

The mediating and moderating role of affective rumination between work interruptions and well-being

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Received 12 May 2018

Accepted 7 December 2018

Abstract.

BACKGROUND: The purpose of this study was to examine whether physical health and well-being are affected by work rumination and the role of work interruptions as job events. It was hypothesized that stressful work interruptions, would be related to affective rumination, psychosomatic symptoms and poorer general health.

OBJECTIVE: To determine the role of work rumination in the relationship between work interruptions, physical and general well-being.

METHODS: Self-reports of distressing work interruptions, psychosomatic symptoms and general health data were gathered from employees ($N = 139$) from diverse occupational groups.

RESULTS: Affective rumination acted as a partial mediator ($\beta = 0.37$) and moderator ($\beta = 0.24$) in the relationship between stressful work interruptions and psychosomatic symptoms. As a mediator affective rumination explains 34.8% of the effect of work interruptions on psychosomatic symptoms.

CONCLUSION: Affective rumination about work hinders psycho-physiological recovery, and such an effect relates to stressful work interruptions. Implications for future research are discussed.

Keywords: Affective rumination, interruptions, well-being

1. Introduction

In the context of occupational health psychology models such as the Demand-Control-Support (DC-S) model [1, 2] and the Effort Recovery model (E-R) [3] have been developed to identify the complex relationship between the psychosocial work environment and the health reactions of employees [4]. The DC-S model draws on the notion that Job Strain, translated into high demands, and low control at work account for stress. Working conditions characterized by high

strain have been related to elevated psychological strain and mental disorders [5]. Longitudinal studies have also shown that job strain interferes with the process of psychophysiological stress recovery [6, 7], and recovery from stress has been defined as “the post-stress rest period that provides information about the degree to which the reactivity in the physiological and psychological parameters measured persists after the stressor has ended” [8 p.117].

The Effort Recovery (E-R) model [3], claims that effort spent on meeting work demands causes load reactions and resource depletion. The concept of work recovery refers to the process of “*replenishing the depleted resources by reversing the negative*

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effects of job demands and by bringing the individual to the pre-stressor level of functioning” [3, 9]. The time and completeness of the recovery process may be as important to the health outcomes of stress exposure as reactivity (8, 60, 61). Insufficient recovery has been associated with psychosomatic complaints, poor physical health and burnout [7, 10]. Previous research has shown that the recovery process is hampered by individuals’ thoughts and disengagement from work demands [11–13, 29]. Work rumination is defined as involuntary thoughts about work-related issues when the strenuous exposure has ended [35]. In the present study we focus on work rumination [22] since it can become a risk factor for poor health and recovery. Workers who ruminated about work issues post work reported burnout symptoms [10]. Individuals who ruminated also generated less efficient ways to solve problems, experienced negative mood, dysphoria [14], and generated negative thinking and depressed mood [15]. A study on work ruminators showed that high ruminators demonstrated intrusive work-related thoughts and their conversations focused on work issues, whereas low ruminators detached themselves cognitively from work [16]. Some evidence suggest the indirect effect of work stressors (including high workload) on burnout and depression via affective rumination [59]. Empirical research has shown that psychological detachment (a form of work-rumination), relaxation and control during leisure are considered efficient recovery strategies in the field of work recovery [10].

On the basis of the DC(-S) model, time demands result in strain [1]. Daily hassles at work have been associated with poor psychological well-being and negative emotions, and uncompleted work tasks elicit anxiety and depression [23–25]. Individuals who are disrupted from work activity put greater effort to return to the main task, however, this causes more fatigue and impaired well-being [24, 25]. The construct of interruptions is defined as “externally generated, temporary cessations in the current flow of behaviour, typically meant for the subject to execute activities that belong to a secondary set of actions” [26 pp.236]. Research has provided some support for the inference of work interruptions on psychological and psychosomatic well-being. Luong and Rogelberg [23] found that frequent work meetings and daily hassles at work caused a disruptive effect on well-being and increased fatigue among administrative employees.

