, the project was presented as a learning and development opportunity from which participants would benefit personally and professionally. Second, all participants who were actively involved in all project stages participated at the end of the study in a raffle for winning one of 23 book or sports vouchers, ranging in value between 20 and 100 EUR.

Job Crafting, Strengths Use, and Deficit Correction Intervention

The present intervention program has been developed based on the JD-R theory (Bakker & Demerouti, 2014; 2017) and goal-setting

theory (Latham & Locke, 2007) to teach the participants how to increase their job crafting (i.e., structural and social resources, challenging job demands), strengths use, and deficit correction behaviors.

The content of the intervention was divided into three workshop sessions delivered online by the first author. The first two sessions had two hours each, while the third session had a duration of one hour and a half (see Figure 3 for details related to the intervention design). To stimulate active participation in the online setting, the groups had a maximum of 14 participants. The first two sessions had four time slots, out of which three were during working hours and one after working hours, while the last session had three time slots, all during working hours, based on the fact that the after working hours session had only a few participants enrolled.

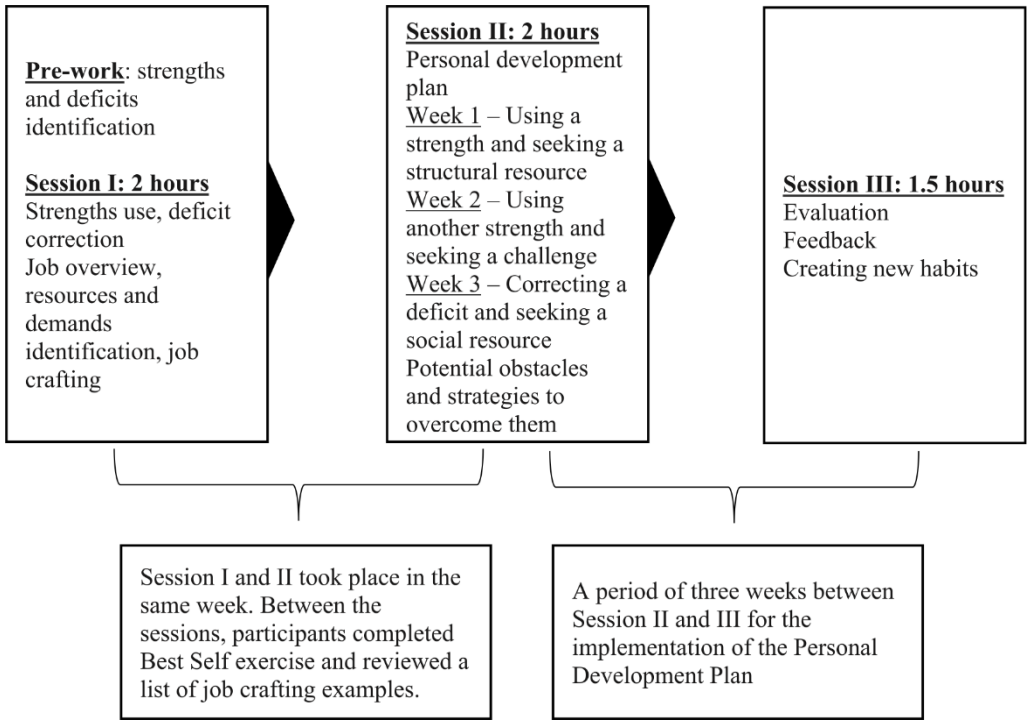

Figure 3. Job crafting, strengths use, and deficit correction intervention design

As a pre-work, one week before the first and second training sessions, participants completed the DECAS questionnaire, a personality assessment tool based on the Big Five model, developed by Sava (2008). Based on the business report, which contained a detailed personality profile and a presentation of the development degree of 16 professional competencies, the participants identified two of their top strengths and one deficit during the intervention. The first training session took place a week after the pre-work, focused on strengths and deficits theory, and continued with an interactive exercise where participants worked in smaller groups within breakout rooms. The scope of the practice was to discuss their strengths, how they apply them at work, and in what types of activities, as well as to identify new ways to use them. They also discussed their deficits and what benefits would bring their development. The training continued with the job crafting part designed based on the Job Crafting Exercise (Berg et al., 2010) and the JD-R theory (Bakker & Demerouti, 2014; 2017). Employees reviewed their jobs by dividing their activities into three categories: tasks that required a high amount of energy and time, tasks that required a medium amount of energy and time, and tasks that required low energy and time to be

performed. Based on the overview, they debriefed on how they feel about the way their energy and time are spent at work.

Furthermore, the JD-R theory was presented, and participants worked in smaller groups to identify the resources and demands of their jobs and working environments. Finally, employees received Burt's Bees case study (Berg, Kahn & Dutton, 2010) to help them understand what job crafting is and what benefits could bring to individuals and organizations. At the end of the session, everyone received two activities to perform until the next session. First, each participant had to identify a colleague who knows him or her very well and ask them to describe a situation in which the participant was at his/ her best self. This qualitative method of identifying strengths was used in addition to the personality report provided to participants, as the five-step integrative model proposed by Miglianico et al. (2020) in developing strengths interventions suggests that a combination of methods leads to more accurate results in strengths identification. Second, each of them had to study a list of job crafting examples (Knight et al., 2021) and identify a social resource, a structural resource, and a challenge they would like to seek in their job.

The second training session was dedicated to bringing all the elements together and building the personal development plan. Employees received a working file based on which they established three actions to perform in the following three weeks: 1) Use a strength to seek a structural resource; 2) Use another strength to seek a challenge; and 3) Develop a deficit by seeking a social resource. In line with goal-setting theory principles (Latham & Locke, 2007), which states that specific and challenging goals motivate individuals to do their best in achieving them, we instructed participants to define SMART (Specific, Measurable, Achievable, Realistic, Timely) actions that are relevant for them. After the plan development, employees were divided into smaller groups, discussed potential obstacles and barriers in implementing the plan, and shared strategies to overcome them. During the following three weeks, the participants received an e-mail at the beginning of each week reminding them about the week's objective. At the end of each week, they received a short evaluation measuring the level of task implementation. In the final session, which took place three weeks after the first two training sessions, employees shared their experience and feedback and learned about forming new habits and integrating the newly acquired information in their lives.

Measures

Primary Outcomes Measures

Job crafting. Job Crafting Scale (Tims et al., 2012) was used to measure the three dimensions of job crafting: *seeking structural resources* (e.g., "I try to develop myself professionally"), *seeking social resources* (e.g. "I ask my supervisor to train me"), and *seeking challenging job demands* (e.g., "When an interesting project comes up, I proactively involve as a project team member"). All items were evaluated on a 5-point Likert scale, where 1 = *totally disagree* and 5 = *totally agree*. The Cronbach's α results were good across the three measurement points, their levels ranging between .73 and .80 for *seeking structural resources*, between .71 and .83 for *seeking social resources*, and between .70 and .73 for *seeking challenging job demands*.

Strengths Use. Strengths use behavior was measured using the dedicated subscale of the Strengths Use and Deficit COrrection (SUDCO) Questionnaire developed by van Woerkom et al. (2016). The six items were assessed on a 7-point Likert scale, the answers ranging from 1 = *almost never* to 7 = *almost always*. One example is, "I use my strengths at work". Reliabilities were excellent, their values ranging between .93 and .95 for all measurement points.

Deficit Correction. The dedicated subscale of the Strengths Use and Deficit COrrection (SUDCO) Questionnaire (van Woerkom et al., 2016) was used to measure deficit correction behavior. The subscale comprised six items measured on a 7-point Likert scale (1 = *almost never*; 7 = *almost always*), one example being, "At work, I look for training opportunities to improve my weaknesses". Cronbach's α ranged between .86 and .89 across the three measurement points.

Secondary Outcomes Measures

Work Engagement. To measure work engagement, we used the shortened version of the Utrecht Work Engagement Scale (UWES-9) developed by Schaufeli et al. (2006) and adapted to the Romanian population by Vîrgă et al. (2009). All nine items were assessed on a 7-point Likert scale, where 1 = *never* and 7 = *daily*. An example of a work engagement item is, "I am proud of the work I do". Reliabilities were good, ranging between .87 and .92, across the three measurement points.

Life Satisfaction. Life satisfaction was measured with the five items of the Satisfaction with Life Scale developed by Diener et al. (1985). All items were assessed on a 7-point Likert scale (1 = *totally disagree*; 7 = *totally agree*), one item example being, "I am satisfied with my life". Cronbach's α ranged between .83 and .89 for the three measurement points.

Work-Life Balance. Work-life balance was assessed using the Work-life balance measure developed by Brough et al. (2014). The four items are evaluated on a 5-point Likert scale (1 = *totally disagree*; 5 = *totally agree*). An example of an item is, "I currently have a good balance between the time I spend at work and the time I have available for non-work activities". Cronbach's α were very good, their levels ranging between .90 and .94 across the three measurement points.

Moderator Variables

Autonomy. Autonomy was assessed at baseline using the Experience and Evaluation of Work scale (Van Veldhoven & Meijman, 1994). The three items were assessed on a 5-point Likert scale (1 = *never*; 5 = *very often*), an item example being, "Do you have flexibility in performing your work?". Cronbach's α was .55.

Workload. Workload was assessed at baseline using the Experience and Evaluation of Work scale (Van Veldhoven & Meijman, 1994). The five items were assessed on a 5-point Likert scale (1 = *never*; 5 = *always*), one item example being, "Do you have too much work to do?". Cronbach's α was .80.

Sample Size

Since previous meta-analyses on the effectiveness of interventions for increasing work engagement (Vîrgă et al., 2019) or job crafting interventions (Oprea et al., 2019) revealed effect size estimates ranging in the interval of small magnitude, we took $d = .35$ (midpoint between .20 and .50) as a reference ES. Hence, for the aforementioned effect, with an α error probability of .05, an estimated power (1-β) of .80, and a correlation amongst repeated measures of $r = .50$, the total sample needed for testing our hypotheses was 52 participants. Considering a 20% attrition rate, the overall sample we aimed at recruiting was 65 participants. The sample size estimation was performed with the aid of GPower 3.1 software (Faul et al., 2007).

Randomization

The randomization was achieved by alphabetically organizing the employees of each of the four departments, numbering every person, and dividing the group into even and odd numbers. Since the odd group was slightly larger, it was decided to form the experimental condition. As we expected a higher dropout rate in the experimental group, we moved additional participants from the control group to the experimental one, using the online application www.random.org (Haahr, 2021), to achieve a 56% vs. 44% distribution of the participants. They were instructed not to discuss the intervention before the end of the study to prevent cross-contamination from one group to another. Employees who comprised the wait-list control group attended the workshop sessions after the end of the study.

Statistical Analyses

As being the "gold standard" approach for randomized controlled trials, the data were analyzed based on the intent-to-treat principle (ITT; McCoy, 2017). This method shields the internal validity of the study by preserving the benefits of randomization. Also, it yields higher external validity since in a real-life setting, rarely the entire client population will completely adhere to an intervention protocol. The ITT was performed based on the last

observation carried forward principle in which data missing from one measurement point were completed using the previous measurement information. For transparency and comparison, we also performed the primary analyses on pre protocol data (only on those participants who adhered to the intervention and filled in the post-test, respectively follow-up measures). In addition, we reported the correlation matrices between all studied variables at all-time points for future meta-analyses or other inquiries.

We applied chi-square to test for baseline differences between the two groups on categorical variables, as well as independent-samples t-tests to assess for differences at baseline for the numerical ones. To investigate the effects of the mixed intervention on the participants' levels of job crafting (H1a, H1b, H1c), strengths use (H2), deficit correction (H3), work engagement (H4), life satisfaction (H5), and work-life balance (H6), we conducted mixed factorial analyses of variance (ANOVA) with time (T1 vs. T2; T1 vs. T3) as a within-subjects factor and group (experimental group vs. wait-list control group) as a between-subjects factor. As an effect size estimate, we computed Cohen's *d* for each comparison point (T2 and T3) by considering the T1 means, the between measures correlation, and the change score SD. Hence, the effect size reflects the between-groups standardized comparisons in outcome improvement relative to baseline. Furthermore, we conducted moderation analyses using multiple linear regression with centered interaction terms to investigate the possible moderator effect of autonomy (Research question 1) and workload (Research question 2) between the intervention (dummy coded: 1 – intervention vs. 0 – control) and all the outcomes, at both T2 and T3 occasions. In each regression model, we controlled for the baseline (T1) scores of the investigated outcome. Significant moderation effects were further analyzed by means of the Johnson–Neyman technique. This approach avoids using arbitrary points for the moderator variable (e.g., +/- 1SD) to conduct slope analysis and identifies the exact region of the moderator within or outside of which the relationship between the predictor and the outcome is significant (Preacher et al., 2006).

