



A Romanian adaptation of the Recovery Experience Questionnaire: Psychometric properties and measurement invariance across general and educational sector employees

Patricia Albulescu¹, Irina Macsinga^{1*}, Bogdan T. Tulbure¹, Andrei Rusu¹

¹ *Department of Psychology, West University of Timișoara, Timișoara, România*

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Finding a balance between work-invested effort and recovery moments represents one of the key paths to preserving employee health and well-being. The present research aims to facilitate this line of study in the East European context by adapting the Recovery Experience Questionnaire (REQ; Sonnentag & Fritz, 2007) to the Romanian culture. Based on two cross-sectional designs, the REQ was administered online to Romanian employees from various occupations (N = 264, Study 1), and to a sample of Romanian higher education professionals (N = 176, Study 2). Confirmatory factor analyses were conducted, which supported the first-order four-factor structure and the two-factor second-order model of REQ. Nomological validity received support through the expected correlations between the recovery experiences factors and antecedent job demands (i.e., work pressure, role conflict) and an antecedent resource (i.e., autonomy). Criterion validity was sustained by the concurrent relationships with consequences of recovery (i.e., work engagement, job performance, mental and physical health complaints). REQ demonstrated excellent reliability with internal consistencies marginal to or above .90. Moreover, the instrument was invariant across genders and study populations. Overall, the present research suggests that the Romanian version of the REQ is an adequate measure that can be used in this cultural context to assess recovery experiences.

Keywords: recovery experiences; job demands; job resources; performance; reliability

Address of correspondence: Dr. Irina Macsinga, West University of Timisoara, Department of Psychology, 4 Vasile Pârvan Blvd., Timișoara, 300223, România;
E-mail: irina.macsinga@e-uvv.ro, Contact no.: +40 755 240 203

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Introduction

Working under stress can lead to physical and mental strain, including cardiovascular activation, fatigue, and burnout (Totterdell et al., 2006). Research has shown that challenging work conditions and events are generally associated with poor health and well-being (Nixon et al., 2011). One possible reason for this is the imbalance between the effort put into work-related goals and the opportunities to recover from that effort (Sonnentag, 2018). This imbalance can be exacerbated by the rapidly changing labor market, driven by technological advancements and the impact of the COVID-19 pandemic (Kniffin et al., 2021). While flexibility and autonomy in work can have positive effects on employee health and productivity, the expectation to work anywhere and anytime can have negative consequences on productivity, safety, health, and work-life balance (Von Bergen et al., 2019). In Romania, the introduction of remote work has led to increased working

hours and concerns about the quality of family life for employees (Zamfir & Zamfir, 2020).

In this context, how employees recover their resources used during work time reignites as an area of legitimate scientific interest. More precisely, recovery becomes an important phenomenon to consider in protecting individual well-being, engagement, and performance, especially for those employees exposed to high demands during the workday (Sonnentag et al., 2022). To further facilitate research on this topic in a particular cultural context of Eastern Europe, the current study aims to evaluate the psychometric characteristics of the Romanian version of the Recovery Experience Questionnaire (REQ; Sonnentag & Fritz, 2007). This tool assesses unwinding and recuperation processes and can be helpful both in studying the “mechanisms underlying the effects of job stressors on the individual” and in identifying those “experiences helpful in protecting individuals’ well-being and performance capability” (Sonnentag & Fritz, 2007, p. 219). Besides investigating the instrument’s structural validity and

nomological network, we also inspected its invariance across men and women and across general, private sector employees, and educational sector professionals. The later analyses pave the ground for conducting comparative studies between such groups of workers.

Recovery experiences – conceptualization and operationalization

Recovery is understood as the process opposite of strain, in which employees stop spending the resources used during the workday and replenish those exerted in fulfilling work-related tasks (Meijman & Mulder, 1998). Individuals have a limited supply of personal resources (e.g., attention, affect, cognitive resilience) to achieve work-related tasks and goals (Hobfoll, 1989; Meijman & Mulder, 1998). Therefore, recovery opportunities offer the occasion to replenish such resources or create new ones (Sonnentag & Fritz, 2007). Two theories usually explain the recovery mechanism. Refraining from task-related demands allows the recovery processes to occur — a process suggested by the effort-recovery model (E-RM; Meijman & Mulder, 1998), whereas the time off used for restoring lost or threatened resources by investing other resources is a process suggested by the Conservation of resources theory (COR; Hobfoll, 1989). Thus, two complementary processes underlie recovery from work, one passive through disengagement and relaxation which facilitate the restoration of employees' psychobiological systems to baseline levels, and then another one, rather active, highlighting the importance of engagement in pleasant or challenging leisure activities (Sonnentag & Fritz, 2015). Sonnentag and Fritz (2007) developed the REQ to assess experienced recovery from job stress as a universal process, making the distinction between psychological detachment from work (disengaging oneself both physically and mentally from work), relaxation (a state of increased positive affect, and low activation), mastery (challenging experiences and learning opportunities during off-job time), and control (ability to choose which activity, when and how to pursue during off-job time). Thus, a recovery process must unfold after a period in which resources were spent to replenish them. Employees can recover their used resources by experiencing being away from the work situation, engaging in relaxing activities, learning new things, or choosing their preferred leisure activity (Sonnentag & Fritz, 2007).

Previous research has revealed that work characteristics, such as job demands and job resources, are associated with recovery experiences. Considering work-related characteristics as antecedents of recovery experiences, we base our predictions on the Job Demands–Resources theory (JD-R; Bakker & Demerouti, 2014; 2017), in which job demands can be seen as factors that inhibit recovery, whereas job resources may facilitate it. Job demands refer to those factors within the work environment that hinder the action regulation process, because (1) when individuals face high demands at work, they tend to constantly ponder their job to devise solutions to challenges stemming from those demands; (2) the heightened level of arousal induced by job demands impedes relaxation during non-work periods; (3) fatigue resulting from job demands hinders engagement in self-regulation; and (4) high job demands result in less available time for leisure, diminishing the control over the non-work time (Sonnetttag & Fritz, 2007). Job demands such as negative events experienced during the workday (Bono et al., 2013), unfinished tasks (Syrek et al., 2017), and

quantitative or emotional demands (Volmer et al., 2012) were associated with impaired detachment from work. Job stressors, particularly workload and time pressure, were found to impede psychological detachment from work, and in turn, to affect employee strain levels and well-being (Sonnetttag & Fritz, 2015). Indeed, workload, defined by the amount of work an employee must handle, was found to predict poor psychological detachment (Kinnunen & Feldt, 2013; Sonnetttag et al., 2010). Interestingly, high job demands predicted not only a decrease in psychological detachment over time but also a decrease in relaxation (Kinnunen & Feldt, 2013). There is also evidence from longitudinal research, showing that high workload and time pressure predict a decrease in psychological detachment and relaxation (Kinnunen & Feldt, 2013; Meier & Cho, 2019). Thus, we expect negative associations between job demands and all four recovery experiences.

The positive effects of job resources on recovery experiences can be explained with the help of the COR theory (Hobfoll, 1989), according to which resources tend to accumulate and generate other resources. Following this line of reasoning, employees who have high resources on the job are likely to have more internal resources available to spend their free time in gaining mastery experiences or control over free time after work, or simply to not linger on the negatives occurring during the workday, and just kick back, detach and enjoy after-hours relaxation (Sonnetttag & Fritz, 2007; Kinnunen & Feldt, 2013). However, the relationship between job resources and individual recovery experiences is more nuanced when empirically tested. Job resources were found to predict an increase in mastery experiences over time across one year, but no such relationship was found for other recovery experiences (Kinnunen & Feldt 2013). Several longitudinal studies have confirmed that an increase in job control predicted a subsequent decrease in the need for recovery (de Croon et al., 2004; de Raeve et al., 2007). Other studies failed to find an association between job control and psychological detachment (Shimazu et al., 2012; Sonnetttag & Fritz, 2007). As a possible explanation for this less uniform pattern of relations, it was argued that because job control or autonomy entails having the flexibility to make decisions regarding one's work methods, often offering multiple avenues for action, individuals may find it challenging to psychologically detach from work after hours, as they are more likely to ponder various work-related aspects. Similarly, heightened decision latitude about how to do one's work can lead to persistent thoughts about work during non-work hours, thereby making relaxation more challenging (Sonnetttag & Fritz, 2007). According to these previous results, we expect autonomy at work to be positively related only to mastery and control.