Our study makes several contributions to the literature. First, it extends the current understanding of the

effects of work-related rumination on the relationship between work interruptions, general health and well-being. Second, it sheds light on the important role of work rumination in the work stress recovery process from work interruptions, and its association with psychological and psychosomatic health outcomes. More specifically, we conceptualise work interruptions and work rumination as two forms of work demands that may cause poor health. However, one limitation of the available research to date is that there has been limited effort to establish a comprehensive model to explain the process of psycho-physiological work stress recovery from work rumination and work interruptions among employees working in different occupational groups.

1.1. Work interruptions, work rumination, well-being and general health

This study extends earlier findings on the effect of work interruptions on well-being [23, 24], and on the relationship between work interruptions, psychosomatic symptoms and reports of distress. Previous studies found that strongly held beliefs in delaying gratifications and weak belief in ethics played a protective role between work interruptions and psychosomatic symptoms among employees [27]. Also, employees who endorsed positively work interruptions and held a strong belief in hard work reported improved general health and well-being [27]. Managers also accepted interruptions as “part of the job” [32] and reported recreational activities as an important theme in recovery from work interruptions post work. Thus a positive attitude towards work interruptions might even be beneficial for health and psychological distress from work demands.

Affective rumination, a form of work rumination, refers to intrusive and recurrent negative thoughts in affective terms [17], and has been associated with the activation of the sympathetic nervous system [18]. In the work domain, research has shown that affective rumination is related to chronic and acute work related fatigue [19], and that affective rumination interferes with work recovery over time [20]. Previous research on the relationship between rumination and well-being showed that there is a direct effect of affective rumination on poor health outcomes [28], and that negative affect mediated the relationship between rumination and poor physical health. Negative affect and poor self-reported physical health were associated with increase in work rumination among the young, whereas among the elderly it is related

to a decrease in work rumination. Researchers also found that work rumination affects sleep [29–31]. Therefore, we argue the following:

Hypothesis 1: Affective rumination and distressing work interruptions will be associated with psychosomatic symptoms, as well as impaired general health and well-being.

In addition, previous work has found work rumination and recovery experiences during leisure to play a mediating role with emotional exhaustion [21]. For example, nurses who ruminated about work outside of working hours were more likely to experience emotional exhaustion compared to non-ruminators. There is also some empirical evidence to suggest that work rumination both moderates and mediates the relationship between job strain and well-being [33]. Research evidenced that affective rumination was a good predictor of psychological distress [34] and anxiety [14]. Brosschot, Gerin, and Thayer [35] also found that perseverative cognition mediated the negative effects of stressors on cardiovascular activity. Evidence suggests the importance of affective rumination as mediator between stressors at work and ill health i.e. burnout and depression [36]. Thus we tested the mediating role of work rumination in the relationship between work interruptions and psychosomatic symptoms. This leads to our hypothesis:

Hypothesis 2: Affective rumination will mediate the impact of distressing work interruptions on psychosomatic symptoms.

Perseverative cognitions account for the negative impact of time pressure on poor sleep [37] as well as for the mediating role in the relationship between job strain and sleep [38]. Therefore, we believe that employees who face interruptions at work and mentally distance themselves from work during off-job hours can cope physically and emotionally better compared to employees who remain emotionally overwhelmed by work problems. There is some empirical evidence that work rumination mediated and moderated the relationship between job strain and well-being [33], whereas other studies have failed to find a mediation effect of work rumination [29] or failed to show a moderation effect of affective rumination on the association between work stressors and emotional exhaustion, depression and risk of morbidity among health care professionals [59]. In this study, we aim to investigate the potential mediating or moderating role of work-related rumination between work interruptions and health outcomes. Thus we argue that:

Hypothesis 3: Affective rumination will mediate the relationship between distressing work interruptions and general well-being.

Hypothesis 4: Affective rumination will moderate the relationship between distressing work interruptions and psychosomatic symptoms.

Hypothesis 5: Affective rumination will moderate the relationship between distressing work interruptions and general well-being.