We used IBM SPSS Statistics 27 (IBM Corp, 2020) to check the baseline equivalence and test the main hypotheses and the SPSS custom dialog PROCESS (Hayes, 2017) to perform the moderation analyses.

Results

Participant Flow

Out of the 86 eligible employees, 80 agreed to participate in the intervention and were randomly assigned to the intervention or the wait-list control condition (see Figure 4).

All 80 participants completed the pre-test questionnaire (100% response rate), 74 participants completed the post-intervention questionnaire (92% response rate), and 69 participants completed the follow-up questionnaire (86% response rate). Six employees from the experimental group dropped out during the intervention, the registered dropout rate for this group being 13% at post-test. Of the five additional employees who dropped out after the post-test, three were from the experimental condition and two from the wait-list control condition. The extra five participants increased the total dropout rate to 20% for the experimental group and 5% for the wait-list control group.

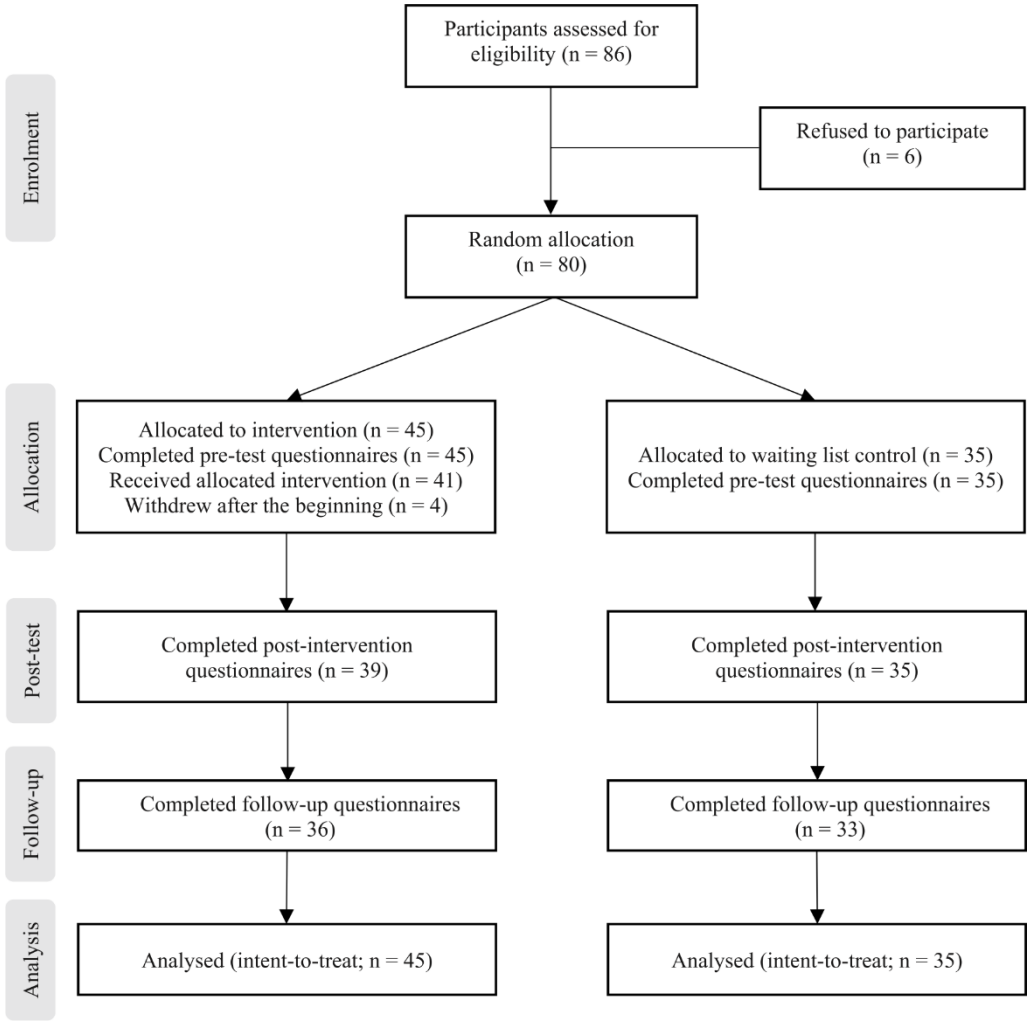

Figure 4. The flowchart displaying participants' cycle throughout the study

Descriptive Statistics and Preliminary Analysis

Table 1 contains more details regarding the demographic aspects investigated for the two groups. Of the 45 employees who formed the experimental group, 38 (84%) were women; the average age was 30.18 years (SD = 5.06); 100% held a bachelor's degree or a higher educational degree; 76% were in a relationship, married or divorced. Concerning the control group, out of the 35 participants, 30 were women (86%); the average age was 30.71 years (SD = 5.07); 89% held a bachelor's degree or a higher educational degree; 17% were single. The average working time per week was 40.27 (SD = 1.49) hours for the experimental group and 40.94 (SD = 2.86) hours for the control group. Finally, concerning organizational tenure, 78% of the experimental group participants and 71% of the wait-list control group participants worked for more than one year within the company.

Table 1. *Demographics differences between the experimental and wait-list control group*

Demographic	Group	Description	Mean / Count (SD / %)	Comparison test
Participants	Experimental	Number	n=45 (56%)	--
	Control		n=35 (44%)	
Gender	Experimental	Male	7 (16%)	
		Female	38 (84%)	$\chi^2 = 0.03$,
	Control	Male	5 (14%)	$p = .88$
		Female	30 (86%)	
Average age	Experimental	Years	30.18 (5.06)	$t = 0.47$,
	Control		30.71 (5.07)	$p = .64$
Average tenure	Experimental	< 1 year	10 (22%)	
		1 – 3 years	25 (56%)	
		> 3 years	10 (22%)	$\chi^2 = 0.98$,
	Control	< 1 year	10 (29%)	$p = .61$
		1 – 3 years	20 (57%)	
		> 3 years	5 (14%)	
Average working time/ week	Experimental	Hours	40.27 (1.49)	$t = 1.37$,
	Control		40.94 (2.86)	$p = .18$
Marital status	Experimental	Single	11 (24%)	
		In a relationship	15 (33%)	
		Married/ Divorced	19 (43%)	$\chi^2 = 3.05$,
	Control	Single	6 (17%)	$p = .38$
		In a relationship	17 (48%)	
		Married/ Divorced	12 (35%)	

In order to identify if there were any significant differences between the experimental and wait-list control group at pre-test (T1) we conducted independent-samples t-test analyses on all study variables. The results showed non-significant differences between the two groups for each study variable: $t(78) = 0.80$, $p = .42$ (seeking structural job resources), $t(78) = -0.54$, $p = .59$ (seeking social job resources), $t(78) = -0.01$, $p = .98$ (seeking challenging job demands), $t(78) = -0.39$, $p = .69$ (deficit correction behavior), $t(78) = -0.52$, $p = .60$ (strengths use behavior), $t(78) = -1.21$, $p = .22$ (work engagement), $t(78) = -0.45$, $p = .65$ (life satisfaction), $t(78) = 0.13$, $p = .89$ (work-life balance), $t(78) = 0.57$, $p = .74$ (autonomy), and $t(78) = 0.32$, $p = .74$ (workload).

Table 2 displays the correlation coefficients between all research variables on Time 1-3, for both intent-to-treat and per protocol data.

Intervention Effectiveness on Primary Outcomes

Our first hypothesis was that the intervention would result in increased levels of seeking structural job resources (H1a), seeking social job resources (H1b), and seeking challenging job demands (H1c). We performed mixed factorial ANOVAs to test for the group by time interactions. Specifically, we investigated if the mean changes from Time 1 to Time 2, as well as from Time 1 to Time 3 for the intervention group, outperformed those reported in the control condition. The results showed no significant group by time interaction regarding neither the Time 2 (F (1, 78) = .56, $p = .45$) and nor the Time 3 (F (1, 78) = .48, $p = .49$) increasing structural job resources. Similarly, there were no group by time interactions regarding increasing social job resources at Time 2 (F (1, 78) = .06, $p = .80$) or Time 3 (F (1, 78) = .42, $p = .51$). Regarding increasing challenging job demands, this time, we registered a significant effect at Time 2 (F (1, 78) = 3.85, $p = .05$), the Cohen's d value being .44, which suggests a small to medium effect size. However, this significant effect was not maintained at Time 3 (F (1, 78) = .13, $p = .71$). This result partially supports our first hypothesis.

Table 2. *Correlation coefficients between all research variables on Time 1-3 (intent-to-treat data above the main diagonal and per protocol data below)*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1. Intervention	-	-.07	-.04	-.09	.06	.01	.05	.06	.14	.05	-.02	-.02	.04	.18	-.03	.05	.15	.21	.04	-.16	.00	.04	-.09	-.07	.10	.15	.03
2. Autonomy T1	-.09	-	-.20	.14	-.04	.17	.25*	.54**	.20	.40**	.33**	.18	.01	.24*	.27*	.33**	.18	.17	.31**	.21	-.01	.24*	.26*	.41**	.19	.17	.21*
3. Workload T1	-.05	-.17	-	.20	-.21	.10	-.02	-.07	-.15	-.14	-.38**	.02	-.22*	-.01	-.17	-.24*	-.18	-.19	-.37**	.09	-.22*	-.01	-.04	-.13	-.16	-.25*	-.36*
4. Structural resources T1	-.13	.08	.19	-	.26*	.59**	.55**	.25*	.22*	.07	-.09	.63**	.27*	.38**	.52**	.18	.18	.07	-.02	.62**	.22*	.31**	.46*	.17	.20	-.04	-.06
5. Social resources T1	.06	-.03	-.22	.26*	-	.21	.45**	.01	.16	-.06	-.04	.22*	.71**	.09	.32**	.07	.19	.06	-.09	.04	.67**	-.09	.23*	.15	.11	-.04	-.09
6. Challenging job demands T1	-.03	.08	.11	.58**	.23*	-	.59**	.23*	.17	.29**	.05	.48**	.36**	.68**	.74**	.21	.21	.19	.02	.40**	.31**	.59**	.44**	.20	.09	.05	.04
7. Deficit correction T1	.01	.18	.00	.53**	.47**	.56**	-	.39**	.33**	.35**	.07	.56**	.39**	.45**	.61**	.27*	.27*	.29*	.08	.48**	.38**	.40**	.65**	.23*	.24*	.16	.12
8. Strengths use T1	.03	.51**	-.05	.22	.03	.18	.35**	-	.34**	.28**	.05	.32**	.13	.18	.23*	.58**	.30	.14	.08	.37**	.16	.29*	.29*	.59**	.42**	.11	.13
9. Work engagement T1	.11	.26*	-.19	.21	.12	.17	.33**	.36**	-	.21	.13	.32**	.23*	.27*	.27*	.33**	.78**	.33**	.26*	.24*	.18	.18	.21	.29**	.73**	.24*	.28*
10. Life satisfaction T1	.03	.31**	-.08	.05	-.08	.23*	.30**	.23*	.23*	-	.46**	.06	-.09	.23*	.16	.26*	.14	.74*	.38*	.17	.03	.30**	.22*	.20	.06	.74**	.48**
11. Work-life balance T1	.00	.33**	-.38**	-.09	-.01	.02	.05	.01	.14	.45**	-	-.05	-.17	.05	-.02	.19	.09	.35**	.75**	-.09	-.09	.07	.01	.12	.05	.44**	.79**
12. Structural resources T2	-.07	.12	-.01	.60**	.22	.46**	.54**	.28*	.31**	.02	-.06	-	.38**	.54**	.65**	.51**	.35**	.09	.06	.75**	.39**	.47**	.57**	.45**	.33**	.02	.06
13. Social resources T2	.03	.01	-.22	.27*	.68**	.39**	.39**	.15	.19	-.11	-.14	.39**	-	.40**	.55**	.27*	.42**	.11	-.13	.20	.86**	.10	.38**	.26*	.26*	-.06	-.20
14. Challenging job demands T2	.14	.16	-.00	.35**	.11	.65**	.41**	.12	.27*	.16	.02	.52**	.43**	-	.57**	.39**	.42**	.35**	.19	.43**	.36**	.76**	.51**	.32**	.29**	.22*	.14
15. Deficit correction T2	-.08	.19	-.15	.50**	.33**	.43**	.57**	.18	.27*	.08	-.04	.63**	.57**	.53**	-	.50**	.40**	.23*	.09	.53**	.47**	.39**	.74**	.38**	.33**	.11	.04
16. Strengths use T2	.00	.26*	-.25*	.13	.10	.15	.22	.54**	.35**	.21	.16	.49**	.31**	.33**	.46**	-	.50**	.26*	.25*	.40**	.34**	.41**	.50**	.77**	.46**	.23*	.25*
17. Work engagement T2	.12	.23*	-.22	.17	.16	.21	.27*	.32**	.77**	.14	.09	.35**	.40**	.43**	.40**	.53**	-	.35**	.22	.29*	.38*	.31**	.32**	.39**	.82**	.23*	.17
18. Life satisfaction T2	.22*	.05	-.13	.06	.05	.14	.24*	.09	.37**	.71**	.35**	.07	.10	.31**	.17	.22	.38**	-	.40**	.11	.19	.29**	.19	.21	.23*	.85**	.46**
19. Work-life balance T2	-.03	.31**	-.37**	-.02	-.06	-.01	.05	.04	.27*	.37**	.73**	.04	-.11	.16	.06	.22	.23*	.40**	-	.03	.04	.17	.11	.21	.18	.44**	.84**
20. Structural resources T3	-.23	.16	.02	.63**	.12	.41**	.50**	.35**	.25*	.19	-.11	.75**	.33**	.43**	.54**	.40**	.32**	.14	.00	-	.29**	.51**	.59**	.39**	.34**	.07	-.02
21. Social resources T3	.05	.06	-.18	.28*	.64**	.33**	.45**	.22	.22	.01	-.08	.52**	.83**	.42**	.55**	.38**	.37**	.18	.10	.43**	-	.19	.40**	.33**	.23*	.05	-.07
22. Challenging job demands T3	-.03	.16	.01	.30*	-.07	.57**	.42**	.26*	.23	.25*	.03	.48**	.12	.72**	.36**	.36**	.30*	.22	.16	.51**	.24*	-	.47**	.30**	.24*	.25*	.13
23. Deficit correction T3	-.15	.17	-.02	.45**	.25*	.42**	.62**	.23	.21	.15	-.03	.67**	.45**	.50**	.73**	.47**	.36**	.17	.07	.59**	.50**	.47**	-	.49**	.32**	.07	.07
24. Strengths use T3	-.14	.37**	-.10	.14	.19	.12	.18	.53**	.31**	.12	.05	.45**	.31**	.27*	.37**	.74**	.43**	.15	.14	.38**	.41**	.24*	.45**	-	.46**	.18	.22*
25. Work engagement T3	.11	.27*	-.19	.23	.13	.13	.24*	.41**	.68**	.04	.05	.38**	.28**	.36**	.44**	.54**	.85**	.21	.11	.38**	.25*	.30*	.35**	.49**	-	.21	.20
26. Life satisfaction T3	.13	.07	-.15	-.00	-.02	.00	.16	.04	.22	.73**	.49**	.00	-.14	.13	.04	.15	.16	.80**	.40**	.10	.00	.17	.02	.12	.19	-	.58**
27. Work-life balance T3	-.04	.21	-.36**	-.03	-.04	.05	.11	.05	.23	.46**	.82**	.02	-.21	.11	.00	.20	.14	.44**	.82**	-.03	-.03	.12	.02	.16	.14	.57**	-

