

Boredom at work: towards a dynamic spillover model of need satisfaction, work motivation, and work-related boredom

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ABSTRACT

Boredom occurs regularly at work and can have negative consequences. This study aimed to increase insight in the antecedents and processes underlying the development of work-related boredom by (a) examining whether work-related need satisfaction and the quality-of-work motivation mediate the associations between the work characteristics defined in the Job Characteristics Model and work-related boredom, (b) investigating if this motivational process operates both on an “enduring,” between-person level and a daily within-person level, and (c) examining if and how daily experiences of work-related boredom spill over to the next day. Data among employees were collected in a cross-sectional study ($N = 115$) and a 5-day daily diary study ($N = 90$). Study 1 results showed that need satisfaction and quality-of-work motivation mediated the association between work characteristics and work-related boredom. This motivational process was also found on a day-to-day basis in Study 2. This study further revealed that work-related boredom spills over to the next day through its associations with increased negative work attitudes and decreased intrinsic motivation. These findings provide insight in the process by which momentary experiences of boredom at work may develop into a more enduring experience of work-related boredom.

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In contemporary workplaces, it is not uncommon that employees experience feelings of boredom. Research indicates that between 15% and 87% of employees feel bored at work at least some times (cf. Fisher, 1993; Mann, 2007; Rothlin & Werder, 2008; Van der Heijden, Schepers, & Nijssen, 2012; Watt & Hargis, 2010). Although academic interest in boredom at work dates back to the beginning of the twentieth century (see e.g., Munsterberg, 1913), research on this topic is scarce (Fisher, 1993, *in press*). However, the studies that did examine boredom at work have shown it to be associated with various negative consequences for both the employee (e.g., distress, depressive complaints, work injuries, job dissatisfaction) and the employer (e.g., low effort and performance, absenteeism, counterproductive work behaviour; Bruursema, Kessler, & Spector, 2011; Frone, 1998; Kass, Vodanovich, Stanny, & Taylor, 2001; Reijseger et al., 2013; Spector et al., 2006; Van Hooff & Van Hooft, 2014). These negative consequences highlight the importance of thoroughly understanding how boredom develops among employees, as this may provide information on how to reduce feelings of boredom at work.

Work-related boredom can be defined as a profound negative (i.e., unpleasant, dissatisfying) and deactivating (i.e., low arousal) activity-related emotion, implying that employees experience attentional difficulties and a negative value regarding their work activities (Fisher, 1993, 1998; Mikulas & Vodanovich, 1993; Pekrun, Goetz, Daniels, Stupnisky, & Perry, 2010). It comprises more than just the absence of interest, positive emotions, or intrinsic value and can instead be viewed

as a unique discrete unipolar emotional state, triggered by specific stimulus conditions (Fisher, *in press*; Pekrun et al., 2010). Boredom is different from low intrinsic motivation because it indicates that an activity has negative rather than low intrinsic value (Pekrun et al., 2010). Depending on the duration of the boredom-evoking activity, feelings of boredom may vary in duration from minutes to days or even weeks. The emotion of boredom is distinct from other negative affective states, as it is characterized by feeling unchallenged and perceptions of meaninglessness (Van Tilburg & Igou, 2012). Furthermore, in terms of the Job-Demands Resources model (e.g., Schaufeli & Bakker, 2004), work-related boredom has been shown to be distinct from other employee well-being constructs such as job burnout and work engagement (Reijseger et al., 2013). Whereas burnout develops as a consequence of high job demands and low resources, and work engagement results from high levels of job resources, work-related boredom has been theorized to be caused by a combination of low demands and low resources (Reijseger et al., 2013).

Also, it is important to distinguish (work-related) boredom as an emotional state from its trait-like counterpart boredom proneness (i.e., individual differences in the likelihood to experience boredom in general across situations), as these two are only slightly to moderately correlated (e.g., Kass et al., 2001; Van Hooff & Van Hooft, 2014). In other words, although boredom-prone individuals are (slightly) more likely to experience boredom in a given situation, actual

experienced boredom also depends on situational factors linked to the specific activity that individuals perform.

Extant theory has linked the occurrence of work-related boredom to characteristics of employees' activities during the workday. For example, Fisher (1993) argued, based on Hackman and Oldham's (1975) Job Characteristics Model (JCM), that tasks low on skill variety, task identity, task significance, autonomy, and feedback are more likely to induce boredom. Similarly, in his theory on flow, Csikszentmihalyi (1999) proposed that boredom occurs when one's skills are greater than the challenges posed by the activity. Although previous studies examined the role of some of these job characteristics in predicting job boredom (see for a review Loukidou, Loan-Clarke, & Daniels, 2009), more research is needed to better understand if and how a broader set of work characteristics predict work-related boredom, and which psychological mechanisms underlie the associations between work characteristics and work-related boredom. Insight in these mediating mechanisms is important, both from a theoretical and a practical point of view. Theoretically, it increases our understanding of how boredom develops. Practically, mediating mechanisms provide additional starting points for interventions that may reduce and prevent boredom, besides from the work characteristics that cause work-related boredom.