2. Method

2.1. Ethics statement

The study was carried out in accordance with the ethical guidelines of the University of Surrey and the British Psychological Society. Based on Faculty of Arts and Human Sciences Ethics criteria of the University of Surrey, this study did not need to go through the formal ethics procedures (see <http://www.surrey.ac.uk/faahs/files/Ethics>). The data was generated from primary resources (questionnaires) that did not include offensive wording and the research participants were not considered vulnerable. Issues of confidentiality and anonymity (of the data) were guaranteed. Participants were requested to give written consent to participate and could withdraw from the study if they wished.

2.2. Participants

The sample used in this study was selected from a larger data set from the author's thesis [62]. Participants were recruited from the private business sector. All participants were given an information sheet and completed a self-administered Work and Well-Being Questionnaire. Complete data was obtained from a wide range of workers including managers 15%, business analysts 7%, drivers 17%, estate agents 10%, retailers 8%, consultants 6%, electricians 17%, electric engineers 10% and teachers 10%. In total 139 participants completed the questionnaire. Only participants who reported that they were exposed to stressful interruptions at their work and left tasks uncompleted due to the urgency of interruptions were asked to complete the questionnaire. The participants' age ranged from 21 to 78 years with a mean age of 40.29 ($SD = 13.46$), who worked a mean of 45.92 ($SD = 14.16$) hours (Table 1). The sample consisted of 69 females (49.64%) and 70 males (50.35%).

Table 1
Means, standards deviations and correlations between study variables ($n = 139$)

Variables	1	2	3	4	5	6	7
(1) Stressful Interruptions	–						
(2) Affective Rumination	0.28**	–					
(3) Problem-Solving Rumination	0.21*	0.29**	–				
(4) Detachment	-0.31**	-0.44**	-0.16	–			
(5) GHQ	0.16	0.26**	0.00	-0.14	–		
(6) PILL	0.40**	0.45**	0.04	-0.24**	0.23*	–	
(7) Age	-0.20*	-0.13	-0.19*	-0.04	0.12	0.11	–
Mean	2.41	2.33	2.69	3.20	1.07	1.53	40.29
SD	0.95	0.86	1.12	0.72	0.97	0.46	13.26

Note. GHQ = General Health Questionnaire; PILL = Physical Illness Symptoms. * $p < 0.05$, ** $p < 0.01$. This is a two-tailed test.

2.3. Measures

2.3.1. Interruption question

A single item of interruption was taken from the Effort-Reward Imbalance model [39]. The response format of the item “*I have many interruptions and disturbances in my job*” utilized a five-point scale. A single item was used to measure the global construct of work interruptions which comprised appraisals of positive and negative interruptions at work [40].

2.3.2. General Health Questionnaire (GHQ)

General health/well-being as well as was assessed using the 12 item General Health Questionnaire [41, 42]. The validity of GHQ-12 has been assessed in at least 15 different countries [43]. This scale consists of 12 items and it has been used in previous large scale studies to assess psychological distress [43, 44]. The traditional GHQ scoring method (0, 0, 1, 1) was used to classify probable cases of psychological distress (scoring 3 or more points out of the 12 in total) [43, 45] against the Likert scoring which was (0.1.2.3). The scale has consistently been shown to have high internal reliability with a coefficient a between 0.82 and 0.86 [46, 47]. Participants were asked to indicate “*How they have been feeling over the past few weeks*”. Items are rated on a 4-point scale (1 = better than usual, 4 = Much less than usual). The present study found a coefficient α of .85 for the scale.

2.3.3. The Pennebaker Inventory of Limbic Languidness (PILL)

A short version of PILL was used to assess 21 items of psycho-somatic symptoms (e.g., your mouth became dry, your muscles felt tight, you felt a lump in your throat or a choked-up feeling). This scale has been widely used in a number of settings [48–51]. Participants were asked to rate each symptom on a

5-point scale (1 = Never, 5 = Very often) by indicating “How often have you experienced any of the following symptoms during the past month?”. This scale had high internal reliability with (Cronbach’s alpha) coefficient α of 0.89.