Considering the potential outcomes of recovery experiences, to date, several well-being variables have been examined. Past studies suggest that recovery acts as a critical mechanism by which employees can improve their psychological and physiological well-being, as well as their performance at work (Steed et al., 2021). Experiencing high levels of recovery in the evening was found to influence sleep quality and improve affective states in the morning (Chawla et al. 2020), being particularly important on days with high levels of stress (Park et al., 2018).

Psychological detachment, as the experience of being physically and mentally away from the work situation, was found to positively influence mental and physical health, well-being, and task performance (Wendsche & Lohmann-Haislah, 2017). Psychologically detaching from work

stressors was associated with increased positive mood (Fritz et al., 2013), better sleep quality, increased vigor (Clinton et al., 2017), reduced levels of exhaustion and fatigue (Bennett et al., 2018; Demerouti et al., 2012) and next-day job performance (Liu et al., 2021).

Empirical evidence suggests that relaxation helps in reducing stress-related complaints, in the short as well as in the long run (Stone et al., 1995; Van der Klink et al., 2001), associated with increased positive mood and vigor, decreased negative mood and exhaustion (Fritz et al., 2013), and increased work engagement and job performance (Shimazu et al., 2012). Experiencing relaxation in the evening was found to be associated with other performance-related behavior at work on the subsequent day (Hur et al. 2020; Rodríguez-Muñoz et al., 2021). As relaxation is characterized by reduced arousal coupled with positive emotions, it is significant for recovery because (1) a reduction in arousal levels can halt the progression of strain caused by job stressors, which can lead to health issues, and (2) positive emotional states have the potential to counteract the effects of negative emotions (Sonnentag & Fritz, 2007).

Mastery experiences during leisure time stem from engaging in off-duty activities that are intellectually or physically challenging, fostering learning, and offering a sense of accomplishment, linked with feelings of competence and skillfulness. Despite requiring effort, participation in activities conducive to mastery experiences is believed to aid in recovery from previous stressors and acquiring new resources that promote enhanced health and well-being (Sonnentag & Fritz, 2007). Mastery experiences, as they challenge the individual without overtaxing his/her capabilities, are related to outcomes such as increased occupational well-being (Fritz & Sonnentag, 2006; Siltaloppi et al., 2009), vigor (de Bloom et al., 2015), job performance, work engagement, and decreased psychological distress and physical complaints (Shimazu et al., 2012).

The experience of control during leisure refers to the autonomy degree in selecting, timing, and executing leisure activities, acting as a resource that enhances recovery from work due to its ability to (1) fulfill the need for autonomy and (2) afford individuals the chance to select leisure activities aligned with their preferences, which may aid in the recovery process (Sonnentag & Fritz, 2007). Control was also found to be negatively associated with health complaints, emotional exhaustion, depressive symptoms, need for recovery, and sleep problems, and positively associated with life satisfaction and vigor (Bennett et al., 2018; Sonnentag & Fritz, 2007). Next-day proactive behavior at work was predicted by evening mastery and control experiences during free time (Ouyang et al., 2019).

To sum up, we identified in the literature potential antecedents (i.e., job resources, job demands) and consequences (i.e., job engagement, job performance, physical and psychological health) of recovery, highlighting the importance of studying this phenomenon due to the effects on both the organization and employee outcomes.

Recovery Experiences Questionnaire

To capture the core functional aspects of recovery experiences – detachment, relaxation, mastery, and control – the REQ was developed and validated initially in Germany (Sonnentag & Fritz, 2007). Since then, the instrument has been used to assess recovery experiences in various empirical studies employing a cross-sectional method (Demsy et al., 2019), using a diary design (Hao et al., 2023), or longitudinal ones (Sianoja et al., 2016). Some

researchers used an overall score (McGrath et al., 2017), whereas others preferred to use only a subset of all four recovery experiences (i.e., relaxation and psychological detachment subscales of REQ) (van Wijhe et al., 2013). Leaving aside the way this instrument was used from its development until now, as far as we know, no other measures assessing how individuals experience their non-work time exist.

Since its development, the psychometric proprieties of REQ have been evaluated across different populations and contexts, proving it to be a valid and reliable instrument. The REQ has been translated into several languages and validated in various countries such as Spain (Sanz-Vergel et al., 2010), Japan (Shimazu et al., 2012), South Africa (Mostert & Els, 2015), South Korea (Park et al., 2011), Finland (Kinnunen et al., 2011), Holland (Bakker et al., 2015), Sweden (Almén et al., 2018), Nepal (Panthee et al., 2020), and more recently in Lithuania (Kazlauskas et al., 2023). The proposed four-factor structure of REQ was found in all aforementioned studies in various countries, supporting the claim that all four recovery experiences can be conceptually and empirically differentiated (Sonnentag & Fritz, 2007). However, a recent meta-analytic approach of the construct validity of the instrument added to previous results, showing that a second-order two-factor model best explains the REQ, with psychological detachment and relaxation encompassing one factor, and a combination of mastery and control indicating the second factor (Hao et al., 2023).

The reliability of REQ was found to be favorable for both the overall instrument and for each of its four components (Almén et al., 2018; Panthee et al., 2020). Moreover, extensive support was found for REQ construct validity, with good convergent and discriminant validity (Almén et al., 2018; Merino-Tejedor et al., 2017; Mostert & Els, 2015; Panthee et al., 2020; Sanz-Vergel et al., 2010; Shimazu et al., 2012). However, less evidence from these studies exists concerning REQ invariance across genders or occupations. Only one study examined the fit of the four-factor structure of REQ for both genders simultaneously, finding support for it for both males and females (Almén et al., 2018). Regarding the sample used in the studies adapting REQ, some had a diverse sample of employees from various occupations (Almén et al., 2018; Bakker et al., 2015; Kinnunen et al., 2011; Shimazu et al., 2012), whereas others had more homogeneous participants (Mostert & Els, 2015; Panthee et al., 2020; Park et al., 2011; Sanz-Vergel et al., 2010). Importantly, none of these studies tested the instrument's invariance across two different populations in terms of occupation.

The current research

The main objective of the present study was thus to empirically evaluate the multi-dimensional model of the Romanian version of REQ. We investigated the psychometric properties of the instrument in two studies. Specifically, we examined its factorial, nomological, and criterion validity and reliability on two samples of employees from different occupations: one sample consisting of diverse workers and one consisting of a specific population of professionals from academia

In the first study, after adapting the items through the backward translation approach (International Test Commission, 2018) we conducted the instrument's structure analysis among a diverse Romanian sample of employees — referred to as the general population. To assess REQ's construct validity, we tested several first-order models as

well as a second-order model, as suggested by previous research (Hao et al., 2023). Nomological validity was performed by testing the associations between REQ and several demands and resources (i.e., autonomy, work pressure, and role conflict) identified in the literature as antecedents of recovery (Chawla et al., 2020). Work-related characteristics are considered antecedents of recovery experiences (Sonnentag & Fritz, 2007). Therefore, the job demands-resources theory offers a comprehensive explanatory framework, where job demands can hinder recovery, whereas job resources may facilitate it (JD-R; Bakker & Demerouti, 2014; 2017). Past research shows that several job demands were associated with impaired recovery from work (Bono et al., 2013; Syrek et al., 2017; Volmer et al., 2012). More specifically, workload and time pressure were found to inhibit recovery by negatively influencing the detachment of employees in the evening (Sonnentag & Fritz, 2015). Moreover, having high job resources might also mean having more internal resources. Such an association might allow employees to spend their free time gaining mastery experiences or control over free time after work or simply to not linger on the negatives occurring during the workday and just kick back, detach, and enjoy after-hours relaxation (Sonnentag & Fritz, 2007).