A first aim of the present study, therefore, was to enhance insight in the work-related processes underlying the development of boredom experienced at work. We therefore studied the associations between the job characteristics of the JCM and work-related boredom and disentangled *why* these work characteristics are related to boredom, by examining theoretical-relevant mediating mechanisms underlying these relationships. To this purpose, we developed and tested a model that integrates perspectives from the JCM (Hackman & Oldham, 1975) and Self-Determination Theory (SDT; Deci & Ryan, 2000). We believe that combining the perspectives from these two theories provides a valuable perspective to study the mechanisms leading to work-related boredom, because (a) by distinguishing the quality of employees' work motivation along a continuum from external to intrinsic motivation, SDT fits with and extends the assumptions of JCM, which poses that certain work characteristics relate positively to employees' intrinsic work motivation; (b) quality of work motivation has been identified as an important predictor of affective outcomes (Vallerand, 1997); and (c) SDT makes it possible to draw a theoretical connection between the work characteristics of the JCM and quality of work motivation by means of its central concept "need satisfaction" (i.e., the extent to which human's basic psychological needs are fulfilled). Satisfaction of the basic human needs for autonomy, relatedness, and competence allows people to thrive and grow. In this sense, SDT's concept of need-satisfaction shows some similarities with the concept of "growth need strength" included in JCM. However, unlike JCM, which focuses on individual differences in growth need strength and views this as a moderator in the associations between work characteristics and motivation, SDT proposes that all human beings strive to grow and develop themselves, and that the extent

to which tasks satisfy people's need explains subsequent motivation.

As a second aim, we sought to investigate whether the motivational process underlying work-related boredom as suggested by SDT also manifests itself at a day-to-day level within employees. More specifically, we propose that employees' work motivation and subsequent boredom on a given day may not only depend on job resources and need satisfaction, but also on prework attitudes that originate from work experiences of the previous day. As such, we aim to extend knowledge on the processes underlying the development of work-related boredom by proposing and testing a spillover hypothesis. Based on the conceptualization of boredom as a transient affective state, the proposed spillover effect suggests that experiencing boredom at work on a given day induces negative work attitudes the next day, resulting in reduced motivation quality, which increases the likelihood of experiencing boredom at work. Such a spillover effect may provide insight in how "momentary" experiences of boredom eventually spiral into more stable "enduring" accounts of this affective state.

The present paper presents two field studies among employees from various occupations. Consistent with our first aim, Study 1 was designed to examine the role of work characteristics and the general experience of work-related need satisfaction and work motivation in the development of work-related boredom, by using a between-individuals design. Consistent with our second aim, Study 2 employed a daily diary design to examine whether the theorized mechanisms between need satisfaction, work motivation, and work-related boredom also manifest themselves on a daily basis at the within-individuals level. Furthermore, Study 2 allowed for examining the possible spillover of work-related boredom to experiences during the next day. As, according to Vallerand's (1997) hierarchical model of motivation, situational outcomes (in this case: work-related boredom) are mainly affected by need satisfaction and motivation experienced at the same hierarchical level, this study focuses on *work-related* need satisfaction and *work* motivation. A graphical representation of our conceptual model is presented in Figure 1.

Study 1

The vast majority of research on the work-related antecedents of boredom has focused on monotony of the job tasks, and found this to be positively related to work-related boredom (Davies, 1926; Fisher, 1993; Loukidou et al., 2009; Smith, 1981). Similarly, underutilization of skills and unchallenging jobs with low mental demands has been suggested to be associated with the development of work-related boredom (Caplan, Cobb, French, Harrison, & Pinneau, 1975; Fisher, 1987). Furthermore, Reijseger et al. (2013) showed that job resources such as autonomy, social support from one's supervisor, and social support from colleagues negatively relate to work-related boredom.

In the present study, we aimed to enhance insight in the associations between a broader range of work characteristics and work-related boredom, and examined if and how the five work characteristics of Hackman and Oldham (1975) JCM are associated with work-related boredom. Thus, we investigated

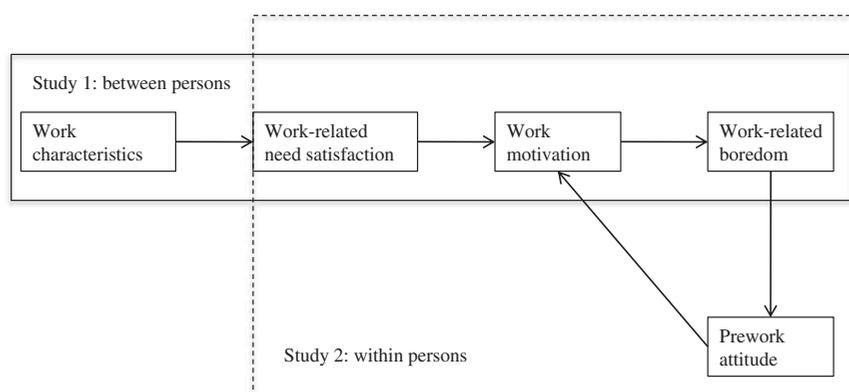


Figure 1. Graphical representation of the conceptual model.

if and how skill variety (i.e., using different skills at work), task identity (i.e., performing a whole piece of work from beginning to end), task significance (i.e., feeling that one's job has an impact on other people inside or outside the organization), autonomy (i.e., having freedom as to how to schedule and execute one's job), and feedback (i.e., obtaining sufficient information about one's effectiveness) relate to the experience of boredom at work. The work characteristics of the JCM have been theoretically assumed to relate negatively to work-related boredom, because they make the job interesting and capture the attention of the worker (Fisher, 1993). We therefore propose that skill variety, task identity, task significance, autonomy, and feedback are negatively related to work-related boredom, and we expect these associations to be mediated through their associations with employees' work-related need satisfaction, and need satisfaction's association with the quality of work motivation (see Figure 1).