Note. Intent-to-treat $N = 80$; per protocol N = 74 (T1, T2); N = 69 (T3). Intervention (1 – intervention group vs. 0 – control group); T1 = Time 1 (first survey, pre-test), T2 = Time 2 (second survey, post-test), T3 = Time 3 (third survey; follow-up).
* $p < .05$, ** $p < .01$;

Our second and third hypotheses were that the intervention would result in increased levels of strengths use (H2) and deficit correction (H3). The mixed factorial ANOVA showed non-significant group by time interactions for Time 2 (F (1, 78) = .01, p = .89) and Time 3 (F (1, 78) = 1.56, p = .21) strengths use. Similarly, there were no changes on deficit correction at Time 2 (F (1, 78) = .60, p = .43) and Time 3 (F (1, 78) = 1.94, p = .16). Thus, our second and third hypotheses were not supported by the data.

Intervention Effectiveness on Secondary Outcomes

Our central assumption was that the intervention would lead to higher levels of work engagement (H4), life satisfaction (H5), and work-life balance (H6) for the experimental group in comparison with the wait-list control group. The mixed factorial ANOVA results showed non-significant group by time interactions at Time 2 (F (1, 78) = .08, p = .77) and Time 3 (F (1, 78) = .14, p = .70) for work engagement. In contrast, a significant effect was registered for life satisfaction at Time 2 (F (1, 78) = 4.68, p = .03), reflected through a Cohen's d value of .47, suggesting again a small to medium effect size. As for Time 3, the group by time interaction was not statistically significant regarding participants' life satisfaction (F (1, 78) = 1.70, p = .19). Concerning work-life balance, the results showed no significant effects, neither for Time 2 mean changes (F (1, 78) = .40, p = .52) nor Time 3 (F (1, 78) = .40, p = .52). In conclusion, our fifth hypothesis (H5) was partially supported, while the other two hypotheses (H4 and H6) were rejected.

Table 3 summarizes the descriptive statistics, comparison results, and effects size estimates for each outcome, while Table 4 reports the summary of analyses of variance on data per protocol.

Table 3. *Summary of analyses of variance for study outcomes*

Variable		Experimental (n = 45)		Control (n = 35)		ANOVA	*d* [95%CI]
	Time	*M*	*(SD)*	*M*	*(SD)*	*F* Values	
Structural resources	T1	4.11	(0.48)	4.19	(0.43)	--	--
	T2	4.02	(0.47)	4.03	(0.46)	F (1, 78) = 0.56, p = .45	.17 [-.27, .61]
	T3	3.97	(0.48)	4.12	(0.44)	F (1, 78) = 0.48, p = .49	-.16 [-.60, .29]
Social resources	T1	3.29	(0.68)	3.21	(0.65)	--	--
	T2	3.28	(0.77)	3.23	(0.71)	F (1, 78) = 0.06, p = .80	-.06 [-.50, .39]
	T3	3.33	(0.65)	3.33	(0.72)	F (1, 78) = 0.42, p = .51	-.15 [-.59, 3.0]
Challenging job demands	T1	3.39	(0.58)	3.39	(0.61)	--	--
	T2	3.40	(0.58)	3.19	(0.61)	F (1, 78) = 3.85, p = .05	.44 [.01, .88]
	T3	3.38	(0.52)	3.34	(0.58)	F (1, 78) = 0.13, p = .71	.08 [-.36, .52]
Deficit correction	T1	4.96	(1.10)	4.86	(0.97)	--	--
	T2	4.79	(0.99)	4.86	(0.97)	F (1, 78) = 0.60, p = .43	-.18 [-.62, .27]
	T3	4.71	(0.88)	4.88	(1.02)	F (1, 78) = 1.94, p = .16	-.31 [-.75, .14]
Strengths use	T1	5.38	(1.06)	5.25	(1.08)	--	--
	T2	5.13	(0.92)	5.03	(1.17)	F (1, 78) = 0.01, p = .89	-.03 [-.47, .41]
	T3	4.97	(0.85)	5.11	(1.14)	F (1, 78) = 1.56, p = .21	-.28 [-.72, .17]
Work engagement	T1	5.32	(0.93)	5.04	(1.14)	--	--
	T2	5.30	(1.04)	4.98	(1.20)	F (1, 78) = 0.08, p = .77	.07 [-.38, .51]
	T3	5.23	(1.08)	5.03	(1.11)	F (1, 78) = 0.14, p = .70	-.09 [-.53, .36]
Life satisfaction	T1	5.40	(1.07)	5.29	(0.95)	--	--
	T2	5.79	(0.95)	5.33	(1.21)	F (1, 78) = 4.68; p = .03	.47 [.02, .92]
	T3	5.75	(1.02)	5.42	(1.11)	F (1, 78) = 1.70, p = .19	.29 [-.15, .74]
Work-life balance	T1	3.89	(0.85)	3.91	(0.86)	--	--
	T2	3.87	(0.79)	3.81	(0.83)	F (1, 78) = 0.40, p = .52	.14 [-.30, .59]
	T3	3.83	(0.88)	3.78	(0.93)	F (1, 78) = 0.40, p = .52	.14 [-.30, .58]

Note. M = mean; SD = standard deviation; The F tests the Group x Time interaction effect to detect significant difference between the conditions in the mean change across time (from T1 to T2, and from T1 to T3 respectively); T1 = Time 1 (first survey, pre-test), T2 = Time 2 (second survey, post-test), T3 = Time 3 (third survey; follow-up)

Table 4. *Summary of analyses of variance on data per protocol*

Variable		Experimental (N = 39; T3 = 36)		Control (N = 35; T3 = 33)		ANOVA RM	*d* [95%CI]
	Time	M	*(SD)*	M	*(SD)*	*F* Values	
Structural resources	T1	4.07	(0.47)	4.19	(0.42)	--	--
	T2	3.96	(0.46)	4.03	(0.45)	F (1, 72) = 0.30, p = .58	.13 [-.33, .59]
	T3	3.92	(0.48)	4.13	(0.44)	F (1, 67) = 1.31, p = .25	-.26 [-.73, .22]
Social resources	T1	3.28	(0.66)	3.21	(0.65)	--	--
	T2	3.27	(0.75)	3.22	(0.71)	F (1, 72) = 0.06, p = .80	-.06 [-.51, .40]
	T3	3.37	(0.56)	3.30	(0.72)	F (1, 67) = 0.27, p = .60	-.02 [-.50, .45]
Challenging job demands	T1	3.34	(0.58)	3.38	(0.60)	--	--
	T2	3.36	(0.58)	3.19	(0.61)	F (1, 72) = 3.39, p = .06	.42 [-.04, .88]
	T3	3.30	(0.48)	3.33	(0.59)	F (1, 67) = 0.00, p = .95	.01 [-.46, .49]
Deficit correction	T1	4.88	(1.12)	4.86	(0.97)	--	--
	T2	4.70	(0.98)	4.85	(0.97)	F (1, 72) = 0.70, p = .40	-.20 [-.65, .26]
	T3	4.60	(0.86)	4.89	(1.05)	F (1, 67) = 3.83, p = .054	-.36 [-.84, .12]
Strengths use	T1	5.32	(1.08)	5.25	(1.07)	--	--
	T2	5.02	(0.89)	5.02	(1.17)	F (1, 72) = 0.08, p = .77	.07 [-.39, .52]
	T3	4.87	(0.76)	5.14	(1.15)	F (1, 67) = 2.11, p = .15	-.34 [-.82, .14]
Work engagement	T1	5.25	(0.93)	5.04	(1.13)	--	--
	T2	5.23	(1.06)	4.97	(1.20)	F (1, 72) = 0.06, p = .80	.06 [-.40, .52]
	T3	5.25	(0.95)	5.03	(1.05)	F (1, 67) = 0.07, p = .79	.00 [-.47, .47]
Life satisfaction	T1	5.34	(1.03)	5.29	(0.95)	--	--
	T2	5.80	(0.89)	5.32	(1.20)	F (1, 72) = 5.67; p = .02	.53 [.07, .99]
	T3	5.73	(0.95)	5.48	(1.04)	F (1, 67) = 1.65, p = .20	.28 [-.19, .75]
Work-life balance	T1	3.83	(0.88)	3.91	(0.86)	--	--
	T2	3.81	(0.82)	3.80	(0.82)	F (1, 72) = 0.32, p = .57	.15 [-.31, .60]
	T3	3.78	(0.92)	3.85	(0.88)	F (1, 67) = 0.10, p = .75	-.01 [-.47, .60]

Note. N = 39 (T1, T2) and N = 36 (T3) for the experimental group and 35 (T1, T2) and N = 33 (T3) for the waiting list control group; M = mean; SD = standard deviation. * $p < .05$, ** $p < .01$; The F tests the Group x Time interaction effect to detect significant difference between the conditions in the rate of change across time; T1 = Time 1 (first survey, pre-test), T2 = Time 2 (second survey, post-test), T3 = Time 3 (third survey; follow-up)

Moderation Analyses

The moderator analyses revealed three significant interaction effects. Namely, autonomy acted as significant moderator for the relationship between the intervention and seeking social resources job crafting behavior measured at follow-up (interaction effect: b = -.33, p = .04; regression model: F (4, 75) = 17.36, p < .01). The Johnson-Neyman approach showed that the intervention had a significant but negative impact (bs > -.45; ps < .05) on follow-up seeking social resources for those participants who reported higher levels of autonomy (> 1.24). Autonomy also significantly interacted with the intervention in predicting work-life balance at post-intervention (interaction effect: b = -.34, p = .05; regression model: F (4, 75) = 26.47, p < .01). In this case, the intervention was effective in increasing the work-life balance (bs > .42, ps < .05) of participants with lower scores on autonomy (< -0.98). Finally, participants' workload interacted with the intervention regarding its impact over the follow-up strengths use levels (interaction effect: b = -.68, p = .01; regression model: F (4, 75) = 13.68, p < .01). For participants with higher levels of workload (> .23) the intervention had a significantly negative impact (bs > -.37, ps < .05).