To test the criterion validity of REQ, we investigated concurrent patterns with two recovery outcomes: work engagement and job performance (i.e., in-role and extra-role performance). Past studies suggest that recovery acts as a critical mechanism by which employees can improve their psychological and physiological well-being and performance at work (Steed et al., 2021). Empirical evidence revealed that relaxation during leisure is associated with increased positive mood and vigor, decreased negative mood and exhaustion (Fritz et al., 2013), and increased work engagement and job performance (Shimazu et al., 2012). In the second study, we cross-validated the instrument's structure among a more specific population — academia employees. Besides the structural validity of REQ, we also tested the instrument's criterion validity by analyzing concurrent relationships with mental health complaints, physical health complaints, and work engagement. Psychologically detaching from work stressors was previously associated with increased positive mood (Fritz et al., 2013), better sleep quality, increased vigor (Clinton et al., 2017), reduced levels of exhaustion and fatigue (Bennett et al., 2018; Demerouti et al., 2012), and next-day job performance (Liu et al., 2021).

The instrument's internal consistency was also examined to evaluate its reliability (Clark & Watson, 2019). We used both Cronbach's alpha and McDonald's omega composite reliability. Average Variance Extracted (AVE) (Fornell & Larcker, 1981) was also calculated to examine convergent validity, considering the suggested threshold of ≥ 0.50 .

We tested for measurement invariance across genders in both studies, as this variable is discussed in the literature concerning important outcomes of recovery, such as stress and burnout (Purvanova & Muros, 2010). There is some indication that men and women react and cope differently in stressful or difficult situations (Meléndez et al., 2012). A leisure gap was identified between men and women, the latter spending time after work an additional 8.5 hours per week on childcare and other household chores, leaving less time for self-care or effort recovery activities (Jolly et al., 2014). Given the evidence suggesting that men and women react to and cope to stress differently, it is plausible that there could be differences between them in recovery

strategies they apply and how they experience their free time. Therefore, to compare the two categories from a recovery perspective, we must first find out if REQ is invariant across genders (i.e., that men and women relate equally to the instrument's items).

We also tested the REQ's invariance across occupations. Specifically, we compared the samples from the two studies to assess if there are differences in the way a heterogeneous sample and a homogeneous sample of higher education employees interact with the REQ. We chose the more homogenous sample to be comprised of academia employees as evidence amounts of unique occupational stressors for this specific group (McCarthy et al. 2016). Several studies show that academics find their work demanding and have high levels of work-related stress, experiencing unique professional challenges such as repeated rejection and impostor syndrome (Heiden et al., 2021; Jaremka et al., 2020). Considering the specific demands this professional group is handling, we believe it is fruitful to test if there is a difference between the two samples in their responses to this instrument.

Study 1 Method

Participants

The data was collected via online questionnaires, participants being invited to this study using two different social media platforms (i.e., LinkedIn and Facebook). The respondents were instructed about the present research, and informed consent was secured from all participants (confidentiality, anonymity, and the respondents' rights were emphasized). Data collection took place during September to December 2021.

Our study sample consisted of 264 employees from different types of occupations (e.g., 74.6% private-sector employees, 12.9% public sector employees, freelance or business owners 4.5%), and various sectors, such as IT (42.8 %), research and development (8%), education (6.8%), health services (6.8%), culture and leisure (5.7%), or financial (4.9%). Work-related activities performed by these participants are primarily online (54.2%). The full list of characteristics of the sample can be found in Supplementary Material (Table SM1).

Measures

Recovery experiences were assessed with the Romanian version of the REQ (Sonnentag & Fritz, 2007). Each of the four subscales consists of four items: psychological detachment (e.g., "I forget about work."), relaxation (e.g., "I use the time to relax"), mastery (e.g., "I do things that challenge me.") and control (e.g., "I take care of things the way that I want them done"). The responses were gathered on a five-point Likert scale ranging from 1 (do not agree at all) to 5 (fully agree). The English version of the REQ was translated into Romanian by the first author of the current study. Next, the back-translation into English was performed by an English translator without access to the original items. Finally, we compared the English and back-translated versions. A total of five items needed further refinement and adaptation to the Romanian language (i.e., "I get a break from the demands of work.", "I kick back and relax.", "I use the time to relax.", "I take time for leisure.", and "I determine for myself how I will spend my time."). The item "I kick back and relax." was the most problematic one, as there is no correspondent for this expression in the Romanian language. Thus, we decided to use and translate

only the “I relax” part of the English item for this specific item. The Romanian translation of REQ can be found in Supplementary Material (Table SM8).

Two antecedent demands and one resource were assessed for investigating the nomological validity, namely the work pressure, role conflict, and autonomy subscales from The Job Demands-Resources Questionnaire (Bakker & Demerouti, 2014). The instrument was successfully used in previous studies on Romanian samples (Roşca et al., 2021; Tisu et al., 2022). The two demands consist of four items each, during the resource of three items. All items were scored on a five-point Likert scale ranging from 1 (never) to 5 (very often). A sample item from the work pressure subscale is “Do you have too much work to do?”, for role conflict, a sample item is “At my work, different groups of people expect opposite things from me.”, whereas for autonomy, is “Do you have control over how your work is carried out?”. Very good levels of reliability were observed for autonomy and work pressure subscales, whereas, for role conflict, the reliability level is excellent (Table 2).

Criterion validity was investigated in relation to two presumed recovery outcomes, i.e., work engagement and job performance. Work engagement was assessed with the 3-items, the ultra-short form of the Utrecht Work Engagement Scale (UWES; Schaufeli et al., 2017). The scale was previously adapted and used in past studies on Romanian population (Schaufeli, 2018). Each item of the instrument corresponds to the underlying dimensions of work engagement, namely vigor (“At my work, I feel bursting with energy.”), dedication (“I am enthusiastic about my job.”), and absorption (“I am immersed in my work.”). Responses were gathered on a 7-point Likert scale ranging from 0 (never) to 6 (all the time). This scale demonstrates good levels of reliability (Table 2).

Job performance was assessed using two subscales from The Job Demands-Resources Questionnaire (Bakker & Demerouti, 2014), namely three items measuring in-role performance (e.g., “You meet all the requirements of your position.”) and other three for extra-role performance (e.g., “You help your colleagues with their work when they return from a period of absence.”). Responses were offered on a 7-point Likert scale ranging from 0 (not at all characteristic) to 6 (totally characteristic). Other past studies successfully used these subscales on Romanian samples (Oprea et al., 2021). Both in-role and extra-role performance subscales from The Job Demands-Resources Questionnaire (Bakker & Demerouti, 2014) showed excellent reliability (Table 2).

Data analyses

In the present study, we tested for structural, nomological, and criterion validity of REQ. The statistical analyses were carried out with R, version 4.1.0 (R Core Team, 2021), using the lavaan package (Rosseel, 2012) for investigating the factorial structure and invariance.

In testing for structural validity, a confirmatory factor analysis (CFA) was conducted for the four-factor model, which assumes that each item loads on their respective hypothesized factors (i.e., psychological detachment, relaxation, mastery, and control). Following the example of Sonnentag and Fritz (2007) as well as other past instrument validation studies (Kinnunen et al., 2011; Mostert & Els, 2015), we tested four alternative first-order models (i.e., one-factor, two-factor, and three-factor models). All the items were defined as the same factor in the one-factor model. In one of the two-factor models, psychological detachment and relaxation items were loaded on the first factor, whereas mastery and control items were loaded on

the second factor. In the other two-factor model, relaxation and control items were loaded on the first factor, and psychological detachment and mastery items were loaded on the second factor. In the three-factor model, relaxation and control items were loaded on the first factor, psychological detachment items were loaded on the second, and mastery items were loaded on the third factor. In light of the work of Hao et al. (2023), we also added a two-factor second-order model to the analysis, comprised of psychological detachment and relaxation for one factor, and control and mastery for the other factor.