2.3.4. Work-Related Thoughts Questionnaire (WRTQ)

The items of the work-related thought questionnaire were taken from previous research [22]. The questionnaire assessed post work ruminative thinking. For example, questions were of the type “Do you find yourself thinking about work-related issues when you are not at work?”, “Do you feel unable to switch off from work?”, “Do you think about tasks that need to be done at work the next day?”. The response format utilized a five-point scale. Some items were removed; one item from problem solving rumination (e.g. “find solutions to work related problems in free time”), two items from the detachment factor (e.g. “unable to switch off from work”, “able to stop thinking about work related issues in my free time”). This was due to low item-total correlations. The internal consistency of the factors was good. The present study found a (Cronbach’s alpha) coefficient α for affective rumination = 0.80; problem solving rumination = 0.79; and detachment = 0.81.

2.4. Data analysis

Mediated and moderated regression analysis, according to Baron and Kenny [52], was utilised to test the direct and indirect effect of affective rumination on work interruptions. The Sobel [53] test was used to test for mediation. The multiple regression (R) and the correlations analysis tests are conducted at the 0.01 level.

Table 2
Significant regression analyses for mediating direct and indirect effects of work interruptions on psychosomatic symptoms via affective rumination

DV:Variable	B	β	Partial R ²
<i>Step1</i>			
<i>Regression of Interruptions on affective rumination (R² = 0.08)</i>			
Interruptions	0.25*	0.28	0.28
<i>Step2</i>			
<i>Regression of Interruptions on PILL (R² = 0.16)</i>			
Interruptions	0.19**	0.40	0.40
<i>Step3</i>			
<i>Regression of Interruptions and Affective Rumination on PILL (R² = 0.29)</i>			
Interruptions	0.14**	0.29	0.32
Affective Rumination	0.20**	0.37	0.39
Indirect			0.10

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

3. Results

The vast majority (83%) of participants reported that they were exposed to stressful interruptions during their working time, although 29% participants reported no feelings of distress due to interruptions, whereas 16 per cent reported they had not been exposed to interruptions at work.

Correlations, means, standard deviations for all study variables used in the study are presented in Table 1. As further shown in Table 1, psychosomatic symptoms were positively correlated with affective rumination ($r = 0.45$), and affective rumination was positively correlated with stressful work interruptions ($r = 0.28$). Stressful work interruptions related positively to psychosomatic symptoms. ($r = 0.40$) (*Hypothesis 1*). Table 1 also shows psychosomatic symptoms, general health and well-being were significantly correlated with each other ($r = 0.23$).

Furthermore, Table 1 shows that General Health and Well-Being had only a positive correlation with affective rumination ($r = 0.26$). Higher scores in the GHQ represent poorer health. Stressful work interruptions were uncorrelated with general health and well-being. As for demographic variables, age was negatively correlated with interruptions at work and problem-solving rumination but not related to psychosomatic symptoms and general health and well-being, hence was not included as a control variable in further regression analyses.

3.1. Mediating effects of work interruption on psychosomatic symptoms via affective rumination

For psychosomatic symptoms, the mediation effect is indirect (0.10) through affective rumination, *Sobel*

$Z = 2.65$, $p < 0.01$ (Table 2) (*Hypothesis 2*). With affective rumination in the equation, the unstandardized regression coefficient for work interruption on psychosomatic symptoms is reduced from 0.25 to 0.20. Consequently, there is support for the assumption that affective rumination partially mediates the relationship between stressful interruptions and psychosomatic symptoms. The results of the regression analysis in Table 2 show the proportion of the total effect of interruptions (0.32) on psychosomatic symptoms, consisting of the direct effect (0.37) and the indirect effect through affective rumination (0.10). Therefore, affective rumination as a partial mediator accounts for 34.48 % of the total effect of stressful interruptions on psychosomatic symptoms.