Treatment Adherence and Satisfaction

We have also assessed the active implementation of the personal development plan by analyzing the weekly questionnaires filled in by the experimental group's participants. We discovered that 10 participants (26%) completed all three actions,

9 participants (23%) completed two out of three activities, while 14 participants (36%) completed only one of the three actions. Six participants (15%) completed partially or did not complete any action. Furthermore, the implementation rate registered a decreasing trend as during the first week, 23 participants (60%) reported they had implemented the assigned activity, while during the second week the number dropped to 20 participants (51%), and finally to 19 participants (49%) during the third week. We had the opportunity to investigate how participants perceived the intervention during the final training session. The feedback received was positive; the participants mentioned they appreciated the opportunity to learn about their strengths and actively change different aspects of their jobs, which they were not previously aware of. However, some participants reported that three weeks were too short for implementing the personal development plan, considering their workload, and they would have preferred a longer period.

Discussion

Our study makes three key theoretical contributions to the literature. The first theoretical contribution of our study is related to the unique intervention design that combines three types of proactive behaviors: job crafting, strengths use and deficit correction. To our knowledge, this study is the first one that investigates the effectiveness of a mixed personal strategies (job crafting, strengths use, and deficit correction) program on employee proactive behaviors, work engagement, life satisfaction, and work-life balance, using a randomized controlled trial design. The intervention consisted in identifying participants' strengths and deficits, two sessions on the theory of job crafting, strengths use, and deficit correction, the development and implementation of a personal development plan over three weeks, and an evaluation session. We encouraged employees to choose relevant aspects to them in terms of structural and social resources, challenging job demands, strengths, and deficits. Moreover, we asked the employees to define SMART actions that could be implemented in a short period, one activity per week, combining a job crafting form with using a strength or correcting a deficit. Previous studies have focused solely on job crafting (Kooij et al., 2017; Knight et al., 2021) or on combining job crafting with personal resources (van Wingerden et al., 2017). Concerning strengths-based interventions, a study that combined the strengths and deficits approach was conducted by Rust et al. (2009) and found evidence that focusing on both strengths and weaknesses effectively increases life satisfaction. Our study combines three personal strategies: job crafting, strengths use, and deficit correction, and registers positive increases in employees' life satisfaction.

Our first assumption was that the mixed intervention would increase the targeted proactive behaviors (primary outcomes). We registered one significant result for seeking challenging job demands job crafting behavior, while for the other job crafting facets, strengths use, and deficit correction behaviors, the results were not significant. In terms of job crafting, previous research reported mixed results. While in some studies, none of the job crafting forms significantly changed after the intervention (Kuijpers et al., 2020; van den Heuvel et al., 2015), other studies reported changes in some job crafting behaviors (but not in all). For example, Demerouti et al. (2016) reported significant changes in decreasing hindering job demands, but no modifications for increasing job resources and challenging job demands, while Demerouti et al. (2020) found significant changes in optimizing demands and seeking challenges, but not in seeking resources.

Furthermore, meta-analytical results (Oprea et al., 2019) revealed that job crafting interventions are effective in increasing the overall job crafting, seeking challenging job demands, and decreasing hindering job demands. Although we registered significant differences between the two groups concerning seeking challenging job demands after the intervention, we consider this outcome should be interpreted with caution, as the seeking challenging job demands behavior remained constant for the experimental group. At the same time, it decreased for the wait-list control group, hence the significant difference. One possible explanation for the

mixed results across studies could be related to contextual factors, such as organizational culture, leadership style, or type of work, which may affect the research effectiveness (Kuijpers et al., 2020; Thomas et al., 2020). In our study, employees reported that due to the high workload and the short period to implement the personal development plan, they did not manage to carry out all assigned actions. A similar explanation was given by Demerouti et al. (2020), as in their study the intervention was not efficient in increasing job resources due to participants' perceived pressure to fulfill work assignments. In addition, van Wingerden et al. (2017b) mention that longer periods are required to increase structural resources at work and that frequent interaction with colleagues is needed to increase social resources.

Concerning strengths use behavior, most interventions reported increases in strengths use as an effect of the intervention (Bakker & van Wingerden, 2021; Dubreuil et al., 2016; Forest et al., 2012). In contrast, the intervention designed and delivered by van Woerkom and Meyers (2019) did not result in increased strengths use levels. The authors suggested the participants might have overestimated the use of their strengths before the workshop in which they learned about the theory on strengths. This explanation could be valid in the case of the present study as well, as participants identified their strengths after the pre-test measurement and built a plan to use their strengths to craft their jobs. Another possible explanation could be that more time is needed for employees to practice what they have learned and perceive a change since only 26% of employees completed the personal development plan. This is the case for deficit correction as well, since the participants reported during the evaluation session that a longer period would have helped them to implement the plan.

Regarding our secondary outcomes' hypotheses, only one of the three hypotheses was partially confirmed, while the other two were rejected. Our prediction was that the mixed job crafting, strengths use, and deficit correction intervention would lead to increased levels of work engagement, life satisfaction, and work-life balance. The second main theoretical contribution of our study is that it proves that a mixed job crafting, strengths use, and deficit correction intervention is effective in increasing employees' life satisfaction in the short term – immediately after the intervention. In our literature search, we did not identify any other intervention in which life satisfaction was measured as an outcome of job crafting interventions. On the other hand, strengths-based interventions have found strong links with life satisfaction (Dubreuil et al., 2016). Furthermore, mixed strengths use and deficit correction studies have discovered that focusing on strengths or balancing strengths with deficits successfully leads to life satisfaction (Rust et al., 2009). Our results contrast with the study conducted by Meyers and van Woerkom (2017), which did not register significant effects on life satisfaction as a result of their three-week online strengths intervention, arguing that longer interventions could be needed for influencing participants' well-being.

However, our study did not lead to increased work engagement or work-life balance. Concerning work engagement, our result is in line with several other studies that reported non-significant changes after job crafting interventions (van Wingerden et al., 2017; 2017a) or strengths interventions (Meyers & van Woerkom, 2017). One possible explanation of the fact that the intervention did not result in positive outcomes regarding work engagement could be related to the initial high levels of this variable. Van Woerkom et al. (2021) state that not everyone benefits the same from positive psychology interventions. Those scoring high on well-being or personal resources benefit less as they do not have as much room for improvement as those with lower scores. Another possible explanation for not registering increases in employee engagement is related to the job resources and demands awareness generated by the job overview exercise part of the intervention. Van Wingerden et al. (2017) suggest that the motivational process can be affected if, during the process in which participants analyze the resources and challenges that characterize their jobs and work environment, they

evaluate the job demands as being more than they were aware of before the process. As it concerns work-life balance, DeLongchamp (2020) registered a similar result, as work-life balance did not improve following the implementation of a job crafting intervention.

Finally, the third theoretical contribution of our study is related to the moderating role of autonomy and workload. We explored if the effectiveness of the intervention would be moderated by autonomy and workload, and we registered three significant interactive relationships. First, we found that autonomy is a significant moderator of the intervention effectiveness on seeking social resources one month after the intervention – medium-term, respectively, work-life balance immediately after the intervention – short term. Specifically, when autonomy levels were high, the intervention decreased seeking social resources job crafting behavior. A possible explanation could be that when participants have high autonomy, the job crafting/strengths use focus of the intervention supports them in feeling more empowered, and therefore, they do not feel the need to seek external help, such as social support, coaching or mentoring. In the case of the other significant effect, participants who reported low levels of autonomy increased their work-life balance as a result of the intervention. A possible explanation for this positive result could be that the intervention increased participants' awareness regarding their opportunities to balance their job resources and demands, influencing their work-life balance. This result is of particular interest in the current context marked by the COVID-19 pandemic. The switch of many jobs to a work-from-home setting generated new challenges for couples and multi-member families. The fact that the program seems effective in improving the work-life balance for those with low job autonomy draws attention to the impactful contribution that such interventions can have in this newly emerged context.

The last significant moderation effect is given by workload. When participants' levels of workload were high, the mixed intervention led to a decrease in strengths use in the medium term. This negative effect could have been the consequence of the fact that participants identified their strengths and ways to use them during the intervention. Still, the high workload did not permit them to put the set actions into practice, leading to the perception of lower strengths use. This idea is also supported by the qualitative feedback received at the end of the intervention. Participants explained they would have preferred a longer period to implement the personal development plan because their demanding schedule impeded them to successfully do so.

Strengths, Limitations, and Avenues for Future Research

One of the strengths of our study is the use of a randomized controlled trial type of design that ensures an elevated degree of experimental control and thus the causal interpretation of the results. Such designs are not so often used in organizational settings, researchers often opting for less controlled designs for practical reasons. Moreover, we used a post-test and a follow-up to understand our intervention's short- (at post-test) and medium-term (at follow-up) effects. Another strength and practical contribution is related to the detailed presentation of the intervention that allows future researchers to replicate the current study.

However, the first limitation of our study is related to the research design. Since we had only one intervention combining the three proactive behaviors, we cannot assess if the combination of the proactive strategies led to the results or if one strategy is more efficient than the others. Hence, future studies should consider our study a pilot and aim to compare several independent arms (e.g., a strengths condition, a strength and deficit condition, a job crafting condition, and a mixed group) to better understand the effects of the intervention on the outcome variables. As it concerns the intervention design, the first two training sessions dedicated to the theory and activities regarding job crafting, strengths use and deficit correction had a short duration (four hours). Other organizational interventions report different workshop durations, from two hours (Kuijpers et al., 2020) to eight hours (van Wingerden et al., 2017b). Since we combined three proactive behaviors, it might have been useful to

dedicate a longer period for the activities related to the theory and practice of proactive behaviors. Future studies could evaluate the optimal duration of the workshops, the combination of activities and the delivery of training sessions (e.g. by training professionals). Even though bottom-up interventions have emerged, more studies are needed to fully understand when employees craft their jobs, what crafting strategies they choose and in which context, and the underlying psychological mechanisms that influence the effectiveness of the interventions on the desired outcomes.

Some aspects related to the sample could be considered limitations. First, all the participants were employees of the same organization working in the global shared services departments, and the majority were females. Thus, the generalizability of our findings is limited. Future studies should replicate our study among different industries and organizations, including employees working in several departments and occupations. Moreover, even though we took all possible measures to avoid cross-contamination between the experimental and wait-list control groups, there may still be the possibility that this has happened. Also, the fact that our participants had moderate to high initial levels on most outcomes represents another limitation that future studies should address. A recommendation would be to include only participants with deficits regarding such variables (e.g., low levels of well-being) in similar programs.

Finally, another limitation of our study could be related to the methods and measurements used throughout the study. First, as our research contained only quantitative methods, it could be useful for future studies to include qualitative research methods as well. For example, by organizing structured interviews (van Wingerden et al., 2017), researchers can have a more accurate picture regarding the study results and understand participants' experiences better, including how relevant or useful were different aspects of the intervention. Another limitation related to the measurements used is the low reliability of the autonomy scale. Therefore, all the results regarding autonomy should be interpreted with caution. Second, all study variables were measured using self-ratings. Future studies should consider including peer or manager ratings and ensuring a more objective overview of results. This can be achieved by adapting the used scales so that colleagues or managers evaluate the degree to which the employee manifests the targeted proactive behaviors before and after the intervention.