Work characteristics and work-related need satisfaction

In its core, SDT (Deci & Ryan, 2000; Ryan & Deci, 2000a) poses that the satisfaction of innate psychological needs is the basis for motivation, and essential for facilitating optimal functioning and personal well-being. Although various psychological needs can be identified, SDT emphasizes that satisfaction of the need for autonomy, competence, and relatedness is most crucial for human motivation, optimal functioning, and well-being, as these needs are essential universal nutrients for human thriving. The need for autonomy refers to the need to experience self-endorsement or volition in one's actions (Ryan, Bernstein, & Brown, 2010) and to act as the originator of one's own behaviour (Patrick, Knee, Canevello, & Lonsbary, 2007). The need for competence refers to the feeling of being effective in one's actions as well as having opportunities to use one's capacities (Deci, 1975). The need for relatedness comprises the need to feel close and connected to others (Baumeister & Leary, 1995; Ryan, 1995). In support of the SDT, satisfaction of these needs has been shown to relate positively to (work-related) well-being and job attitudes (see Van den Broeck, Ferris, Chang, & Rosen, 2016 for a meta-analysis). As Ryan and Deci (2000a) argue, specifying psychological needs as essential nutrients for optimal functioning

and well-being implies that individuals cannot thrive without satisfying all of them, just as people cannot live with food but no water. Consistent with this theoretical position, the satisfaction of one need has been found to positively relate to the satisfaction of the other needs (Van den Broeck, Vansteenkiste, De Witte, & Lens, 2008).

The extent to which people's needs are satisfied importantly depends on the demands, obstacles, and affordances in people's environment (Ryan & Deci, 2000a). Need satisfaction at work therefore likely depends on the characteristics of people's work situation. More specifically, need satisfaction is supposed to be facilitated by characteristics of the work environment that stimulate personal growth, learning, and development, that is, by "job resources" (Schaufeli & Bakker, 2004), and this postulation was indeed supported by previous research (see Van den Broeck et al., 2016 for a meta-analysis). The work characteristics defined in the JCM can be considered job resources because of their motivating potential. Therefore, we hypothesize that these work characteristics are positively related to need satisfaction. Specifically:

Hypothesis 1: (a) Task autonomy, (b) task significance, (c) feedback, (d) task identity, and (e) skill variety are positively related to general work-related need satisfaction.

Work-related need satisfaction and work motivation

In the previous section, we posed that the work characteristics of the JCM relate to employees' work-related need satisfaction. Based on SDT (Deci & Ryan, 2000; Ryan & Deci, 2000a), we further pose that work-related need satisfaction affects the quality of employees' work motivation. SDT emphasizes that it is not only the strength of motivation but also the type or quality of motivation that explains its effects. More specifically, SDT conceptualizes motivation quality as the extent to which people's motivation is self-determined or autonomous rather than controlled by others. *Intrinsic motivation*, defined as engaging in an activity because one finds the activity inherently interesting or enjoyable (Ryan & Deci, 2000a), is the motivation type that is highest in self-determination. SDT further distinguishes between four types of *extrinsic*

motivation (i.e., engaging in an activity because it is associated with a separable, valued outcome; Ryan & Deci, 2000b) that differ in the extent to which they imply autonomous regulation of behaviour (i.e., high self-determination) or controlled regulation of behaviour (i.e., non-self-determination) (Gagné & Deci, 2005). Specifically, *integrated regulation* (i.e., engaging in an activity because it is an integral part of one's identity; Deci & Ryan, 2000) and *identified regulation* (i.e., engaging in an activity because it is in accordance with one's own goals; Deci & Ryan, 2000) are types of extrinsic motivation that are self-determined and autonomous, as these reflect people's own identity or goals. In contrast, *introjected regulation* (i.e., engaging in an activity in order to avoid guilt or anxiety or to attain ego-enhancement or pride; Ryan & Deci, 2000b) and *external regulation* (i.e., engaging in an activity to obtain a reward or to avoid a punishment; Deci & Ryan, 2000) are types of extrinsic motivation that are non-self-determined, as these refer to motivation controlled by other people's interests or goals.

SDT poses that the quality of motivation depends on the fulfilment of basic psychological needs. The higher the level of need satisfaction, the more autonomously motivated behaviour will be (Gagné & Deci, 2005). In contrast, lack of need satisfaction is associated with the more controlled types of motivation (external and introjected regulation), because engagement in tasks that do not satisfy one's needs implies that task performance is prompted by external circumstances, such as having to comply with one's managers' instructions. The association between need satisfaction and quality of motivation has been supported in various empirical studies (see Van den Broeck et al., 2016 for a meta-analysis). Also in the work domain, some evidence has been found for the expected positive association between need satisfaction and quality of motivation (e.g., De Cooman, Stynen, Van den Broeck, Sels, & De Witte, 2013; Lynch, Plant, & Ryan, 2005). In addition, the causal order of need satisfaction and quality of motivation has been supported in experimental studies (e.g., Deci, Eghrari, Patrick, & Leone, 1994; Joussemet, Koestner, Lekes, & Houliort, 2004). Thus, based on the assumptions of SDT and related research, we hypothesize

Hypothesis 2: *Satisfaction of the basic psychological needs in the work domain is positively related to (a) autonomous work motivation, and negatively to (b) controlled work motivation.*

Work motivation and work-related boredom

The relevance of work motivation as an antecedent of work-related boredom has already been suggested by Barmack (1938), who argued that boredom develops as a consequence of inadequate motivation during the operation of a task. To further specify and disentangle the associations between specific types of motivation and work-related boredom, we relied on SDT (Deci & Ryan, 2000; Ryan & Deci, 2000a). We propose that the various types of motivation are differentially related to the experience of work-related boredom. Vallerand's (1997) hierarchical model of motivation distinguishes between the quality of motivation and (affective) consequences that follow from the quality of motivation. Specifically, Vallerand (1997)

poses that positive (affective) consequences should result from autonomous forms of motivation (intrinsic motivation, integrated and identified regulation) and that negative (affective) consequences should result from controlled forms of motivation (especially external regulation). This assumption has received some support in work-related contexts. For example, Fernet, Trépanier, Austin, Gagné, and Forest (2015) found that among nurses, autonomous motivation is negatively, and controlled motivation is positively related to experienced psychological strain. Based on Vallerand's (1997) model and extending Fernet et al.'s (2015) findings to work-related boredom, we expect that the quality-of-work motivation is negatively related to work-related boredom.