Several absolute and relative fit indices were used to evaluate the fit of the model: χ^2 goodness-of-fit statistic, the comparative fit index (CFI), the Tucker and Lewis index (TLI), the root mean square error of approximation (RMSEA), and root mean squared residual (SRMR). An acceptable fit of the model is indicated by non-significant χ^2 values, CFI and TLI $\geq .95$, RMSEA $\leq .06$, and SRMR $\leq .08$ (Hu & Bentler, 1999; Weston & Gore, 2006). Since χ^2 statistic is affected by sample size, the main focus was on the other fit indices (Alavi et al., 2020). An alternative metric was also used to test whether there is any significant misfit between the estimated and observed correlation matrix. Precisely, the ratio of the chi-square statistic to the respective degrees of freedom (χ^2/df) was calculated, where a ratio of ≤ 2 indicates a superior fit between the hypothesized model and the sample data (Alavi et al., 2020).

To test if there is a difference between men and women in interpreting the instrument, we conducted multiple-group confirmatory factor analysis (MGCFA) where configural, metric, scalar and strict models were estimated and compared sequentially by testing the decrease in model fit (Wang et al., 2018). Whereas in the first model, all parameters were allowed to differ across the groups (configural invariance), in the second model, factor loadings were constrained to be equal. However, residuals and intercepts were allowed to differ by group (metric invariance). In the third model, factor loadings and intercepts were held constrained, but residuals were allowed to differ across groups (scalar invariance) (Meredith & Teresi, 2006). If scalar invariance is supported, the final step for establishing measurement invariance is to test for strict factorial invariance by constraining the item residuals to be equivalent in the two groups. We considered RMSEA $< .08$ and CFI $> .90$ as good indicators of configural invariance (Marsh et al., 2005). In assessing metric and scalar invariance, we used the chi-square difference test ($\Delta\chi^2$), with a critical value of .01, $\Delta CFI \leq .010$, and $\Delta RMSEA \leq .015$ (Chen, 2007). Because the $\Delta\chi^2$ test is sensitive to sample size, we favored the ΔCFI test in combination with $\Delta RMSEA$ (Cheung & Rensvold, 2002).

Reliability was obtained through Cronbach’s α as well as McDonald’s ω values (Hayes & Coutts, 2020), while Pearson’s correlation coefficient was used to analyze nomological and criterion validity (convergence and concurrent patterns between recovery experiences and documented antecedents and outcomes of recovery). We follow the recommendations of Rönkkö and Cho (2022) and assess discriminant validity, which is considered achieved when the Average Variance Extracted (AVE) exceeds the value of the squared correlations of the latent constructs.

Results

Structural validity and internal consistency

To ensure that the Romanian version of REQ has a four-factor structure, with the hypothesized factors of

psychological detachment, relaxation, mastery, and control, we computed a series of CFA's. The hypothesized four-factor model provided the best approximation with the given data as also the only acceptable one compared with the other four CFA models (one-factor, two-factor, and three-factor models). Although the χ^2 value of the four-factor model is significant ($p < .001$), all other fit indices are reasonably good (CFI = .96, TLI = .95, SRMR = .05, RMSEA [90%CI] = .071 [.059, .083]). The alternative metric, χ^2 / df ratio ($228 / 98 = 2.32$) reflects a good fit of the data as well. Regarding the second-order model, results show similar results to the first-order four-factor model, indicating a good fit to the data as well (CFI = .95, TLI = .94, SRMR = .06, RMSEA

[90%CI] = .071 [.060, .084]). Table 1 presents the fit indices for all tested models.

The REQ also demonstrated very good internal consistency. Cronbach's alpha values were $\alpha = .89$ for psychological detachment, $\alpha = .92$ for relaxation, $\alpha = .89$ for mastery, and $\alpha = .89$ for control. The McDonald's values were: $\omega = .89$ for detachment, $\omega = .93$ for relaxation, $\omega = .89$ for mastery, and $\omega = .89$ for control. Regarding the AVE for REQ, all values were acceptable, above the recommended threshold (for psychological detachment AVE = .67, for relaxation AVE = .75, for mastery AVE = .67, and for control AVE = .68). Importantly, the indicators suggest overall good discriminant validity across all four factors, with each factor's AVE being higher than the squared correlations.

Table 1: Goodness of fit statistics for the tested CFA models on Romanian population

Study 1							
Model	CFI	TLI	SRMR	RMSEA [90%CI]	χ^2	df	p
First-order models							
One-factor model ^{a)}	0.533	0.461	0.151	0.228 [0.218-0.238]	1534	104	< .001
Two-factor model ^{b)}	0.677	0.624	0.118	0.191 [0.180-0.201]	1090	103	< .001
Two-factor model ^{c)}	0.616	0.552	0.184	0.208 [0.198-0.218]	1279	103	< .001
Three-factor model ^{d)}	0.820	0.786	0.092	0.144 [0.133-0.154]	653	101	< .001
Four-factor model ^{a)}	0.958	0.948	0.052	0.071 [0.059-0.083]	228	98	< .001
Second-order model							
Two-factor model ^{f)}	0.955	0.945	0.059	0.071 [0.060-0.084]	232	99	< .001
Study 2							
Model	CFI	TLI	SRMR	RMSEA [90%CI]	χ^2	df	p
First-order models							
One-factor model ^{a)}	0.517	0.443	0.145	0.277 [0.265-0.289]	1508	104	< .001
Two-factor model ^{b)}	0.722	0.676	0.135	0.211 [0.199-0.224]	911	103	< .001
Two-factor model ^{c)}	0.629	0.568	0.227	0.244 [0.232-0.257]	1182	103	< .001
Three-factor model ^{d)}	0.798	0.760	0.138	0.182 [0.169-0.195]	689	101	< .001
Four-factor model ^{a)}	0.968	0.961	0.061	0.073 [0.058-0.089]	190	98	< .001
Second-order model							
Two-factor model ^{f)}	0.967	0.960	0.068	0.074 [0.059-0.089]	194	99	< .001

Notes: N = 264 for Study 1, and N = 176 for Study 2.

CFI = Comparative Fit Index, TLI = Tucker-Lewis Index, SRMR = Standardized Root Means Square Residual, RMSEA = Root Mean Square Error of Approximation. a) All items measuring the four constructs load on one general recovery experiences factor. b) Psychological detachment and relaxation items loading on the first factor and mastery and control items loading on the second factor. c) Relaxation and control items loading on the first factor and psychological detachment and mastery items loading on the second factor. d) Relaxation and control items loading on the first factor, psychological detachment items loading on the second factor, and mastery items loading on the third factor. e) Each item loads on the hypothesized factor. f) Psychological detachment and relaxation loading on one factor, whereas control and mastery loading on another factor.

Nomological and criterion validity

Table 2 shows the associations between the hypothesized antecedents, consequences, and all four recovery experiences.

Results show that work pressure was significantly negatively associated with psychological detachment ($r = -.31, p < .001$), relaxation ($r = -.39, p < .001$) and control ($r = -.22, p < .001$), with the exception of mastery experience ($r = -.10, p = .105$). Work conflict was significantly negatively associated with relaxation ($r = -.26, p < .001$) and control ($r = -.20, p > .001$), but not with psychological detachment ($r = -.08, p = .185$) and mastery experiences ($r = -.07, p = .224$). Autonomy was significantly positively associated with

relaxation ($r = .27, p < .001$), mastery ($r = .21, p = .001$), and control experiences ($r = .31, p = .001$), except for psychological detachment ($r = .12, p = .054$).