Practical Implications

The present study is the first to test a mixed proactive strategies intervention. Given the limited significant effects, our experiment could be considered a starting point. While the intervention could be further developed and tested, the results show potential in stimulating positive organizational outcomes. In addition to the theoretical contributions, our study suggests that organizations can invest in bottom-up interventions in order to increase employees' levels of life satisfaction in the context of remote work, in the short term. With the support of Human Resources specialists, managers could enroll employees in programs that target their job crafting, strengths use, and deficit correction behaviors.

Furthermore, organizations could consider a balanced approach regarding strengths and deficits in addressing employee development programs. Having a holistic approach in terms of employee strengths and deficits can support the employee in ensuring acceptable levels of performance when addressing weaknesses and enhancing his/her strengths. By delivering this type of bottom-up intervention, employers also engage employees in their own development. This shared responsibility has the potential to ensure more individually tailored learning and development plans and more empowerment at the employee level in taking over the responsibility of further developing himself or herself.

As previously emphasized, the degree of autonomy and workload moderate the effectiveness of the intervention. The results indicate that employees with low autonomy could benefit from a mixed job crafting, strengths use, and deficit correction intervention in increasing their work-life

balance. Nevertheless, to ensure long-term effects, organizations must develop practices to support proactive behaviors and adjust employees' workload levels to help them integrate the newly acquired information into their daily work life.

Conclusion

This study has revealed that a mixed job crafting, strengths use, and deficit correction intervention can positively influence the life satisfaction of employees working in a home office setting in the short-term. We also discovered that the level of seeking challenging job demands is maintained as a result of the intervention. Additionally, autonomy and workload play a moderating role for the intervention effectiveness. As such, this study indicates that it might be useful for organizations to adopt a holistic approach regarding employees' strengths, deficits, job resources, and job demands, as it could lead to an increased feeling of satisfaction with their lives, an aspect that is beneficial both for the employee and for the organization.

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RESEARCH ARTICLE

The Mediating Role of Work-Family Conflict in the Relationship Between Technostress and Psychological Well-being in the COVID-19 Pandemic Context

SILVIU RÎGLEA
Psychology of Human Hesources and Orgaanizational Health Master, Babeș-Bolyai University

CLAUDIA LENUȚA RUS
Department of Psychology, Work and Organizational Research Center, Babeș-Bolyai University

LUCIA RAȚIU
Department of Psychology, Work and Organizational Research Center, Babeș-Bolyai University

Abstract

The COVID-19 pandemic has brought dramatic changes both for work and employees' personal and family life domains. In this context, this research investigates the mediating role of the work-family conflict in the relationship between technostress creators (techno-overload and techno-invasion) and psychological well-being. We conducted a survey of 217 employees and the results indicated that the work-family conflict fully mediated the relationship between techno-overload and psychological well-being, thus strongly affecting the psychological well-being of employees in the context of exposure to the stress generated by ICTs overload. Similar results were identified regarding the mediating role of work-family conflict in the relationship between techno-invasion and psychological well-being. The findings suggest the need to increase the coping capacity of employees with technostress and their psychological well-being by reducing the work-family conflict and technostress.

Keywords

technostress creators; work-family conflict; psychological well-being; COVID-19.

Introduction

The sudden and global spread of the SARS-CoV-2 virus has led to the onset of the COVID-19 pandemic and created an unprecedent threat blocking most of the human activities, both nationally and globally (Curșeu, Coman, Panchenko, Fodor, & Rațiu, 2021; Todorova et al., 2021). These unprecedented circumstances have led many employees to adapt to full-time work from home, exposing themselves intensely and with no choice to information and communication technologies (ICTs). Even some of the employees in certain fields initially not suitable for telework, who physically continued to work in the office setting, were more intensely exposed to the use of ICTs in order to perform their work tasks.

These dramatic changes brought about by the pandemic had implications both on work and employees' personal and family life

Correspondence concerning this article should be addressed to Claudia Lenuța Rus, Department of Psychology, Work and Organizational Research Center, Babeș-Bolyai University, Cluj-Napoca, Romania. Email: claudiarus@psychology.ro

domains. The COVID-19 pandemic was a mobilizing force for the modernization of labor in general, by driving the wider spread of telework through the development and increasing spread of information and telecommunications systems. In the family life domain, employees had to spend their personal psychological resources to adapt to the new conditions generated by telework and the intensive use of ICTs, while managing interferences between work and family (Carillo, Cachat-Rosset, Marsan, Saba, & Klarsfeld, 2020). Of course, all these radical changes have affected employees' psychological well-being (PWB), including the alteration of their mood, the increase of anxiety and concerns about their personal and family well-being, their own health and the health of the loved ones, and accentuated feeling of job insecurity and intense social isolation (Pluut & Wonders, 2020; Zacher & Rudolph, 2021).

Telework can have positive effects, both for organization and employees, including saving the organization's resources, improving employee performance, increasing job satisfaction, saving time and reducing costs on commuting to and from work (Barbuto, Gilliland, Peebles, Rossi, & Shrout, 2020; Gajendran & Harrison, 2007; Thulin, Vilhelmson, & Johansson, 2020). However, it can also have negative consequences for employees, such as anxiety and ineffectiveness related to the use of technology, skepticism, mental fatigue, difficulty taking decisions or even burnout (Salanova, Llorens, & Cifre, 2013). Telework and, in particular, work from home, which involves more intense use of ITCs, is a considerable source of stress that negatively affects the employees' well-being as a result of techno-overwork (Giberson & Miklos, 2013; Perry, Rubino, & Hunter, 2018), spending energy and extra time contacting colleagues to obtain information or approvals, coordinating tasks or even performing them without having high-performance office equipment. The activation of these sources of stress due to telework, mainly when working from home, took place simultaneously with the loss of coping resources, especially those provided by spontaneous face-to-face interactions with colleagues at work, such as socio-emotional support, information and visibility within the organization (Dennis & Wixom, 2002). Much of this research has focused on the study of telework work as an employees' conscious, voluntary and active choice, mainly for reasons of work-life balance (Anderson & Kelliher, 2020).

A small body of research has been dedicated to understanding how the use or the stress generated by the use of technology is related to work-family conflict (Harris, Marett, & Harris, 2011; Harris et al., 2015; Kotecha, Ukpere, & Geldenhuys, 2014; Ma & Turel, 2019; Wang, Chen, & Duan, 2017) and well-being (Molino et al., 2020; Ninaus, Diehl, Terlutter, Chan, & Huang, 2015; Pfaffinger, Reif, & Spieß, 2020; Ragu-Nathan, Tarafdar, Ragu-Nathan, & Tu, 2008). Moreover, less is known about the relationship between these variables in the actual pandemic context (Anderson & Kellier, 2020). Whether the use of technology for work purpose in the COVID-19 epidemic-induced telework may have a positive or negative impact on work-family conflict and well-being remains an open question. Furthermore, we know little on how technostress/ tehcnostressors (i.e., factors that create stress from the use of ICTs; Ragu-Nathan et al., 2008) as variables related to work have an impact on a variable related to the interface between work and family, such as work-family conflict, and how both impact on employees' well-being, mainly on psychological dimension of well-being or positive psychological functioning (Keyes, 2002; Ryff, 1989).

In this context, our study investigates the mediating role of work-family conflict in the relationship between the stress generated by techno-overload and techno-instrusion and psychological well-being. In this in this endeavor, we draw on the Conservation of Resources Theory (COR; Hobfoll, 1989; Hobfoll, Halbesleben, Neveu, & Westman, 2018), the Job Demands-Resources Model (JD-R Model; Bakker, & Demerouti, 2007, 2017; Schaufeli & Taris, 2014) and the Theory of Role Stresss (Kahn,Wolfe, Quinn, Snoek, & Rosenthal, 1964; Katz & Kahn, 1978) to explain the relationships between these constructs.

As most of the previous studies on technostress creators and well-being have

focused on well-being rather from the hedonic approach (in terms of job satisfaction and overall life satisfaction; Al-Ansari & Alshare, 2019; Suh & Lee, 2017), our study proposes firstly to advance knowledge about the effects of technostress generated by the use of ICTs (techno-overload and techno-invasion) on employees' psychological well-being. Secondly, our study highlights the role of work-family interface variables such as work-family conflict in the relationship between technostress creators and employees' psychological well-being. Work-family interface describes the process of influence between pressures and resources from the work (or family) domain and the individual's behavior in the family (or work) domain (Bakker, ten Brummelhuis, Prins, & van der Heijden, 2011). Conflictual perspective is one of the approach to understand this process. According to COR theory (Hobfoll, 1989), family can be a resource for the employee to cope with the stress generated by the use of technology. Thirdly, because in this pandemic employees worked more in telework, we expect the technostress induced by the use of ICTs in terms of overload and intrusion to have an impact on the conflict from work to family. Our study sheds light on the role that work-family interface variables (i.e. work-family conflict) play in the relationship between technostress creators and employee's psychological well-being, knowing that the work-family conflict itself is related to the well-being of the individual.

In addition, our study provides the theoretical fundamentals to develop intervention strategies in order to alleviate the stress experienced by employees due to the intense use of ICTs, such as techono-overload and techno-invasion and to mitigate the employees' work-family conflict, which would later impact on their psychological well-being.

Technostress

The term technostress was first used by Craig Brod (1984) who defined it as a modern adjustment disorder caused by the inability to cope with new information technologies in a healthy way. Over time, technostress has been labeled by researchers as technophobia, cyberphobia, computerphobia, computer anxiety, computer stress, negative computer-related attitude.

Although there are several definitions of techonostress (La Torre, Esposito, Sciarra, & Chiappetta, 2019), Ragu-Nathan et al. (2008) provided a widely accepted definition. These authors considered technostress as "a user's stress experience when using information technology (IT)". Building on this definition, Tarafdar and colleagues (2010, pp. 304-305) described this form of stress as *"the stress that users experience as a result of multitasking, permanent connectivity, information overload, uncertainty of results due to frequent system updates, continuous re-learning and of job insecurity and technical problems associated with the use of ICT in the organization"*. The common feeling experienced by the most ICT users is the self-perceived lack of time to successfully complete tasks, despite the constant effort spent to be effective. Lately, the amount of information to be processed has increased, as well as the expectations that workers will face it as before when there were fewer demands, and maybe even faster than that (Tarafdar, Tu, & Ragu-Nathan, 2010). As computer and communication devices, including the internet connection, can operate day and night, there is an expectation that workers will be continuously connected, available and able to work (Ayyagari, Grover, & Purvis, 2011).

Tarafdar and colleagues (2007) and Ragu-Nathan and colleagues (2008) identified five technostress creators (i.e., factors that create stress from the use of ICTs) including techno-overload, techno-invasion, techno-complexity, techno-insecurity and techno-uncertainty. For the purpose of this research, techno-overload and tehno-invasion will be detailed below as these two technostressors seems to be more relevant in the telework performed in the actual pandemic context.

Techno-overload refers to the potential of ICTs to force users to work faster and harder or to change their work habits (Ragu-Nathan et al., 2008), as mobile computing devices, social networks and collaborative applications make possible the simultaneous real-time processing of information flows, which

ultimately lead to information overload, interruptions and multitasking (Tarafdar et al., 2011). Information overload consists of exposing users to more information than they can use and manage efficiently, thus leading to information fatigue (Weil & Rosen, 1997). Interruptions generated by e-mail alerts, notifications and text-based workflows force users to manage information as soon as it arrives, creating anxiety, tension, disconnection from workflow state, and difficulties in paying attention (Tarafdar et al., 2011). Multitasking assumes that employees are involved in working simultaneously in several applications and tasks, trying to do more in a shorter time, often experiencing states of tension and pressure (Tarafdar et al., 2011).

Techno-invasion refers to the intrusive effect of ICTs and the situation in which employees can be contacted at any time and feel the need to be continuously connected; so the line between work and personal contexts becomes unclear (Ragu-Nathan et al., 2008). The usual working day extends beyond the hours that should be spent with the family, including the holidays, and "not connecting" becomes frightening. Due to this type of continuous connection, individuals feel bound to these technologies and face their intrusion into their personal time and space. Therefore, they end up experiencing frustration and stress (Tarafdar et al., 2011).