More precisely, employees who experience controlled motivation at work, engage in their work activities because their behaviour is instigated by some external reward or punishment or by internal ego-involving pressures such as shame or guilt. This will increase the possibility that employees experience their work as of little value or as being unpleasant or uninteresting, because they are not focused on the potentially interesting or valuable aspects of the work tasks. Instead, they are focused on rewards, punishments, and pressures accompanying task performance. As work-related boredom is an unpleasant, deactivated state, during which employees experience their tasks as meaningless and uninteresting, we expect that controlled motivation is positively related to work-related boredom. This view concurs with the control-value theory of achievement emotions (Pekrun, 2006; Pekrun, Frenzel, Goetz, & Perry, 2007), which poses that boredom develops when the activities engaged in are experienced as having negative intrinsic value. This implies that one's natural tendency would be to avoid these activities, and engagement can only be obtained by having some form of external reward or pressure.

On the contrary, if workers are autonomously motivated for their work, they engage in their work activities because they think these are interesting and pleasant, or because their work tasks are in accordance with their goals or an integral part of their identity. Under these circumstances, they consider fulfilling their work tasks as inherently interesting or pleasant, or personally important or meaningful. Therefore, we expect that autonomous work motivation is negatively related to work-related boredom.

Although these assumptions have not been empirically tested in a work situation, our line of reasoning is consistent with the findings of a study on motivation and boredom for physical education (Ntoumanis, 2001). In this study, external regulation was found to be positively, and intrinsic motivation was found to be negatively related to boredom. Pekrun et al. (2010) also found intrinsic motivation to be negatively related to boredom in educational settings. Additionally, on a more general level, research found that, compared to an external motivational orientation, an internal motivational orientation was associated with less boredom during leisure time (Barnett & Klitzing, 2006). Therefore, we hypothesize

Hypothesis 3: *(a) Autonomous work motivation is negatively related to work-related boredom, and (b) controlled work motivation is positively related to work-related boredom.*

Work characteristics, need satisfaction, work motivation, and work-related boredom

So far, we have argued that the work characteristics of the JCM are positively related to work-related need satisfaction (*Hypothesis 1*), that work-related need satisfaction is positively related to the quality of employees' work motivation (*Hypothesis 2*), and that the quality of employees' work motivation is negatively related to work-related boredom (*Hypothesis 3*). Based on this line of reasoning, we finally pose that work-related need satisfaction and the quality of employees' work motivation are the explaining mechanisms that mediate the relationship between work characteristics and work-related boredom. Thus,

Hypothesis 4: *Skill variety, task significance, task identity, feedback, and autonomy are negatively related to work-related boredom, and these associations are mediated via work-related need satisfaction by quality of employees' work motivation.*

Method

Participants and procedure

Data were collected within the national head office of a large multinational company. Employees of the head office were personally asked whether they were willing to participate in the study. When agreeing to participate, employees received an envelope with a paper-and-pencil questionnaire. Of the 160 questionnaires that were distributed, 115 were completed. The sample consisted of 47% males, with an average age of 35.3 years ($SD = 10.2$). Participants worked on average 37.3 contractual hours a week ($SD = 5.0$), 73.4% had obtained a bachelor or master degree, and their average tenure with the company was 5.23 years ($SD = 7.07$). Participants were from different departments (e.g., HR, Marketing, Finance, Sales), and different jobs (e.g., manager, secretary, recruiter, assistant).

Measures

Task characteristics *Task autonomy* (e.g., "In my job, I can act independently"; $\alpha = .80$), *task significance* (e.g., "I consider my job important for this company"; $\alpha = .69$), *feedback* (e.g., "In my job, I immediately know if I perform well"; $\alpha = .78$), *task identity* (e.g., "The results of my efforts are visible in the products or services delivered by my company"; $\alpha = .77$), and *skill variety* (e.g., "My job is varied"; $\alpha = .89$) were each measured by five items developed and validated by Biessen and De Gilder (1993). All items were rated on a 5-point Likert scale (1 = disagree, 5 = agree).

Work-related need satisfaction was measured with 16 items of the validated Dutch Work-Related Basic Need Satisfaction Scale (Van den Broeck, Vansteenkiste, De Witte, Soenens, & Lens, 2010), which assesses the extent to which respondents experience that each of the three universal needs are satisfied at work. Sample items include: "I feel free to do my job the way I think it could best be done" (satisfaction of the need for autonomy), "I feel competent at my job" (satisfaction of the need for competence), and "At work, I feel part of a group" (satisfaction of the need for relatedness). All items

were rated on a 5-point Likert scale (1 = disagree, 5 = agree), with higher scores indicating that the respective needs were satisfied to a larger degree. Following previous research on work-related need satisfaction (e.g., Van den Broeck et al., 2008), a composite score of need satisfaction was used in this study ($\alpha = .84$). This approach was supported by results of a principal component analysis (promax rotation), in which the scree plot showed a strong drop in eigenvalues after the first factor (eigenvalue = 5.09). This finding is in line with previous research on need satisfaction (e.g., Van den Broeck et al., 2008) and empirically justifies the use of a general need satisfaction scale in this study.