3.2. No mediating effect of affective rumination on general health and well-being

A simultaneous regression analysis with distressing work interruptions, affective rumination, problem-solving rumination and detachment as predictors for GHQ revealed that only affective rumination ($\beta = 0.25$) accounted for unique variance in GHQ scores $F(4, 117) = 2.74$, $p < 0.01$ (*Hypothesis 3*). All variables, distressing work interruptions ($\beta = 0.11$), problem-solving rumination ($\beta = -0.10$), detachment ($\beta = -0.05$) contributed negligibly ($p > 0.05$) and were thus omitted in the mediating and moderating effects in the relation between distressing work interruptions and GHQ. The regression analysis on GHQ included the main effect of affective rumination on GHQ. Distressing work interruptions significantly accounted for variations in affective rumination ($B1 = 0.25$, $F(1, 120) = 9.98$, $p < 0.01$). The relationship between distressing work interruptions and general health

Table 3
Results of regression analysis of distressing work interruptions and affective rumination on psychosomatic symptoms and general health

Dependent Variable	Psychosomatic Symptoms		General Health	
	B	β	B	β
Step 1				
Distressing Work Interruptions	0.19*	0.40	0.17	0.16
Affective Rumination	0.20*	0.37	0.26**	0.23
Step 2				
Distressing InterruptionsX Affective Rumination	0.11*	0.24	-0.03	-0.03

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

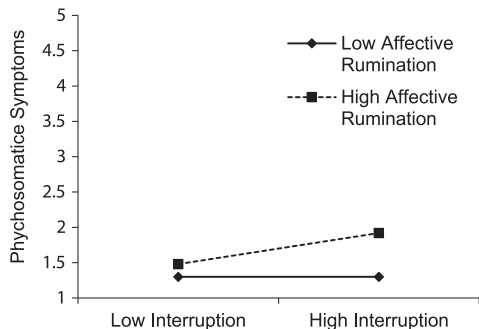


Fig. 1. The moderating role of affective rumination in the relationship between distressing work interruptions and psychosomatic symptoms.

was non-significant ($B2 = 0.17$, $F(1, 120) = 3.37$, $p > 0.05$). Due to the fact that the analysis failed in the above step, no further analysis was conducted. Hence, there was no mediation effect of affective rumination on GHQ. Hypothesis 3 was not supported by the data.

3.3. Moderating effect of affective rumination on psychosomatic symptoms and on well-being

In step 2 of Table 3 there was a significant interaction effect between distressing work interruptions and affective rumination on PILL ($\beta = 0.24$, $t = 3.07$, $p < 0.01$) which made a significant contribution to the prediction of psychosomatic symptoms (*Hypothesis 4*). Graphical representation of the interaction is shown in Fig. 1. Figure 1 shows employees who experienced high affective work rumination were more likely to report more psychosomatic symptoms and highly distressing work interruptions, compared to employees who reported low levels of affective rumination. Thus, Hypothesis 4 was supported, indicating a significant moderating effect and affective rumination as a predictor on psychosomatic symptoms. Hypothesis 5 was not supported as there was no significant moderator effect on general health and well-being ($\beta = -0.03$, $t = -0.30$, $p > 0.05$).

4. Discussion

Our findings provided mixed support for the five hypotheses underlying this study; affective rumination may serve as a link in the relationship between stressful work interruptions and psychosomatic symptoms. Age was negatively associated with stressful interruptions, affective rumination and problem-solving rumination. It seems that there is age adaptation effect over time to stress. An experienced employee can better utilise coping strategies for stress when work demands are high. A previous study has found that age adaptation to stress improves over time [54].

In line with previous studies, our results support Hypothesis 1 illustrating that those employees who experienced stressful work interruptions reported more psychosomatic symptoms and increased affective rumination. The results also support Hypothesis 1 suggesting that affective rumination is associated with impaired general well-being and stressful work interruptions. Workers with high levels of affective rumination about work are more likely to experience impaired general health and well-being because of post-work rumination about interruptions, whereas workers who do not ruminate about work issues post work experience the opposite pattern.