One theory that describes, explains, and predicts the nature of stress in general and technostress in particular is the Conservation of Resources Theory (COR; Hobfoll, 1989; Hobfoll et al., 2018). The core of this theory is the concept of "resource (s)" that the individual fundamentally values. Resources are generally conceptualized as the total capacity that an employee has to meet the central needs that he/she values (Hobfoll, 2002). Hobfoll (2001) classified the resources into five main categories: energy resources (e.g., effort and time), work-related resources (e.g., status or reputation), material resources (e.g., financial stability), personal resources (e.g., optimism) and interpersonal resources (e.g., friendship).

When employees strive to perform their work tasks, they face several (techno) stressors, such as operating with an excessively large volume of information (information overload), interruption of work due to frequent requests for use of communication channels (overload with communications), and/ or operation with an excessively complex system (overload due to system characteristics) (Harris et al., 2015). In order to meet all these demands, employees use (spend and invest) personal resources valued by them and, as a result, they diminish their ability to manage competing demands (Hobfoll, 1989; 2001). If employees feel that their resources are threatened or not adequately replenished, they may experience technostress, thus reducing their performance (Harris et al., 2015). Resources are often difficult to obtain and maintain. Thus, their loss is greater and more impactful compared to their acquisition. It is important for individuals to protect themselves from wasting resources, as this would cause them stress (Hobfoll & Freedy, 1993).

When employees face technostress, this is a threat to their resources, and, as a result, they will invest more time and more effort in trying to conserve their existing resources than focusing on their job (Hobfoll, 1989). Wealth in resources places individuals in a less vulnerable position and makes them less likely to go through extreme and stressful situations, such as coping with job demands (Hobfoll & Freedy, 1993; Salanova et al., 2013). When work is overloaded with the use of ICTs, employees are likely to have fewer resources to meet the demands of family life. According to COR theory, losing resources in one area can lead to stress in the other domain. As such, this decrease in resources due to work overload through the use of ICTs can contribute to experiencing the conflict between work and family life (WFC; Harris, Marett, & Harris, 2011; Harris et al., 2015). In other words, when the events in the work domain exceed a person's resources that are necessary for functioning in another domain (e.g., family), those events are considered to be stressors (Lazarus & Folkman, 1984), similar to the technology-induced stress that is the focus of the present study.

Furthermore, the impact of techno-overload and techno-invasion on work-family conflict and psychological well-being may be explained also by the JD-R model (Bakker &

Demerouti, 2007, 2017). This model explains health impairment and motivational processes considering two different types of working conditions as the main determinants of the processes: demands and resources. According to this model, techno-overload and techno-invasion can be conceptualized as specific job demands. Job demands refer to those *„physical, psychological, social or organizational aspects of the job that require sustained physical and/or psychological (cognitive and emotional) effort or skill and are therefore associated with certain physiological and/or psychological costs"* (Bakker & Demerouti, 2007, p. 312). Job demands are not harmful by definition but they may be job stressors when great effort is required, which is not followed by adequate recovery (Meijman & Mulder, 1998)..

Research on the use of ICTs has revealed its effects on work-family conflict. In this sense, it was found that techo-invasion defined as the imposition of work-based technologies into an employees personal life overwhelmed their personal lives, increased personal anxiety, and eventually degraded their productivity (Tu, Wang, & Shu, 2005). Harris, Marett and Harris (2011) found that perceived pressure as a result of technology used for work was positively associated to work-family conflict and this relationship was moderated by negative affectivity and social stressor. In another study, Harris and colleagues (2015) found that technology overload in terms of information, communication, and system feature overload was positively related to work-family conflict.

According to Pfaffinger, Reif and Spieß (2020), technostress creators can be considered as stressors according to traditional stress and recovery models including JD-R Model (Bakker & Demerouti, 2007), job demands-control model (Karasek, 1979) and effort-recovery model (Meijman & Mulder, 1998). Techonostress creators constitute job demands which require effort, or reduce an employee's perceived level of control and consequently entail feelings of strain and stress and thereby reduce employees' well-being. Empirical studies found negative effects of tehnostress creators on employees' physical and mental health, job satisfaction, life satisfaction, sleep quality as dimensions of well-being and an increase in stress and strain (Ragu-Nathan et al., 2008, Pfaffinger, Reif, & Spieß, 2020). The employees' impaired well-being has subsequent negative consequences for organizations (Berg-Beckhoff et al., 2017; Tarafdar, Pullins, & Ragu-Nathan, 2015), such as reduced productivity, higher absenteeism and stronger intention to leave the organization (Ragu-Nathan et al., 2008).

Psychological well-being

Marie Jahoda (1958), one of the pioneers of positive psychology, draws attention to the need for the absence of mental health disorders to achieve WB status, but, at the same time, she acknowledges that this criterion is insufficient. Thus, Jahoda (1958) and Gurin et al. (1960) developed two complementary areas of study on positive mental health: psychological well-being, which was later developed by Ryff (1989), and subjective (or emotional) well-being, later developed by Diener (1984). The first perspective considers WB in terms of eudaimonism (Waterman, 1993), according to which the essential attribute of WB is the actualization of an individual's potential rather than happiness itself. The second one refers to WB in terms of hedonism (i.e., pleasure and happiness, including pain avoidance; Kahneman Diener, & Schwarz, 1999).

Subjective (or emotional) well-being is based on Gurin et al.'s (1960) studies and was defined as a set of phenomena, including emotional responses, related to personal areas of life satisfaction (e.g., work, leisure, family, etc.). It includes life satisfaction, positive affect, and negative affect (Machado & Bandeir, 2015). Therefore, an individual who has a high subjective well-being is generally satisfied with his life, often has positive emotions and quite rarely negative emotions (e.g., sadness, anger, disappointment, etc.) (Diener, 1984; 2000; Kahneman et al., 1999). As all of these aspects measure states and feelings, hedonia is also called emotional well-being by researchers (Keyes & Waterman 2003; Kokko, Korkalainen, Lyyra, & Feldt, 2013; Robitschek & Keyes 2009).

The concept of psychological well-being focuses on the development of individual potentials. Although previous research on WB did not include issues related to mental health, clinical theories, and lifelong development, Ryff's new conceptualization summarized these aspects and provided a clearer understanding of the basic structure of the PWB (Ryff, 1989; Ryff & Keyes, 1995). This approach resulted in a six-dimensional framework model (Ryff, 1989; Ryff & Keyes, 1995). The six dimensions of the PWB address different aspects of personal functioning and include the various facets of the optimal development of the person, such as: (1) Autonomy involves a sense of self-determination and the ability to resist social pressures, to think and act in one's own way; (2) Environmental control involves the ability to effectively manage your own life and environment and the ability to create contexts that can meet your personal needs and values; (3) Personal development presupposes the existence of the preoccupation of continuous growth and development as a person and the opening to new experiences for self-knowledge and improvement; (4) Positive relationships with others involve involvement in high quality relationships with others, including concern for the well-being of others and valuing the reciprocity of human relationships; (5). Purpose in life presupposes the belief that both past and present efforts are guided by goals and they give meaning to life; (6). Self-acceptance involves the global and unconditional confirmation and acceptance of the self, including good and bad qualities.

In the context of the conflict between work and personal life favored by work from home and the negative effects of using ICTs, it is expected, according to COR theory, that stress will appear in response to a threat of loss of resources, actual loss of resources or lack of an expected gain in resources. Among these resources that could be lost is psychological well-being (PWB). COR theory considers PWB as a resource belonging to "personal characteristics" as the overall effectiveness of the individual's psychological and social functioning (Wright & Hobfoll, 2004). It is a valuable resource, although sometimes scarce (Hobfoll, 1989). Merino, Privado and Arnaiz (2019) state that resources are fundamental for people, and well-being or "eustress", will depend on gaining these resources; and stress, also called "distress" will depend on the loss of these resources. Impairment of well-being or "distress" refers to the negative response to stressors (e.g., the negative effects of ICTs and / or the conflict between work and family life) that leads to the negative impact of individuals and also can cause major harm to their mental health. On the other hand, "eustress" is defined as a positive response to adversity and the presence of positive affect and well-being in general (McGowan, Gardnerm & Fletcher, 2006; Nelson & Simmon, 2003; Watson & Pennebaker, 1989).

Work-family conflict

Work-family conflict occurs when work and family pressures on the person are mutually incompatible, and as a result, participation in the family role is more difficult by virtue of participation in the work role (Greenhaus & Beutell, 1985). WFC may be time based, strain based or based on incompatible behavioral demands. Similar to other studies (Ghislieri, Emanuel, Molino, Cortese, & Colombo, 2017), as the research on behavioral role conflict is infrequent, in the present study, we only focused on time- and strain-based work to family conflict (Netemeyer et al., 1996).

The notion of role conflict has its roots in deficit theory and the role strain hypothesis (Goode, 1960), which assumes that personal resources, such as time and energy, are finite and that allocating more resources to a particular role requires allocating fewer resources than other roles. Thus, people who participate in several roles (e.g., work and family) are likely to experience conflicts between these roles (i.e. theory of role stress; Kahn et al., 1964; Katz & Kahn, 1978). Multiple work and family roles can lead to conflicting demands on various issues. According to theory of role stress, the experience of ambiguity and/or conflict within the same role is called intra-role conflict, and the experience of ambiguity and/or conflict between multiple roles is called personal inter-role conflict. Because the individual has to assume several roles at the same time, it will be more difficult for him to fulfill each role successfully, due to conflicting time

requirements, lack of energy, or due to incompatible behaviors between roles (Greenhaus & Beutell, 1986; Kahn et al., 1964). Thus, multiple roles compete for the limited resources of individuals, creating states of tension, strain and stress (Greenhaus & Beutell, 1985).

Research on the antecedents of work-family conflict has indicated certain characteristics related to work and personal stressors as the main predictors (Byron, 2005; Frone, Russell & Cooper, 1992; Michel, Mitchelson, Kotrba, LeBreton & Baltes, 2009; Mihelic & Tekavcic, 2014). In addition, work-family conflict has been negatively associated with a range of emotional and behavioral outcomes, including family dissatisfaction, family absenteeism, and poor performance in family-related roles (Mihelic & Tekavcic, 2014). There is evidence of a positive association between work-family conflict and a number of dysfunctional consequences for the individual's physical and psychological health and diminished individual physical and psychological well-being and satisfaction with life (Bellavia & Frone, 2005; Carlson et al., 2011; Frone, 2000; Grandey & Cropanzano, 1999).

In the context of the COVID-19 pandemic, moving work from the office to home settings could create some risks for some employees due to the blurring of boundaries, including physical ones, between work and family domains. These risks could contribute to increasing conflict between work and family life as the employee seems to be easier to be reach in order to handle family demands. In addition, permanent connection to the workplace through ICT devices could lead to an increase in work-family conflict, for example, caused by overtime, interruptions and distractions from family activities outside normal working hours (Sarbu, 2018). Overall, Sarbu (2018) concludes that working from home decreases the probability of employees to reconcile the interests of professional life with personal ones.

Integrating the role conflict related to work and family in the COR theory, Grandey and Cropanzano (1999) call the experience of ambiguity or conflict in work as "work role stress", respectively in the family as "family role stress". These authors consider that the resources in the conditions, personal characteristics and energies domains are the relevant ones for this purpose. For example, resources that belong to both the family and the work field could be: the status of being married and being employed in a well-paid position (conditions domain), resources as a buffer against stress, such as self-esteem (personal resource domain), and resources in the energy domain, such as time, money and knowledge that allow and the acquisition of other resources. All of these resources are sought after and coveted by individuals, and their threat and / or loss can cause stress. Stress related to inter-role conflict occurs because resources are lost in the process of navigating between professional and family roles (Grandey & Cropanzano, 1999). These potential losses of resources or even actual losses lead to a negative 'state of being', which can lead to dissatisfaction, as well as states of depression, anxiety or physiological stress, or, in other words, can lead to significant impairment of well-being (Merino, Privado, & Arnaiz, 2019).

Drawing on previous theoretical arguments and empirical studies, our study investigates the mediating role of the work-family conflict in the relationship between technostress (techno-overload and techno-invasion) and psychological well-being. We expect that techno-overload and techno-invasion will have a negative effect on psychological well-being through the increase of work-family conflict (Figure 1). Thus, we hypothesised that:

Hypothesis 1. Work-family conflict mediates the relationship between techno-overload and psychological well-being.

Hypothesis 2. Work-family conflict mediates the relationship between techno-invasion and psychological well-being.