Quality of work motivation Autonomous motivation was measured by two scales: *Intrinsic motivation* (e.g., "I do my job, because it is fun", $\alpha = .82$) and *identified regulation* (e.g., "I do my job, because I believe it is important to me"; $\alpha = .74$). Both scales consisted of four items derived from the Situational Motivation Scale (SIMS; Guay, Vallerand, & Blanchard, 2000). Measures for controlled motivation were derived from scales used in Koestner, Otis, Powers, Pelletier, and Gagnon (2008) and Pelletier, Dion, Slovinec-D'Angelo, and Reid (2004): *Introjected regulation* (e.g., "I do my job, because I would feel embarrassed if I didn't do it", $\alpha = .77$) and *external regulation* (e.g., "I do my job, because other people think I should do it", $\alpha = .71$) were each measured with three items. All items were rated on a 5-point Likert scale (1 = disagree, 5 = agree).

Work-related boredom We used Lee's (1986) boredom questionnaire to measure work-related boredom, but consistent with the definition of boredom (Fisher, 1993; Mikulas & Vodanovich, 1993; Pekrun et al., 2010), we included only those items that referred to the experience of work-related boredom as a state. Items that confounded boredom and its potential causes (e.g., "Is your work monotonous?") or consequences (e.g., "Do you become irritable on the job?") were omitted (cf. Van Hooff & Van Hooff, 2014). The five items we used were rephrased from questions into statements and were rated on a five-point scale, ranging from 1 (disagree) to 5 (agree), with higher scores indicating higher levels of work-related boredom. The items used were "I find my job boring", "There are long periods of boredom on my job", "My job goes by slowly", "I often get bored with my work", and "The time seems to go by slowly when I'm at work" ($\alpha = .91$).

Control variables Based on previous research suggesting or finding relationships between various demographics and boredom (e.g., Kass et al., 2001; Loukidou et al., 2009; Van Hooff & Van Hooff, 2014), we included a number of control variables in our questionnaire: Gender (0 = male, 1 = female), age (in years), tenure (in months), and education level (0 = no bachelor/master degree, 1 = bachelor/master degree). Based on the actual correlations in the present study, relevant control variables were selected in the analyses to reduce the risk of finding spurious associations between the study variables.

Results

Means, standard deviations, and correlations of the study variables are presented in Table 1. Only age and tenure were

Table 1. Study 1 means, standard deviations, and correlations between the variables.

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Gender (% female)	53%															
2. Age	35.34	10.21	-.10													
3. Education (% BA/MA)	73%		-.05	-.27**												
4. Tenure (months)	62.77	84.85	-.15	.71**	-.25**											
5. Task autonomy	4.37	0.51	-.03	.017	-.10	.13										
6. Task significance	3.71	0.63	.01	.22*	-.11	.24*	.33**									
7. Feedback	3.58	0.65	.06	.42**	-.29**	.20*	.37**	.27**								
8. Task identity	3.66	0.74	-.01	.16	-.11	.18	.33**	.51**	.31**							
9. Skill variety	3.91	0.77	.05	.14	-.04	.11	.30**	.41**	.33**	.35**						
10. Intrinsic motivation	4.22	0.67	.14	.17	.07	.18	.38**	.52**	.24*	.30**	.59**					
11. Identified regulation	3.98	0.72	.09	-.07	.05	-.09	.32**	.34**	.31**	.15	.29**	.52**				
12. Introjected regulation	1.82	0.94	.10	.03	-.07	.01	-.12	-.15	-.07	-.20*	-.15	-.11	.03			
13. External regulation	1.63	0.79	-.01	.24**	-.14	.17**	-.02	-.16	-.09	-.10	-.05	-.26**	-.27*	.51**		
14. Need satisfaction	4.07	0.44	-.04	.35**	-.10	.23*	.47**	.45**	.46**	.49**	.53**	.55**	.21*	-.26**	-.22*	
15. Work-related boredom	1.44	0.67	.07	-.29**	.03	-.23*	-.28**	-.34**	-.34**	-.26**	-.64**	-.60**	-.24*	.20*	.20*	-.59**

n: Between 108 and 113.

p* < .05; *p* < .01.

significantly associated with both work-related boredom and one or more of the independent/mediating variables in our study. Because of the high correlation between age and tenure, and because associations with the core variables of this study were somewhat stronger for age than for tenure, for reasons of parsimony and conserving power, only age was included as control variable in our analyses.

Preliminary analyses

Because of the relatively high correlation between work-related boredom and intrinsic motivation ($r = -.60$) we conducted a confirmatory factor analysis (using WLSMV estimation) to examine if these can indeed be considered empirically distinct constructs. As Chi-square difference tests cannot be computed based on this estimator, we used other fit indices: comparative fit index (CFI), and weighted root mean square residual (WRMR). Values above .95 (CFI; Hu & Bentler, 1999) or below .90 (WRMR; Yu, 2002) are indicative of a good model fit. Two models were compared. The first model, in which all items were forced to load on one factor fitted the data reasonably well (CFI = .97, and WRMR = 1.49). In the second model, two factors were specified, one depicting work-related boredom and one depicting intrinsic motivation. This model provided a better fit (CFI = .99, and WRMR = .90), and we concluded that work-related boredom and intrinsic motivation can be empirically distinguished.