The current study also supports the mediation effect of affective rumination in the relationship between appraisal of stressful interruptions at work and psychosomatic symptoms as suggested in Hypothesis 2. These results suggest that affective rumination hampers the recovery process leading to impaired psychosomatic symptoms. Our findings corroborate previous research suggesting that indirect effects of work stressors were associated with greater depression and burnout via affective rumination [36]. The mediating role of affective rumination on psychosomatic symptoms in the present study is also in line with previous research indicating the detrimental role of affective rumination about work issues on depres-

sion [19, 22]. The fourth hypothesis, concerning the mediating role of affective rumination between work interruptions and general health, was not supported.

The findings of the present study also support Hypothesis 4. High levels of affective rumination were associated with increased reporting of psychosomatic symptoms under stressful work interruptions. Finally, our results showed that affective rumination did not moderate the relationship between stressful work interruptions and general health. Hypothesis 5, concerning the moderator role of affective rumination on general health and well-being, was not supported.

Altogether, our findings suggest that employees who experience affective rumination about work related issues are more likely to report psychosomatic symptoms. Previous studies have also demonstrated the mediating role of work rumination in the relationship between obsessive passion for work and increased emotional exhaustion [21].

4.1. Implications

The current study highlights the critical role of affective rumination in job demanding environments where work interruptions are evaluated as stressful events. In the context of the DC-S model, the present study extends to the role of affective rumination between work interruptions as stressful events and psychosomatic symptoms. Employees, who emotionally experience tension upon thinking about work issues, hamper the process of recovery, and such an effect actually depends on stressful work interruptions. The findings of the present study are consistent collaborated with Syrek and Antoni's [12] findings that showed that perseverative cognitions about work problems increased sleep disturbance among employees who left their work tasks uncompleted. Other studies also evidenced that work rumination was associated with sleep disturbance and job strain and work rumination served as a mediator in this respect [19, 29, 38].

Moving from the form of affective rumination to the theory of "sense of control" [55] over work ruminative thinking, this study contributes towards the implementation of recovery strategies at work when job demands are high and effort is required. Inducing breaks at work, as a form of controlled interruptions, would increase 'a sense of control' [55, 60] and encouraging workers to take walks during their breaks could increase mood and replenish the depleted resources [55, 56]. This adaptive strategy

to work stress could reduce the mechanism of allostatic load [57]. Breaks could buffer the negative impacts of affective work rumination on recovery. Giving employees a short break would help distract them from worrying about work.

4.2. Limitations and future directions

In the current study, the impact of working hours, age and occupational groups was not explored. Further to this, the cross-sectional nature of the sample included employees working in different organizations and this limits the generalizability of the findings. Future research should consider age and occupational groups of employees. Owing to the relatively small size, results are based on regression analysis tests. Future research should extend the sample size to broader occupational settings.

Self-reported measures of psychosomatic symptoms, general health and self reports of distressing work interruptions may have introduced bias and common method variance. Future research might use experience- and time-sampling methods. Interviews at different times can be used to minimize variance [58]. Small handheld computers could be utilised to indicate the type and duration of distressing work interrupted activities employees are engaged in. Further research is needed to investigate the relationship between physical illness in the work setting and work interruptions among healthcare professional groups. Further research can differentiate several facets of interruptions at work to identify attitudes to work interruptions [40], and the characteristics of such work interruptions among professionals with high workload and demands should be considered. As noted by Luong and Rogelberg [23], meetings had adverse effects on well-being among administrative employees working in a university setting.

5. Conclusion

The results of the present study examined the inter-relationship between distressing work interruptions, affective work rumination, psychosomatic symptoms and general health. Affective rumination acted as mediator in the relationship between distressing work interruptions and increasing reports of psychosomatic symptoms. A significant interaction effect between stressful interruptions and high affective rumination emerged for increased psychosomatic symptoms. As such, affective rumination hampers

psychosomatic health but the extent of this influence depends on distressing work interruptions especially when employees face a high workload and intense job demands.

Acknowledgments

We are grateful to Dr Mark Cropley and Dr Fraser Milton for their proofreading support.

Conflict of interest

The authors declare that they have no competing interests.

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