Both job performance (i.e., in-role and extra-role performance) and work engagement were significantly and positively related to relaxation ($r = .21, p = .001$; $r = .18, p = .004$; $r = .32, p < .001$), mastery ($r = .13, p = .038$; $r = .14, p = .025$; $r = .27, p < .001$), and control experiences ($r = .32, p < .001$; $r = .19, p = .002$; $r = .36, p < .001$), except for psychological detachment ($r = .08, p = .168$; $r = .11, p = .062$; $r = .01, p = .890$).

ROMANIAN RECOVERY EXPERIENCE QUESTIONNAIRE

Table 2: Means, standard deviations, internal consistencies, and correlations between recovery experiences and hypothesized precursors, consequences, and demographic variables

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11
<i>Recovery experiences (REQ)</i>													
1. Psychological detachment	12.2	4.46	.89/.89										
2. Relaxation	15.4	4.16	.551**	.92/.93									
3. Mastery	13.9	4.29	.179**	.393**	.89/.89								
4. Control	15.6	4.08	.367**	.543**	.458**	.89/.89							
<i>Potential precursors</i>													
5. Autonomy	10.2	3.05	.119	.272**	.208**	.306**	.86						
6. Work pressure	10.5	3.95	-.312**	-.394**	-.100	-.220**	-.216**	.89					
7. Role conflict	8.99	3.96	-.082	-.263**	-.075	-.206**	-.317**	.376**	.91				
<i>Potential consequences</i>													
8. In-role performance	13.6	4.04	.115	.214**	.128*	.323**	.265**	-.144*	-.094	.96			
9. Extra-role performance	12.7	4.57	.009	.176**	.138*	.193**	.182**	.032	-.114	.550**	.91		
10. Work engagement	11.8	4.11	.085	.325**	.272**	.365**	.460**	-.303**	-.296**	.500**	.377**	.89	
<i>Demographics</i>													
11. Gender	1.50	0.53	.053	.033	.060	.118	.035	-.037	-.045	-.081	-.057	-.098	—
12. Age	34.1	7.92	.003	-.078	.024	-.017	.114	-.103	-.020	-.008	-.007	.233**	-.024

Notes. N = 264. Reliability estimates are displayed on the main diagonal. For the REQ factors, both Cronbach's α and McDonald's ω are reported (α/ω). * $p < .05$, ** $p < .01$

Measurement Invariance

Next, the measurement invariance of the REQ was tested both on the four-factor model and the second-order two-factors one. In what follows, we will report the results for the four-factor model while the complete ones are in Table SM2. Only four participants identified themselves as non-binary, too few for any statistically meaningful comparisons. Therefore, we proceeded with the invariance analysis only between male and female participants (n : male = 123, female = 137). REQ demonstrates configural invariance across gender ($\chi^2(196) = 354.05$, $p = .00$; RMSEA [90%CI] = .079, [.065–.092]; CFI = .94; TLI = .93). The model fit indices also indicate a good fit for the metric model ($\chi^2(208) = 368.25$, $p < .001$; RMSEA [90%CI] = .077, [.064–.090]; CFI = .96; TLI = .93). The results show that the chi-square difference test was not statistically significant ($\Delta\chi^2 = 14.20$, $\Delta df = 12$, $p = 0.28$), $\Delta CFI = -0.001$ and $\Delta RMSEA = -0.002$, suggesting that after constraining the factor loadings to be equal across groups, the model fit did not change substantially. Since metric invariance has been established, we proceeded with the scalar invariance analysis. The model fit indices also suggest a good fit for the scalar model ($\chi^2(220) = 378.52$, $p < .001$; RMSEA [90%CI] = .074, [.062–.087]; CFI = .94; TLI = .94). Both the chi-square difference ($\Delta\chi^2 = 10.26$, $df = 12$, $p = .590$) as well as ΔCFI (.001) and $\Delta RMSEA$ tests (-.003) supported the scalar invariance of the instrument. Strict invariance is also supported ($\chi^2(236) = 403.71$, $p < .001$; RMSEA [90%CI] = .074, [.061–.086]; CFI = .94; TLI = .94; $\Delta\chi^2(16) = 25.19$, $p < .05$; $\Delta CFI = -0.003$; $\Delta RMSEA = -0.001$). Details related to the results of measurement invariance across genders, for both the first-order four-factor model and the second-order two-factor model can be found in Supplementary Material (Table SM2).

Discussion

The CFA results indicated a good fit for the four-factor model comprised of detachment, relaxation, mastery, and control, indicating that it is better to treat these recovery experiences as four distinct constructs (Sonnentag & Fritz, 2007). Past cultural validations and adaptation of the instrument in different other contexts showed similar patterns of results (Kinnunen et al., 2011). Moreover, the results of the analyses also supported the two-factor second-order model whereby psychological detachment and relaxation loaded one factor, and mastery and control loaded another (Hao et al., 2023). Hence, it could be argued that using the mean score of the two dimensions could represent a viable alternative to score the instrument. Also, researchers could use four-factor first-order model and the two-factor second-order model to conduct various studies on employee recovery. Through MGCFA, we tested for measurement invariance across gender (male vs. female). The measurement invariance analyses conducted in this first study indicated configural, metric, and scalar invariance for REQ.

In assessing the nomological validity of the instrument, results showed expected patterns, with most of the job demands negatively associated with recovery, and the job resource mostly positively associated with recovery experiences. Specifically, work pressure was negatively associated with psychological detachment, relaxation, and control, but not with mastery experiences. Similarly, past studies showed that a high workload and time pressure at work are negatively associated with detachment, relaxation, and control during free time, but not with mastery

experiences (Bennett et al., 2018; Steed et al., 2021). A possible explanation for the non-significant relationship between work pressure and mastery could be that engaging in challenging experiences outside work entails investing extra resources which could not be available for the individual after a highly challenging day at work (Moreno-Jiménez et al., 2012). With respect to day-specific job demands, workload appears as a crucial strain hindering employee recovery, as on days with higher demands, lesser recovery opportunities were taken (Rodríguez-Muñoz et al., 2012).

However, role conflict was negatively associated with relaxation and control, but not with psychological detachment and mastery experiences. Similar results were found in past studies where a non-significant association between conflicting roles at work and detachment or mastery experiences after work (Moreno-Jiménez et al., 2012). Challenging experiences require investing effort. Therefore, it could be possible that experiencing conflicting roles at work involving self-regulation can impede employees from engaging in more mentally demanding activities such as gaining new knowledge or skills after the workday (Sonnentag & Jelden, 2009). It is also possible that workdays with higher role conflict increase employees' preoccupation with work and thus making them less likely to disengage from work-related issues (Chawla et al., 2020). Overall, the present study suggests that facing job stressors during the workday makes it more challenging to enjoy the free time after work.

Job autonomy, as a specific resource, was positively related to relaxation, mastery, and control experiences, but not with psychological detachment. This means that when individuals have greater autonomy in their work, they tend to relax better after hours, have challenging experiences to gain new resources, and feel that they have control over their free time and activities pursued during leisure time (Rodríguez-Muñoz et al., 2012). However, our results suggest that a better organization of work tasks due to higher autonomy does not necessarily make it easier for employees to take distance from work during their free time and not ruminate about work-related issues. A possible explanation for this lack of association was forwarded in past studies with similar patterns of results, arguing that the added responsibilities and necessity to make decisions intrinsic to autonomy and control over one's work can make it more difficult to detach from work even during the off-job time (Bennett et al., 2018; Shimazu et al., 2012; Sonnentag & Fritz, 2007).