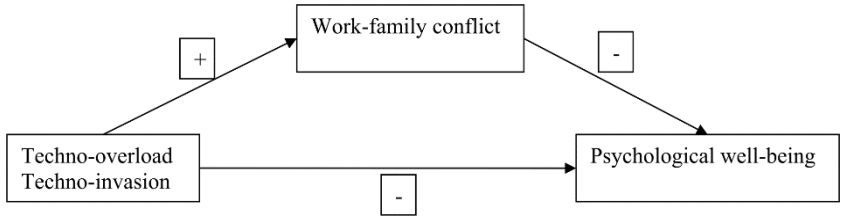

Figure 1. The conceptual model of the present study

Method

Participants

The participants were employees working in various organizations. Most of them worked from home during the restrictions on social distance imposed by the COVID-19 pandemic. Participants sampling was based on the "snowball" method. The only inclusion criterion was for the participants to have a job at the time of completing the questionnaire. Participants were included voluntarily in this study.

The sample consisted of 217 participants, aged between 21 and 56 years (M = 33.15; SD = 8.46), 80.2% of them being under 40, 119 (54.8%) women and 98 (45.2%) men. Of all participants, 57 (26.3%) were team leaders or responsible for a work group, while 160 (73.7%) were members of a team or work group. The participants in our sample stated that they work from home on average, M = 5.41 (SD = 3.75) hours per day.

Instruments

From the *Technostress Creators Inventory* (Tarafdar et al., 2007; Ragu-Nathan et al., 2008), we used the Techno-overload (5 items; "I am forced by this technology to work faster"; α =. 90) and Techno-invasion subscales (4 items; "I spend less time with my family because of this technology"; α = .92). Respondents indicated the extent to which they agreed with each of the statements, using a 5-point Likert response scale, respectively 1 (Totally Disagree) and 5 (Totally Agree).

Work-Family Conflict Scale (WFCS; Netemeyer, Boles, & McMurrian, 1996) captures the influence of work on family context. Five items ask participants about how work interferes with family life, using five answer options, from 1 (Totally Disagree) to 5 (Totally Agree). An example of item is "My work demands interfere with my family and home life" (α = .94).

To measure the criterion variable of our study we used the *Psychological Well-Being Scale* from the Mental Health Continuum-Short Form (Keyes, 2013). Participants rated how they felt in the last month, according to the item statements, on a five-point Likert scale, from 0 = Never; 1 = Once or twice; 2 = About once a week; 3 = About 2-3 times a week; 4 = Almost every day; at 5 = Every day. A typical example of a PWBS item is: "In the last month, how often have you felt that you are managing your day-to-day responsibilities well?". PWBS measures the six dimensions of psychological well-being, with one item for each dimension, reffering to the challenges that individuals face as they strive to function optimally, reach their full potential, and value their unique talents (Ryff 1989; Ryff & Keyes 1995): (1). Self-acceptance, (2). Positive relationships with others, (3). Autonomy, (4). Environmental control, (5). Purpose in life and (6). Personal development (α = .93).

For all scales, the internal consistency has met the minimum recommended value of .7 (Hair, Anderson, Tatham, & Black, 1998; Nunnally, 1978).

Procedure

Data collection took place through an online survey in Romanian, using "Google Form" platform. Participants received a link to fill tthe survey, being encouraged to distribute it online, to be accessed and filled in by other persons. The survey was distributed starting with the end of February 2021 until the end of May 2021.

The front page of the online survey contained a letter of informed consent explaining the purpose and procedure of the study, including contact information of the

authors. Respondents' confidentiality was guaranteed by using a participation code as an element of identity, and by using the data in an aggregated and anonymous way only for research purpose.

Data analysis

Data collected from 220 participants were firstly reviewed for possible errors, missing values, and outliers. Participants who failed to complete the questionnaire were completely removed from the sample, namely three participants did not provide information on the number of hours worked in telework, and thus the sample was reduced to 217 participants. Items of all scales were rated directly, there were no negatively worded items that need to be rated backwards. The gender of the participants was coded as a Dummy variable, as follows: 0 = female and 1 = male; and also the team status of the employees was coded as a Dummy variable, as follows: 0 = simple member of the team / working group and 1 = team leader / responsible for the working group.

Based on relevant past research, we identified several socio-demographic variables as control variables (Tarafdar et al., 2011): gender, age, team status (team leader/ manager or simple team member) and the number of hours worked per day in the telework regime. Gender and age are related to technostress (Krishnan, 2017; Srivastava, Chandra, & Shirish, 2015; Wang et al., 2008). Women report lower levels of stress compared to men after being exposed to a stress stimulus (Riedl, 2012). Ragu-Nathan and colleaugues' (2008) cross-sectional study revealed that men experience more technostress than women. The second controlled variable was age, as there appears to be a positive relationship between age and technostress (Shu, Tu, & Wang, 2011). However, Ragu-Nathan and colleagues (2008) found that young people tend to experience higher levels of technostress compared to the elderly. Even so, the contradictory results in the literature suggested that age needs to be controlled. The third variable controlled was team status, because the literature shows that leaders usually report a higher level of well-being and stress than subordinates, and have more effective stress management mechanisms than subordinates. Finally, time spent in telework can influence the level of work-family conflict (Madsen, 2003; Tremblay, Paquet, & Najem, 2006) and well-being (Spagnoli et al., 2020; Thulin, Vilhelmson, & Johansson, 2019).

After computing the scores on variables, we ran a Pearson bivariate correlation analysis to check the assumptions for testing a mediation model, using SPSS software (IBM Corp. Released, 2011). Subsequently, the two hypotheses were tested through the mediation analysis using the macros PROCESS v.3.5.3 (Hayes, 2017) (model 4; 95% confidence interval, 5000 bootstrap samples).

Results

Table 1 presents the mean, standard deviation and correlations between the main and control variables.

Table 1. *Pearson r correlation matrix, means and standard deviations*

Variabile	Mean	SD	1	2	3	4	5	6	7	8
1. Techno-overload	2.58	1.03	1							
2. Techno-invasion	2.25	1.19	.73***	1						
3. Work-family conflict	2.42	1.18	.59***	.72***	1					
4. Psychological well-being	3.49	1.03	-.19**	-.29***	-.35***	1				
5. Team status	-	-	-.00	.05	.05	.01	1			
6. Age	33.15	8.46	-.00	.03	-.05	.09	.16	1		
7. Gender	-	-	-.00	-.06	-.00	.10	-.11	.00	1	
8. Telework, hours/day	5.41	3.75	-.10	-.06	.08	-.12	.10	-.39***	-.07	1

N = 217; * $p < 0.05$ (2-tailed); ** $p < 0.01$ (2-tailed).

Table 2. *The results of the mediation analysis regarding work-family conflict as mediator in the relationship between techno-overload and psychological well-being*

Variables	Work-family conflict			Psychological well-being		
	b_{boot}	95%CI Lower	95%CI Upper	b_{boot}	95%CI Lower	95%CI Upper
Constant	.38	-.29	1.01	4.01	3.24	4.82
Techno-overload	.69	.57	.81	.01	-.15	.17
Work-family conflict				-.31	-.44	-.17
Age	-.001	-.02	.01	.01	-.01	.02
Gender (M/F)	.04	-.21	.30	.21	-.06	.48
Status (No/Yes)	.13	-.18	.42	.10	-.42	.44
Telework hours/day	.05	.01	.08	-.02	-.07	.02
R	.61			.38		
R^2	.37			.15		
df1	5			6		
df2	211			210		
F	25.06***			5.95***		
p	.000			.000		

Note: $N = 217$, ***$p < .001$.

The data reveal a high positive correlation between techno-overload and work-family conflict ($r = .59$, $p < .001$), as well as between techno-invasion and work-Family conflict ($r = .72$, $p < .001$). Along with the increase of the technostress level of the employees, respectively increase of the techno-overload and techno-invasion levels, the work-family conflict will also increase.

Technostress creators have a negative association with psychological well-being. Techno-overload and psychological well-being are weakly associated ($r = -.19$, $p < .01$), while techno-invasion and psychological well-being are moderately correlated ($r = -.29$, $p < .001$). Thus, as the stress generated by the techno-stressors increases, psychological well-being decreases. In addition, increased

work-family conflict is associated with poor psychological well-being ($r = -.35$, $p < .001$).

Following the mediation analyses, the results highlight a significant positive effect of the stress generated by techno-overload on work-family conflict ($b_{boot} = .69$, $95\%CI_{boot}$ [.57; .81]), but not a direct one on employees' psychological well-being ($b_{boot} = -.01$, $95\%CI_{boot}$ [-.15; .17]) (Table 2). Only work-family conflict has a significant negative effect on psychological well-being ($b_{boot} = -.31$, $95\%CI_{boot}$ [-.44; -.17]). The total effect of techno-overload on psychological well-being is statistically significant (-.20, $p < .01$, 95%CI [-.34; -.07]). The indirect effect is also statistically significant (-.21, $95\%CI_{boot}$ [-.31; -.12] (Table 4). The relationships between variables were controlled for gender and age, team status, and the number of hours worked per day in telework. Consequently, the results indicate that the work-family conflict fully mediates the relationship between techno-overload and psychological well-being, thus strongly affecting the employees' psychological well-being in the context of exposure to the stress generated by ICTs overload. The first hypothesis was supported by the data.

Similar results were identified regarding the mediating role of work-family conflict in the relationship between techno-invasion and psychological well-being (Table 3). We identified a positive relationship between techno-invasion and work-family conflict ($b_{boot} = .73$, $95\%CI_{boot}$ [.64; .82]). In contrast, techno-invasion did not have a significant direct relationship with psychological well-being ($b_{boot} = -.09$, $95\%CI_{boot}$ [-. 27; .08]). Only work-family conflict had a negative impact on psychological well-being ($b_{boot} = -.24$, $95\%CI_{boot}$ [-. 40; -.07]). As a result, the indirect effect of the techno-invasion of ICTs on psychological well-being through the work-family conflict is significant (-.17, 95% CI [-. 29; -.05]; Table 4). The results were controlled for gender and age, team status, and the number of hours per day worked in telework. Therefore, work-family conflict partially mediates the relationship between the techno-invasion with ICTs of employees and their psychological well-being; thus significantly affecting the psychological well-being of employees in the context of their exposure to stress due to the invasion of ICTs. The second hypothesis was supported by the data.

Discussion

The present research investigated the relationship between stress due to the techno-overload and the techno-invasion of ICTs (in the context of the COVID-19 pandemic, when telework was the rule rather than the exception), employees' psychological well-being and work-family conflict. As restrictions imposed during the lockdown in the COVID-19 pandemic limited social life and interpersonal contacts, including those related to work, we assumed that during this period the conflict between work and family life will increase as a result of the stress generated by the intense use of ICTs in telework.

Our findings revealed that stress generated by the overload and invasion of ICTs had a significant positive effect on work-family conflict. Employees who faced a high level of technostress due to exposure to ICTs in order to perform their work tasks, reported a high level of work-family conflict. The stress generated by the techno-invasion of ICTs had a greater impact on the work-family conflict than that generated by the overload of ICTs. These results support and strengthen previous evidence in the literature that stress caused by exposure and use of ICTs increases work-family conflict (Leung & Zhang, 2017). For example, Harris and colleagues (2021) found that techno-overload and techno-invasion of ICTs were significantly associated with a high intensity of work-family conflict, intentions to leave the organization and high family burnout.

In addition, employees who faced a high level of work-family conflict reported low level of psychological well-being. These findings are in line with previous literature that evidenced work-family conflict as a negative predictor of well-being in general (Karimi, Karimi, & Nouri, 2011) and psychological well-being in particular (Koyuncu, Burke, & Wolpin, 2012).

Table 3. *The results of the mediation analysis regarding work-family conflict as mediator in the relationship between techno-invasion and psychological well-being*

Variables	Work-family conflict			Psychological well-being		
	b_{boot}	**95%CI Lower**	**95%CI Upper**	**b_{boot}**	**95%CI Lower**	**95%CI Upper**
Constant	.68	.10	1.25	4.09	3.32	4.91
Techno-invasion	.73	.64	.82	-.09	-.27	.08
Work-family conflict				-.24	-.40	-.07
Age	-.01	-.02	.01	.01	-.01	.02
Gender (M/F)	.13	-.07	.35	.20	-.07	.47
Status (No/Yes)	.04	-.22	.31	.10	-.25	.45
Telework hours/day	.04	.01	.07	-.02	-.07	.02
R	.74			.39		
R^2	.54			.15		
df1	5			6		
df2	211			210		
F	49.68***			6.19***		
p	.000			.000		

Note: $N = 217$, ***$p < .001$.