Testing of hypotheses

To test our hypotheses, the fit of a set of nested path models (using averaged scale scores for the study variables)

were compared using the Mplus7 statistical software package (Muthén & Muthén, 1998–2012). Model 1 specified the hypothesized relations, assuming that the associations between work characteristics and work-related boredom are fully mediated by work-related need satisfaction and subsequent quality of work motivation. Additional models were run to test whether the relationship between work characteristics and boredom is fully or partially mediated by need satisfaction and quality of work motivation. Specifically, Models 2a and 2b tested for partial mediation by including direct paths from the work characteristics to the four indicators of work motivation, and Models 3a and 3b additionally incorporated the direct paths from the work characteristics to work-related boredom. In all models, age was included as a covariate and was modelled to be related to need satisfaction, the four indicators of work motivation, and work-related boredom. The fit of the models was compared using the standard Chi-square difference test, as well as the CFI and the root mean square error of approximation (RMSEA; Bentler, 1990). CFI values above .95 indicate an acceptable fit (Hu & Bentler, 1999), whereas for RMSEA values below .08 (Steiger, 2007) or below .06 (Hu & Bentler) have been proposed as indicative of an acceptable fit.

Results of the analyses are presented in Table 2. This table shows that Model 1 did not provide a good fit to the data (CFI = .76, RMSEA = .17). Adding the direct paths between the work characteristics and work motivation in Model 2a resulted in a significant decrease in Chi-square, indicating a better fit. However, not all associations between the work characteristics

Table 2. Study 1 fit indices of models compared to examine associations between work characteristics, need satisfaction, quality of work motivation, and work-related boredom.

Model	χ^2 (df)	$\Delta\chi^2$ (df)	Model comparison	RMSEA	CFI
M1: Full mediation model	105.70 (26)			.17	.76
M2a: M1 + direct effects work characteristics -> work motivation	32.88 (6)	72.82 (20)**	M2a vs. M1	.20	.92
M2b: M2a—non-significant direct effects work characteristics -> work motivation	57.65 (22)	48.05 (4)**	M2b vs. M1	.12	.89
M3a: M2b + direct effects work characteristics -> work-related boredom	29.01 (17)	28.64 (5)**	M3a vs. M2b	.08	.96
M3b: M3a—non-significant direct effects work characteristics -> work-related boredom	30.77 (21)	26.88 (1)**	M3b vs. M2b	.07	.97

RMSEA: Root mean square error of approximation; CFI: comparative fit index.

***p* < .01.

and the four types of work motivation were significant. Removing these non-significant paths in Model 2b resulted in a model that fitted better than Model 1. Model 3a, which also included the direct paths between the five work characteristics and work-related boredom, turned out to fit significantly better than Model 2b. Finally, non-significant associations between the work characteristics and work-related boredom were removed in Model 3b, which not only fitted better than Model 2b, but also showed a good fit to the data in an absolute sense ($CFI = .97$, $RMSEA = .07$). This model is depicted in Figure 2 (standardized results). From this figure, it follows that – as expected – task autonomy, task identity, and skill variety were positively related to work-related need satisfaction (Hypothesis 1a, d, and e supported). However, although task significance and feedback were positively correlated with work-related need satisfaction (see Table 1), these work characteristics did not explain unique variance (Hypothesis 1b and c not supported).

Figure 2 also shows that the hypothesized positive association of need satisfaction with the autonomous motivation constructs is partially supported: need satisfaction was positively related to intrinsic motivation but not to identified regulation (Hypothesis 2a partially supported). In accordance with our hypothesis, need satisfaction was negatively related to both controlled motivation constructs (external and introjected regulation; Hypothesis 2b supported).

With regard to the relations between autonomous motivation and boredom, Figure 2 shows that, as hypothesized, intrinsic motivation was a significant negative predictor of work-related boredom, but identified regulation was not (Hypothesis 3a partially supported). Regarding controlled motivation, both introjected and external regulation were not significantly associated to work-related boredom (Hypothesis 3b not supported).

Finally, Hypothesis 4 assumed the relationships between the work characteristics and work-related boredom to be mediated by need satisfaction and quality-of-work motivation. As only task autonomy, task identity, and skill variety

turned out to be related to need satisfaction, only intrinsic motivation was significantly related to work-related boredom, and need satisfaction was significantly related to this type of motivation, mediation could only be examined for three of the five work characteristics combined with need satisfaction and intrinsic motivation. Bayesian estimation was used (using the default priors in Mplus7) to test the significance of these indirect effects. The analyses revealed that the (unstandardized) indirect effects of task autonomy ($B = -0.019$, 95% CI between -0.057 and -0.003), task identity ($B = -0.018$, 95% CI between -0.042 and -0.002), and skill variety ($B = -0.013$, 95% CI between -0.036 and -0.001) on work-related boredom through need satisfaction, and subsequently intrinsic motivation were all significant. Altogether, these results provide support for Hypothesis 4 for the work characteristics task autonomy, task identity, and skill variety. For task significance and feedback Hypothesis 4 was not supported, because feedback and task significance did not explain unique variance in work-related need satisfaction. Also the presumed mediating role of identified, introjected, and external regulation could not be established as these types of motivation did not predict significant unique variance in work-related boredom.