Concurrent patterns found in the present study imply that recovery experiences have positive associations with employee outcomes relevant to the organization, such as job engagement and performance. These results align with past studies indicating that when individuals feel recovered, they are also more engaged at work (Headrick et al., 2022). Both job performance (i.e., in-role and extra-role performance) and work engagement are significantly and positively related to relaxation, mastery, and control experiences. However, contrary to our expectations, the psychological detachment was found to be unrelated to any of these outcomes. Whereas some previous studies found positive associations between psychological detachment and such work-related outcomes (i.e., work engagement, job performance) (Sonntag & Fritz, 2007), other studies found no association or even negative ones (Shimazu et al., 2012; Sonnentag et al., 2010). For example, it was found that switching off mentally during leisure time did not improve work engagement but rather decreased it (Shimazu et al.,

2012). It could be that switching on again the next day after switching off during leisure time may be pretty difficult, hindering performance-related behaviors (Fritz et al., 2010).

Moreover, psychologically disengaging from work might not be equally important. For example, it was found that psychological detachment from work was essential only on days when distress at work had been high (Park et al., 2018). Similarly, psychological detachment from work during the free time did not predict any change in work engagement over 12 months (Sonnentag et al., 2010). However, for employees with high job demands, a low psychological detachment was associated with decreased work engagement.

Study 2 Method

Participants

In the second study, a different sample was used to cross-validate the instrument's structure. We relied on the voluntary collaboration of colleagues from the higher education sector, contacting potential participants directly via e-mail addresses and e-mail address groups as well as through the professional social media platform LinkedIn. Participants checked an informed consent sheet before filling in the online questionnaire. Data was collected throughout one year, specifically from November 2020 until November 2021.

A total of 176 Romanian employees from higher education institutions participated in this study. Women are slightly overrepresented (57.4%), with a mean age of 42.4 years ($SD = 0.75$), an average job tenure of 18.5 years ($SD = 0.73$), and working on average 47.9 hours per week ($SD = 0.98$). The participants in the present study are also primarily working from home at the time of completion (55.7%). Details related to participants' characteristics can be found in the Supplementary Material (Table SM3).

Measures

The variables measured in the second study were (1) recovery experiences and (2) mental health complaints, physical health complaints, and work engagement (potential outcomes of recovery, to serve as criteria for further assessing the validity of the instrument). We will describe those instruments used only in Study 2 (which were not presented in the previous measures section).

Mental health complaints were assessed using a 5-item instrument (Berwick et al., 1991) reflecting anxiety (i.e., "been a very nervous person"), depression (i.e., "felt downhearted and blue"), behavioral and/or emotional control (i.e., "felt so down in the dumps that nothing could cheer you up"), as well as general positive affect (i.e., "been a happy person," "felt calm and peaceful"; reverse scored). All items were scored on a six-point Likert scale ranging from 1 (none of the time) to 6 (all the time). This scale demonstrated a very good level of reliability (Table 3). Physical health complaints were assessed using the 18-item Physical Symptoms Inventory (PSI; Spector & Jex, 1998). Three possible responses can be offered (i.e., no; yes, but I didn't see a doctor; yes, and I saw a doctor) to the questions "During the past 30 days did you have any of the following symptoms? If you did have the symptom, did you see a doctor about it?", related to several symptoms, such as headaches, fever, eye strain, loss of appetite or trouble sleeping. The instruments showed a good level of reliability (Table 3).

Both instruments were successfully used in previous studies on Romanian samples (Virgă & Rusu, 2018). The same software and statistical analyses as in Study 1 were used also in Study 2.

Results

Structural validity and internal consistency

The fit indices of the five tested models resulted from the comparison of the hypothesized four-factor model with the alternative first-order one-factor, two-factor, and three-factor models, as well as the two-factor second-order model are in Table 1. The hypothesized four-factor model provided the best fit with the data compared with the other first-order models, $\chi^2(df) = 190(98)$, $p < .001$, CFI = .97, TLI = .96, SRMR = .06, RMSEA [90%CI] = .073 [.058,.089], $\chi^2/df = 1.93$. Regarding the second-order two-factor model, the results show comparable indices with the first-order four-factor model, as a good fit of the data (CFI = .97, TLI = .96, SRMR = .07, RMSEA [90%CI] = .074 [.059,.089]). We thus replicated the findings from our first study in a more specific and homogeneous sample of employees.

The REQ also demonstrated very good reliability, with identical Cronbach's α and McDonald's ω values, i.e., ranging between .91 (mastery) and .94 (relaxation and control) (see Table 3). AVE values are also above suggested threshold (i.e., for psychological detachment AVE = .75, for relaxation AVE = .80, for mastery AVE = .71, and for control AVE = .81).

Moreover, in this second study also, the results suggest good discriminant validity between psychological detachment, relaxation, mastery, and control factors, with squared correlations smaller than the respective AVE values.

Criterion validity

The concurrent patterns between recovery experiences and proposed outcomes (i.e., mental, and physical health complaints, work engagement) are illustrated in Table 3. Psychological and physical distress are significantly negatively correlated with all four recovery experiences (detachment $r = -.31$, $p < .001$; relaxation $r = -.44$, $p < .001$; mastery $r = -.38$, $p < .000$; control $r = -.37$, $p < .001$, respectively detachment $r = -.28$, $p < .001$; relaxation $r = -.38$, $p < .001$; mastery $r = -.25$, $p < .001$; control $r = -.29$, $p < .001$), whereas work engagement is significantly positively associated with all recovery experiences (relaxation $r = .34$, $p < .001$; mastery $r = .32$, $p < .001$; control $r = .31$, $p < .001$) except psychological detachment ($r = .15$, $p = .051$). Thus, the results suggest that when employees are recovering from work during their free time, they also feel better mentally and physically.

Measurement Invariance

The results of the measurement invariance on the four-factor model show that the instrument is invariant across genders, considering configural invariance ($\chi^2(196) = 288.06$, $p < .001$; RMSEA [90%CI] = .07, [.054-.091]; CFI = .96; TLI = .96), metric invariance ($\chi^2(208) = 299.97$, $p < .001$; $\Delta\chi^2 = 11.91$, $\Delta df = 12$, $p = 0.45$; RMSEA [90%CI] = .07, [.052-.088]; CFI = .96; TLI = .96; $\Delta CFI = .000$; $\Delta RMSEA = -.002$) and scalar invariance ($\chi^2(220) = 309.92$, $p < .001$; $\Delta\chi^2 = 9.94$, $\Delta df = 12$, $p = 0.62$; RMSEA [90%CI] = .068, [.050-.085]; CFI = .97; TLI = .96; $\Delta CFI = .001$; $\Delta RMSEA = -.003$) (see Supplementary Material Table SM4, for the results on the second-order two-factor model). However, residual noninvariance is found, as the overall

model fit is significantly worse in the residual invariance model compared to the scalar invariance model ($\chi^2(236) = 391.34$, $p < .001$; RMSEA [90%CI] = .08, [.071–.102]; CFI

= .94; TLI = .94; $\Delta\chi^2(16) = 81.42$, $p < .001$; ; $\Delta CFI = -0.022$; $\Delta RMSEA = 0.018$).

Table 3: Means, standard deviations, internal consistencies, and correlations between recovery experiences and hypothesized consequences

Variable	M	SD	1	2	3	4	5	6	7	8
<i>Recovery experiences</i>										
1. Psychological detachment	10.1	3.96	.92/.92							
2. Relaxation	14.2	3.61	.632**	.94/.94						
3. Mastery	14.6	3.30	.229*	.443**	.91/.91					
4. Control	14.5	3.84	.495**	.636**	.509**	.94/.94				
<i>Consequences</i>										
5. Mental health complaints	13.1	4.34	-.310**	-.445**	-.380**	-.373**	.84			
6. Physical health complaints	22.7	3.61	-.280**	-.383*	-.250**	-.295**	.488**	.78		
7. Work engagement	13.1	3.20	.147	.339**	.323**	.314**	-.453**	-.268**	.85	
<i>Demographics</i>										
8. Gender	1.43	.038	.073	.048	.114	.143	-.184*	-.127	.026	—
9. Age	42.4	.755	.007	-.048	.094	-.035	-.117	-.206**	.094	.133

Notes. Reliability estimates are displayed on the main diagonal. For the REQ factors, both Cronbach's α and McDonald's ω are reported (α/ω). $N = 176$; * $p < .05$, ** $p < .01$

Discussion

This second study aimed to reanalyze the instruments' structure using a homogenous population – academia employees. The confirmatory factor analyses on this sample showed again that the four recovery experiences scales represent distinct factors. Also, the second-order two-factor model was supported by the data from this sample. Measurement invariance was subsequently tested. Thus, we found that in this more specific sample of employees, REQ also measures the same construct in the same way across both genders.