Table 4. *The indirect effect of techno-stress on psychological well-being through work-family conflict*

				95% CI	
Predictor variables	**Mediator**	**b**	**BootSE**	**LL**	**UL**
Techno-overload	Work-family conflict	-.21	.04	-.31	-.12
Techno-invasion		-.17	.06	-.29	- .05

Note: $N = 217$

We found that the higher the level of employees' stress caused by the overload and invasion of ICTs, the lower the level of their psychological well-being would be. In general, there is evidence in the literature supporting the negative association between technostress and well-being (Brooks, 2015; Nimrod, 2018).

The results of the mediation analysis showed a significant mediation effect of the work-family conflict, in a negative direction, in the relationship between the techno-overload with ICTs and psychological well-being. The total mediation effect indicated that the work-family conflict was the mechanism explaining the relationship between the techno-overload with ICTs and employees' psychological well-being. In other words, the lower the level of psychological well-being in conditions of exposure to techno-overload with ICTs , the higher the level of their work-family conflict; employees who had a low level of work-family conflict would experience a high level of psychological well-being, under the same conditions of exposure to techno-overload with ICTs. The lack of a direct relationship between techno-overload and psychological well-being could be explained by the domain referent. While techno-overload is a constrruct in which an individual's work is the referent, psychological well-being has life domain as referent.

The results of the mediation analysis also revealed a significant mediation effect of the work-family conflict, in a negative direction, in the relationship between ICTs techno-invasion and the psychological well-being. The analyses indicated a partial mediation, so that the effect of ICTs techno-invasion on psychological well-being was transmitted directly and through the work-family conflict too.

Implications

This study investigated the mediating role of work-family conflict in the relationship between technostress, respectively between techno-overload and techno-invasion of ICTs and the psychological well-being of employees working form home during the Covid-19 pandemic. As many organizations intend to further computerize their production processes, maintain and intensify remote work, especially work from home, our findings will be useful and relevant even after the pandemic ends. In this respect, our findings provide a particular understanding of the relationship between technostress generated by the use of ICTs and psychological well-being with the involvement of variables belonging to the work-family interface, such as work-family conflict.

Using the COR Theory, we explained how job demands related to the use of ICTs to work from home interfere with those existing in the family life domain. Thus, each of the demands belonging to one or another of the domains will constantly try to take over from the resources of the other domain until depletion. This tandem of resource disputes from one field to another triggers the so-called spiral of resource loss, and this will inevitably lead to negative results on both the employees' well-being and their performance in the organization (respectively, higher level technostress, emotional exhaustion, poor performance, etc.). Also, our findings indicate that technostress can have a major negative impact on both psychological well-being and work-family conflict, in the sense of its intensification, being in line with contemporary literature on the negative effects and consequences of technostress (Harris et al., 2021; Ragu-Nathan et al., 2008; Salanova et al., 2013). Also, even there has been a growing interest in technostress and well-being research, strategies on how to cope with technostress in an effective and appropriate way are still missing from the literature, especially from an organizational perspective. To this end, COR theory helps us to identify those resources that could have a significant counterbalancing impact of these negative effects. In this respect,ur study pointed out the work-family interface as a major area that can provide important resources for employees if the work-family conflict is kept to a minimum.

Subsequently, these resources can be directed both to strengthen employees' psychological well-being and to manage more efficiently the stress generated by the use of ICTs.

In order to increase the coping capacity of employees with technostress and their psychological well-being, the interventions should rather aim at work-family conflict, in order to keep it under control. Therefore, we suggest some recommendations to minimize the work-family conflict as much as possible. First, managers could create a more supportive organizational environment that minimizes work-family conflict, with the effect of improving job satisfaction (Hassan, Dollard, & Winefield, 2010). Organizations could also consider establishing flexible work schedules for their employees, and encourage family-oriented activities, thus helping their employees to maintain clear boundaries between work and personal family life. Promoting such policies would also benefit the organization, because increasing employee satisfaction with work would lead to good results.. Similarly, organizations could invest in training programs or workshops to support employees in managing their time more effectively coping with the technostress generated by the use of ICTs. In this situation, it would also be beneficial to provide employees with regular psychological counseling sessions to help them dealing with work and family problems. Also, a supportive climate in organizations would lead to freely sharing family issues without being blamed and judged. Furthermore, managers should pay particular attention to the high workload that involves intense exposure of employees to ICTs, overtime hours, excessive stress and unnecessary changes of employees from one job position to another (Gözükara & Çolakoğlu, 2015).

To increase the well-being of employees who use ICTs intensively in their work, the solution would be to find mechanisms to reduce technostress, which would also have beneficial effects on the results of the organizations. In this regard, our research has provided evidence that more careful management by organizations of the work-family interface, and specifically the work-family conflict, can have beneficial effects on employees' psychological well-being and, consequently, on their performance, for the benefit of the organization.

Limitations

Findings of our study should be considered in the light of some limitations. First, given that the participants were able to decide for themselves whether or not to participate in the research, and moreover they were free to invite known persons to the study, the data are not based on random sampling. This could have an impact on the results, as individuals who, for example, have recently experienced emotional distress due to ICTs techno-overload or techno-invasion may have been more interested in participating in our study and, thus, certain precautions must be maintained regarding the generalization of the results to the general population. Second, all the measures used were self-reported scales, so the results reflect participants' subjective perceptions of their own experiences of perceptions of technostress, psychological well-being, and work-family conflict. Third, these results are based on a non-representative study sample and this makes it questionable to generalize the results to employees in other countries and/ or cultures. Fourth, our design was a correlational descriptive one preventing us from inferring causal relationships.

Future research

In order to extend the reporting of the results to larger populations, we recommend that future replications of this study be performed under different conditions of other cultures / countries, as well as by setting up more representative samples. As future research directions, we suggest the inclusion and measurement of all five "technostress creators" (techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty; Ragu-Nathan et al., 2008) in the study to examine the effect of these variables mediated by the work-family conflict on the psychological well-being of employees. We consider that measuring all "technostress creators" in the same sample could provide a deeper understanding of how work-family conflict could mediate the effects

of technostress on employees' psychological well-being.

Conclusions

This study investigated whether the stress generated by the use of information and communication technologies, more precisely, techno-overload and techno-invasion, had a negative effect on psychological well-being, through work-family conflict, during the period when a large part of the employees faced the relocation of work at home, in the context of the COVID-19 pandemic.

Our findings revealed that techno-overload and techno-invasion have significant negative effects on work-family conflict and well-being. The results of the mediation analysis identified the work-family conflict as the mechanism by which the techno-overload of ICTs significantly and negatively affects the psychological well-being of employees, and this mediation is total. Regarding the role of the work-family conflict in the relationship between the ICTs techno-invasion and the psychological well-being of employees, we can conclude that the work-family conflict partially mediates this relationship, in a negative sense.

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PUBLISHING STANDARDS

Psychology of Human Resources – guide for authors

THE EDITORS

This document represents the "Guide for Authors". It covers the format and language to be used for manuscripts submitted to Human Resources Psychology. Also, this document can be found on the webpage of the Romanian Association of Industrial and Organizational Psychology (www.apio.ro).

This "Guide for Authors" follows the 6th APA Publication Manual.

Manuscript Submission and Format

All manuscripts for the journal Human Resources Psychology should be submitted to the following e-mail address: revista@apio.ro.

To edit the manuscript please use Times New Roman 12-point type, 1.5 line spacing and the A4 page setting. Each page will be numbered in the upper right corner. The top and side margins should be left of at least one inch or 2.54 cm. A full example of a manuscript can be found in the 6th APA Publication Manual.

Publications

Accepted papers are copy-edited and retyped. Authors have to review edits and proofread their work. The editor of Human Resources Psychology will contact the corresponding author after the editor assigns your work to an issue.

If your work is accepted, please keep the editor informed of changes in your contact information and of long absences.

Front Page

The first page of the manuscript should include the following information:

1. Title

The title should be a concise statement of the main topic and should identify the variables or theoretical issues under investigation and the relationship between them. It should be typed in sentence case, centered between left and right margins, and positioned in the upper half of the page.

2. Author name(s) and institutional affiliation(s)

Author name(s) will be presented in the following form: first name, middle initial(s), and last name.

Institutional affiliation should reflect the institution/location where the author(s) were when the research was conducted. When an author has no institutional affiliation, the city and state of residence below the author´s name should be specified. The institutional affiliation should be centered under the author's name, on the next line.

3. Author´s note

This section should include the following:

- First paragraph should include the departmental affiliations at the time of the study for all authors as follows: name of the author as it appears in the byline, comma, department name, comma, university name, semicolon, next

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- Second paragraph should include any changes in author affiliation subsequent to the time of the study as follows: [author´s name] is now at [affiliation].
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Place the author note on the title page, below the title, byline, and affiliation. Center the label *Author Note.* Start each paragraph of the note with an indent, and type separate paragraphs for the authors' names and current affiliations, changes in affiliations, acknowledgments, and special circumstances, if any, along with the person to contact. The author note is not numbered or cited in the text.

Abstract Page

The abstract as well as the title of the work go on page 2. The abstract should be no longer than 150 words. The label *Abstract* should appear in sentence case, centered, at the top of the page. Type the abstract itself as a single paragraph without paragraph indentation. Place a running head (short title).

The abstract will be written in English. It is necessary to include 3-5 key words after each abstract, in all these three languages.

Main body text pages

In preparing your manuscript, begin the introduction on page 3. Type the title of the manuscript in sentence case centered at the top of the page, and then type the text. The remaining sections of the article follow each other without a break; do not start a new page when a new heading occurs.

This section should include the following:

- Introduction of the problem. This section will present the specific problem under the study and describe the research strategy. There is no need to label this section as Introduction.
- Explore importance of the problem. This section states why the problem deserves new research. State explicitly this problem according to the type of the study (empirical study, literature review and meta-analysis, methodological paper and case study).
- Describe relevant scholarship by discussing the relevant related literature and demonstrating the logical continuity between previous and present work.
- State each tested hypothesis clearly and provide a theoretical argument for how it was derived from theory or is logically connected to previous data and argumentation.

Method

This section describes in detail how the study was conducted, including conceptual and operational definitions of the variables used in the study. Authors should include the following:

- Sample description, by describing the main characteristics with particular emphasis on characteristics that may have bearing on the interpretation of results.
- Sampling procedure by describing the procedures for selecting participants in terms of sampling method, the percentage of the sample approached that participated, the number of participants who selected themselves into the sample.
- Sample size, power and precision.
- Measures and covariates by describing the methods used to collect data and to enhance the quality of the measurements.
- Research design.
- Experimental manipulations or procedures.
- Task description.

Results

This section summarizes the collected data and the analysis performed on the data to test the proposed hypotheses. Report the data analysis in sufficient detail to justify your conclusions. For more information please consult the 6th APA Publication Manual.

Discussion

This section evaluates and interprets the implications of the results, especially with respect to original hypotheses. Examine, interpret, and qualify the results and draw inferences and conclusions from them. Emphasize any theoretical or practical consequences of the results.

Also, the limits of the study and possible future studies can be considered in this section.

References

References are your entries in the *alphabetical list at the end* of your article or research note. This list should include all the works you have cited throughout the manuscript. The references should be formatted as follows:

1. Periodicals (selective examples)

Author, A.A, Author, B. B., & Author, C. C. (year). Title of article. *Title* of *Periodical, xx,* pp-pp. doi: xx.xxxxxxxxxx

Author, A. A., Author, B. B., Author, C. C., Author, D. D., Author, E. E., Author, F.F., … Author, Y.Y. (year). Title of article. *Title* of *Periodical, xx,* pp-pp. doi: xx.xxxxxxxxxx

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2. Books

Author, A. A. (year). *Title of work.* Location: Publisher.

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3. For chapters in a book or entry in a reference book (selective example)

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4. Meeting and symposia (selective examples)

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5. Unpublished works (selective examples)

Author, A.A. (Year). Title of manuscript. Unpublished manuscript [or "Manuscript submitted for publication," or "Manuscript in preparation"].

For a detailed description of the procedure related to the citation of other types of work than those listed above, consult the 6th APA Publication Manual.

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The appendices of the manuscript (labeled APPENDIX A, APPENDIX B etc.) contain materials that supplements article content such as lengthy methodological procedures, calculations of measures, scales etc.

Tables and Figures

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(Johnny, 2011, p. 13)

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