Discussion

In the present study, we aimed to obtain insight in the associations between the work characteristics of the JCM and work-related boredom, and the mediating role of work-related need satisfaction and quality of work motivation in these relations. Our results supported a partial mediation model, in which three of the five work characteristics defined in the JCM (i.e., skill variety, task identity, and task autonomy) were negatively related to work-related boredom through their relationships with work-related need satisfaction and subsequent intrinsic motivation. The hypothesized mediation path was not supported for task significance and feedback, although these job characteristics demonstrated positive correlations

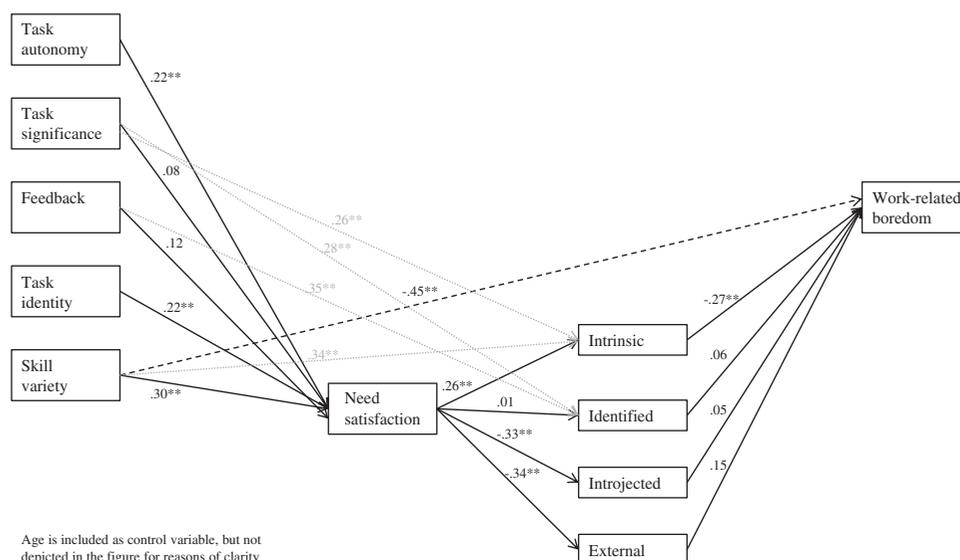


Figure 2. Final model for associations between work characteristics, work-related need satisfaction, quality of work motivation, and work-related boredom (Study 1).

with work-related need satisfaction and autonomous motivation (see Table 1). Our results support previous research that identified lack of autonomy and skill variety as predictors of work-related boredom. It further extends previous findings by providing empirical support for the theoretical notion that lack of task identity may result in feelings of boredom. Moreover, our study extends previous research by providing insight in the processes underlying the development of boredom at work, showing that need satisfaction and subsequent quality of work motivation may be explaining mechanisms in the association between work characteristics and work-related boredom. As such, we additionally showed that – irrespective of specific work characteristics – lack of need satisfaction and intrinsic motivation are important antecedents of boredom at work.

Although this study provided insight in the underlying motivational factors linking work characteristics and work-related boredom, it was based on employees' overall experience of boredom at work, in a between-participants design. Although this provides important information about general state levels of work-related boredom experienced across individuals, it remains unknown if the relations found also manifest themselves at a daily within-individual level. This is nonetheless important to examine, because previous research on motivation theories reported contrasting effects on the between- and within-individuals level (e.g., Vancouver & Kendall, 2006; Wanberg, Zhu, & Van Hooft, 2010).

Examining work-related boredom from a daily perspective is especially important, because boredom is an emotional state, and the duration of emotions may vary, sometimes lasting for only minutes or hours (Oatley & Jenkins, 1996). Moreover, as boredom is an activity-related emotion, it may fade when one is longer engaged in the boredom-inducing activity. Therefore, in order to understand work-related boredom more fully, it is important to also obtain insight in employees' within-person, short-term experiences of boredom, and to examine how the motivational process assumed to underlie its development manifests itself during shorter time intervals. Furthermore, such dynamic day-to-day perspective allows to obtain insight in the possible spillover of boredom from one day to another, which increases our understanding of how day-to-day "momentary" experiences might eventually spiral into more stable and longer lasting "enduring" accounts of work-related boredom. Examining work-related boredom from short-term perspective is also important from a practical point of view, because its potential negative consequences may already develop within a small period of time. For example, work-related boredom has been shown to be strongly associated with immediate withdrawal behaviours (such as working slowly, or spending time on non-work-related activities) that are not functional in obtaining one's work goals and may be damaging for the organization (Van Hooft & Van Hooft, 2014). Thus, based on these considerations, we designed a second study, taking a short-term, daily perspective in order to test the motivational process underlying the development of work-related boredom at the daily within-person level.

Study 2

In this second study, we employed a within-person perspective to investigate to what extent work-related boredom fluctuates on day-to-day basis, and to examine the associations between work-related need satisfaction, work motivation, and work-related boredom on a daily basis. Furthermore, we examined whether work-related boredom is affected by work-related boredom on the previous day, and what underlying psychological mechanisms explain this relation. To this purpose, we conducted a 5-day diary study. As it is recommended that questionnaires in diary research should be kept as short as possible (Bolger, Davis, & Rafaeli, 2003), we included intrinsic motivation as key indicator of the quality-of-work motivation. This choice was based on the Study 1 finding that intrinsic work motivation was the only motivation type that predicted unique variance in work-related boredom.

A dynamic process perspective on work-related need satisfaction, work motivation, and work-related boredom

Not only boredom but also need satisfaction and motivation are dynamic concepts fluctuating day by day, which is supported by various daily diary studies on these topics (e.g., Gagné, Ryan, & Bargmann, 2003; Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Ryan et al., 2010; Sheldon, Ryan, & Reis, 1996). Similar to these studies, we expect that work-related need satisfaction, intrinsic work motivation, and work-related boredom show day-to-day variation. Based on the expectation that the mechanisms on need satisfaction, motivation, and work-related boredom described in Study 1 also manifest themselves on a day-to-day basis within individuals, we hypothesize

Hypothesis 5: *Daily satisfaction of the basic psychological needs in the work domain is positively related to daily intrinsic work motivation.*

Hypothesis 6: *Daily intrinsic work motivation is negatively related to daily work-related boredom.*