Criterion validity was also established by analyzing concurrent patterns between recovery and proposed relevant outcomes, namely mental and physical health complaints and work engagement. Correlational analyses showed that recovery experiences were related to most of the indicators of psychological and physical well-being, in line with previous research (Wendsche & Lohmann-Haislah, 2017). The only exception found was the non-significant but positive association between psychological detachment and work engagement, which was also found in Study 1. This result is somewhat surprising, as it was previously argued that employees who are generally highly engaged in their work could detach better at the end of the workday, even if there were high workloads (Clauss et al., 2021). It was also suggested that a balance between engagement at work and psychological disengagement from work-related effort during free time is highly relevant for protecting employees' well-being, pointing to the crucial relationship between engagement, detachment, and individual health (Sonnentag et al., 2008).

Additional analyses

We also wanted to test if there are differences between the two samples (i.e., academia population and the diverse population of employees) in the way these groups perceive the measure. In doing so, we tested again the invariance models (i.e., configural, metric, scalar, and strict), this time looking for differences between the two employee

populations. The result of these analyses on the combined dataset is in line with the previous findings. The REQ is invariant across employee populations, considering configural ($\chi^2(196) = 417.80$, $p < .001$; RMSEA [90%CI] = .07, [.063–.082]; CFI = .96; TLI = .95), metric ($\chi^2(208) = 432.50$, $p < .001$; $\Delta\chi^2 = 14.70$, $\Delta df = 12$, $p = 0.25$; RMSEA [90%CI] = .07, [.061–.080]; CFI = .96; TLI = .95; $\Delta CFI = .000$; $\Delta RMSEA = -.002$), scalar ($\chi^2(220) = 462.33$, $p < .001$; $\Delta\chi^2 = 29.83$, $\Delta df = 12$, $p < .001$; RMSEA [90%CI] = .07, [.062–.080]; CFI = .95; TLI = .95; $\Delta CFI = -.003$; $\Delta RMSEA = .001$), and strict invariance ($\chi^2(236) = 914.69$, $p < .001$; $\Delta\chi^2 = 51.32$, $\Delta df = 16$, $p < .001$; RMSEA [90%CI] = .11, [.107–.123]; CFI = .88; TLI = .88; $\Delta CFI = -.075$; $\Delta RMSEA = .044$). Details related to these analyses and their results can be found in Table 4. The results pertaining to the invariance of the instrument for the second-order two-factor model can be found in Supplementary Material (Table SM5).

Since the instrument is invariant across occupational groups, we also repeated the measurement invariance analysis across genders in this combined sample. The results were consistent, showing that the instrument is invariant across genders on the whole dataset, considering configural ($\chi^2(196) = 450.73$, $p < .001$; RMSEA [90%CI] = .07, [.068–.087]; CFI = .95; TLI = .94), metric ($\chi^2(208) = 463.76$, $p < .001$; $\Delta\chi^2 = 13.02$, $\Delta df = 12$, $p = 0.36$; RMSEA [90%CI] = .07, [.066–.084]; CFI = .95; TLI = .94; $\Delta CFI = .000$; $\Delta RMSEA = -.002$), scalar invariance ($\chi^2(220) = 474.70$, $p < .001$; $\Delta\chi^2 = 10.93$, $\Delta df = 12$, $p = 0.53$; RMSEA [90%CI] = .07, [.064–.082]; CFI = .95; TLI = .95; $\Delta CFI = .000$; $\Delta RMSEA = -.002$), and strict invariance ($\chi^2(236) = 526.02$, $p < .001$; $\Delta\chi^2 = 51.32$, $\Delta df = 16$, $p < .001$; RMSEA [90%CI] = .07, [.067–.084]; CFI = .94; TLI = .94; $\Delta CFI = -.006$; $\Delta RMSEA = -.003$). Details related to the results of the analyses of the instrument's invariance across genders in this sample for the second-order two-factor model can be found in Supplementary Material (Table SM6).

General discussion and conclusions

The present research aimed to validate the Romanian version of REQ in two different samples of Romanian

employees, one consisting of a diverse, heterogeneous population (as is frequently used in the studies where convenience sampling is being employed) and the other one, more homogeneous, representing employees in higher education institutions. Through a series of CFAs, the Romanian version of REQ was tested in the first study for structural, nomological, and criterion validity. In the second

study, we addressed the cross-validation of the measurement model. We examined the associations of the REQ with relevant well-being criteria (i.e., impaired well-being, work engagement). Across both studies and on the combined datasets, we conducted a series of gender invariance analyses. Moreover, we tested the invariance between the two studied populations.

Table 4: Measurement invariance results on the combined samples of participants

Model	χ^2 (df)	RMSEA [90%CI]	CFI	TLI	Model Comp	$\Delta\chi^2$ (Δ df)	Δ RMSEA	Δ CFI
<i>Invariance across employee populations (various occupations vs. academia)</i>								
Configural Invariance	417.80(196)***	0.072 [0.063, 0.082]	.96	.954	—	—	—	—
Metric Invariance	432.50(208)***	0.070 [0.061, 0.080]	.96	.956	M1	14.70(12)	-0.002	0.000
Scalar Invariance	462.33(220)***	0.071 [0.062, 0.080]	.95	.955	M2	29.83(12)***	0.001	-0.003
Strict Invariance	914.69(236)***	0.115 [0.107, 0.123]	.88	.882	M3	51.32***(16)	0.044	-0.075
<i>Gender invariance in the combined sample (various occupations & academia)</i>								
Configural Invariance	450.73(196)***	0.077 [0.068, 0.087]	.95	.945	—	—	—	—
Metric Invariance	463.76(208)***	0.075 [0.066, 0.084]	.95	.948	M1	13.02(12)	-0.002	0.000
Scalar Invariance	474.70(220)***	0.073 [0.064, 0.082]	.95	.951	M2	10.93(12)	-0.002	0.000
Strict Invariance	526.02(236)***	0.075 [0.067, 0.084]	.94	.948	M3	51.32***(16)	0.002	-0.006

Notes. df = degrees of freedom; RMSEA = root-mean-square error of approximation; CFI = comparative fit index; TLI = Tucker–Lewis index; Model comp = model comparison; $\Delta\chi^2 = \chi^2$ difference test; Δ df = difference in degree of freedom; Δ RMSEA = root-mean-square error of approximation difference; Δ CFI = comparative fit index difference. * $p < .05$; ** $p < .01$, *** $p < .001$

Concerning the factor structure of REQ, CFAs supported the hypothesized four-factor model as well as the second-order two-factor model. These results suggest that it is better to treat recovery experiences as four distinct constructs, in line with past studies (Bakker et al., 2015; Hao et al., 2023; Shimazu et al., 2012). Specifically, our results align with previous research showing that the first-order four-factor structure fits the data better than the other alternative models, suggesting that it is best to consider the recovery experiences as four constructs. However, our findings indicate that the two-factor second-order model also provides a good fit to the data, a result which was explained previously through theoretical lenses (Hao et al., 2023). Specifically, it was argued that whereas psychological detachment and relaxation can be explained using the E-R model, mastery and control experiences can be explained by COR theory, as they can both help in building up new internal resources to achieve effective recovery. Thus, scoring on the two dimensions represents a viable alternative method for measuring individual recovery experiences. However, given that certain components exhibit no significant association with selected and measured variables identified as antecedents (e.g., mastery and role conflict) or consequences of recovery (e.g., psychological detachment and work engagement), we advocate for the adoption of the four-factor structure, as it allows for a more accurate assessment. The internal consistency was very good and excellent, with α and ω

estimates marginal to or above .90 for each of the four subscales.

We investigated the relationships between recovery experiences with potential antecedents and consequences regarding nomological and criterion validity. Some noteworthy results need to be underlined. Work characteristics showed different results with recovery

experiences constructs. For example, as a resource available during the workday, job autonomy was positively related to relaxation, mastery, and control experiences apart from psychological detachment, suggesting a complex relationship with recovery experiences. On one hand, past studies found a similar pattern of results, where more control over work time is not necessarily associated with a better detachment after work (Fritz et al., 2010; Kinnunen et al., 2011; Shimazu et al., 2012; Sonnentag & Fritz, 2007). On the other hand, there are some studies finding an association between job resources and detachment from work. For example, social support was considered a job resource which was positively related to psychological detachment from work (Kinnunen et al., 2011; Sonnentag & Fritz, 2007). The lack of association between job autonomy and psychological detachment could be interpreted through the lenses of the “autonomy paradox,” suggesting that when employees are given more flexibility and freedom over their work, instead of working less, they work more and longer (Sonnentag, 2018). It is also possible that the increased responsibility of employees to make decisions related to their work tasks could come with costs, including taking longer for the employee to detach from the work situation (Shevchuk et al., 2019). Moreover, previous studies show that employees engaged in more psychologically demanding environments tend to ruminate more after work instead of detaching themselves (Querstret & Cropley, 2012). Thus, employees may have less time and energy to stop thinking about work-related aspects, and they do not detach themselves from work, both physically and mentally (Shimazu et al., 2012).

Job demands were mainly negatively related to recovery experiences during after-hours. Work pressure was negatively associated with all recovery experiences except mastery, whereas role conflict was negatively related to only relaxation and control experiences. The results are in line

with the previous research (Sonnentag & Fritz, 2007; 2015) and suggest that in the presence of work demands (especially when working under time pressure and prolonged activation), it seems more difficult to mentally switch off from the work situation, to feel relaxed after finishing up the work tasks, and to feel in control of personal free time available after work hours. It was suggested that when employees' resources are drained, the process of psychological detaching from work would be less likely to occur (Cangiano et al., 2021). In relation to detachment, the workload can increase employees' negative activation, rumination, and worry related to one's work, thus staying preoccupied with work-related issues during their leisure time, which prevents them from detaching from work (Clauss et al., 2021). However, role conflict was negatively associated only with relaxation and control. These results imply that pondering over different and incompatible work-related roles affects employees' engagement in recovery opportunities, such as watching a favorite TV channel to relax or deciding about what to do during leisure time and how to do it. Even if the prolonged activation can hinder relaxation during the off-job time making it more difficult for employees to fully recover, our results suggest that it does not limit their capability to engage in challenging activities to master new knowledge or skills. Indeed, our results indicate that conflicting roles at work impair the ability of individuals to choose how and when to spend their free time. In sum, job demands such as work pressure and role conflict affect employee recovery by impeding them from relaxing after work and feeling that they have complete control over their free time, whereas engagement in mastery experiences is unaffected.

Regarding potential consequences, our results showed that recovery experiences were generally positively related to job engagement and performance and negatively associated with psychological and physical health complaints. These results suggest that recovery experiences might lead to better well-being, being in line with the main assumptions of the E-RM model (Meijman & Mulder, 1998) and the JD-R theory (Bakker & Demerouti, 2014; 2017). Specifically, when individuals do not recover after work effort, they are in a state of psychophysiological activation, and this system may become over-reactive, causing malfunctions of the immune system, poor health symptoms, such as allergic diseases, prolonged fatigue, chronic tension, and sleep difficulties (Sluiter et al., 2001). Positive associations were found for mastery experiences with work engagement, overall job performance, and extra-role performance, suggesting that challenging situations during the off-work time, resulting in feelings of success, achievement, or self-efficacy, may affect the feelings towards work-related activities (Sonnetag et al., 2017). When considering the experience of detaching from work, it seems that being away from the work situation is mainly associated with health-related outcomes – when higher psychological detachment is achieved during the off-job time, there are fewer health complaints. Thus, the experience of gaining mental distance from one's work appears to have a protective effect on employees' health, as it helps to replenish taxed resources and recover from work-related strain (Headrick et al., 2022). Effective interventions can be designed to improve detachment from work with positive outcomes for employees (Karabinski et al., 2021). Overall, the pattern of associations between the REQ dimensions and both recovery precursors and consequences offer support for the validity of the instrument (nomological and criterion).

Furthermore, Study 1 and Study 2 provided evidence for invariance across genders, as no difference was found between men and women in how they responded to the items. These results are in line with past evaluations of the psychometric proprieties of REQ (Almén et al., 2018). Moreover, REQ showed no variance in responses between the two samples of employees – employees from various occupations and individuals employed in higher education institutions similarly perceived the items.

The present research is not without limitations. Firstly, all the data were collected online, and consequently, the samples' representativeness may be challenged. On one hand, even though earlier research on other instruments suggests that Internet surveys generate comparable data to paper-and-pencil surveys (Weigold et al., 2013), future studies could examine the psychometric properties of the two formats of the REQ (paper and pencil and online) using other samples. On the other hand, the realities of working from home during the COVID-19 pandemic are quite different from those in which employees are embedded in face-to-face interactions. Thus, the results of the present study should be considered having in mind that all the data were collected when employees were working mostly online. However, the COVID-19 pandemic continues to reshape the world of work, with hybrid and full remote work environments becoming more and more common as a "new normal". Another possible limitation is that the results were obtained through self-report questionnaires, increasing the possibility of contamination of the reported relationships through common-method variance, alongside self-report bias (Podsakoff et al., 2003). This could mean that the actual associations between variables might be weaker than those observed in the present study. Although other validation studies of REQ arrived at similar well-being outcomes (Panthee et al., 2020; Shimazu et al., 2012), our results should be replicated in future research using objective measures.

All in all, the present research results provide evidence for the good psychometric proprieties of REQ in the Romanian context, demonstrating that it is a suitable instrument to measure the recovery experiences of employees. Therefore, we can safely assert that the Romanian version of REQ can be used in future studies as a reliable and valid instrument, invariant across genders and occupations.

Complete mailing addresses and ORCID of all authors:

Patricia Albulescu: patricia.albulescu@e-uvr.ro; 0000-0003-4949-7292

Irina Macsinga: irina.macsinga@e-uvr.ro; 0000-0002-9878-8136

Bogdan T. Tulbure: bogdan.tulbure@e-uvr.ro; 0000-0001-8101-1753

Andrei Rusu: andrei.rusu@e-uvr.ro; 0000-0003-0036-4149

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Supplementary Materials description:

Table SM1: Means (SDs) or frequencies (and percentages) for demographic variables for Study 1;
Table SM2: Findings about testing measurement invariance across gender in Romanian general population;
Table SM3: Means (SDs) or frequencies (and percentages) of demographic variables for Study 2;
Table SM4: Findings about testing measurement invariance across gender in a sample of academia employees;
Table SM5: Findings about testing measurement invariance across both samples (i.e., academia population vs the diverse population of employees) for the second-order two-factor model;
Table SM6: Findings about testing measurement invariance across genders in this combined sample (i.e., academia population and the diverse population of employees) for the second-order two-factor model; Table SM7: Standardized factor loadings;
Table SM8: Items of the Recovery Experiences Questionnaire in English and Romanian.

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