Hypothesis 7: *Daily need satisfaction in the work domain is negatively related to daily work-related boredom, and this association is mediated by daily intrinsic motivation.*

Spillover of work-related boredom to the next day

Boredom is an activity-related emotion, suggesting that momentary feelings of boredom disappear once one is no longer engaged in the boredom evoking task. However, employees can also experience work-related boredom at a more global level, indicating that they are generally bored by their work. The model proposed until now does not explain how momentary experiences of work-related boredom may eventually develop into such global, more enduring experience of this affective state. We propose that one of the processes underlying this development is a spillover process by which work-related boredom affects next day's

intrinsic work motivation, and by which intrinsic motivation on its turn affects subsequent levels of work-related boredom. If this process continues from day to day, this may result in a downward spiral in which more enduring feelings of work-related boredom gradually develop over time. A first step in testing this theoretical position refers to examining whether work-related boredom may spill over to the next day.

We specifically argue that work-related boredom does not directly affect subsequent work motivation, but that this association is mediated by employees' unfavourable attitudes towards work at the start of their next working day. Namely, given that momentary feelings of boredom disappear once the boring task has ended, it is not likely that this emotion will directly affect employees' next day's intrinsic work motivation, because motivation relates to current task engagement. It is nonetheless possible that cognitive "after effects" of boredom (e.g., thinking about the boring work situation during off-job time) negatively impinge on employees' attitudes towards work before they start working the following morning. This can be understood based on the proposition by Pekrun et al. (2010) that boredom experienced while engaging in an activity is aversive, which induces motivation to avoid the activity, making it likely that employees who feel bored at a certain day would prefer to avoid their work situation the following day. However, to the extent that this is not feasible most of the time, it may be expected that they experience a less favourable attitude towards their work during the next morning, thus feel reluctant to start their next working day. This negative attitude would then reduce employees' intrinsic motivation, because it prevents employees from experiencing their work activities as pleasant and interesting. Such an ordering of constructs from feelings of boredom to more cognitive evaluations in terms of work attitudes, and subsequent work motivation and behaviour has theoretical underpinnings in theories such as affective events theory (AET; Weiss & Cropanzano, 1996) and the theory of planned behaviour (TPB; Ajzen, 1991). Specifically, AET suggests that characteristics of the work environment lead to the occurrence of certain work events, which result in affective responses (e.g., boredom) that in turn shape work attitudes (e.g., positive or negative attitudes regarding one's work), motivation, and behaviour. The TPB positions attitudes as a core construct that affect subsequent motivation and behaviour (Ajzen, 1991). Applying the TPB to the present study context, prework attitudes can be defined as the favourable or unfavourable cognitive evaluation of the employee's work. According the propositions of the TPB, such attitudes are important predictors of subsequent motivation to engage in work behaviour. Thus, based on this line of reasoning, we pose:

Hypothesis 8a: *Daily work-related boredom is positively related to an unfavourable prework attitude during the next morning.*

Hypothesis 8b: *An unfavourable prework attitude in the morning is negatively related to daily intrinsic work motivation during that day.*

This low level of intrinsic motivation would subsequently relate to increased levels of work-related boredom. Therefore, we hypothesize

Hypothesis 8c: *Daily work-related boredom is negatively related to next-day's daily work-related boredom through its associations with employees' next-day's prework attitudes and subsequent intrinsic motivation.*

Method

Participants and procedure

Participation in this study required the completion of a general questionnaire that addressed participants' background information, and the completion of two brief questionnaires daily for the period of one workweek (i.e., five consecutive working days). These daily questionnaires focused on the core variables under study and were filled out before work (i.e., prework attitude) and at the end of each workday (i.e., need satisfaction at work, intrinsic work motivation, and work-related boredom). Because the study design required substantial effort and commitment of participants, we decided to recruit participants via professional and personal networks and social media. To be eligible for participation in the study, participants had to work at least 32 h on at least 4 days per week and had to have access to a computer with internet access to complete the questionnaires. After agreeing to take part, participants received an email with information about the study procedures and a link to the web-based general questionnaire. About a week thereafter, they started the completion of the daily diary surveys. During this period, each participant received two daily emails with a link to the online before and after work questionnaires. Of the 99 persons who indicated their willingness to participate, 90 actually completed the general questionnaire and daily questionnaires on at least one day (91%). Altogether, 382 ($M = 4.2$ per participant) before-work questionnaires, and 342 ($M = 3.8$ per participant) end-of-workday questionnaires were completed.

The total number of completed daily questionnaires across the 5 days varied between 43 and 91 ($M = 76$) for the before work questionnaire and between 34 and 78 ($M = 68$) for the end-of-workday questionnaire. This variation is caused by actual non-response and by the fact that participants did not have to complete the questionnaires on their non-work days. Participants with missing data on one or more daily questionnaires were included, but analyses were run making use of the non-missing data only (i.e., we did not use imputation techniques). Reports of work-related boredom on 2 consecutive days were available from 221 questionnaires. Participants were employed in various industries, such as healthcare (17.5%), IT (9.7%), trade (7.1%), construction (7.1%), or education (6.3%). They were employed in a wide variety of jobs, such as teacher, sales assistant, physiotherapist, taxi driver, project manager, or account manager. Of the participants, 44% was female, and 71% had obtained a bachelor or master degree. Participants' mean

Table 3. Study 2 means, standard deviations, and correlations between the variables.

	M	SD	1	2	3	4	5	6	7
1. Gender (%female)	44%								
2. Age	36.72	11.10	-.11						
3. Tenure	8.91	9.92	-.25*	.76**					
4. Education (% BA/MA)	71%		.23*	-.28**	-.33**				
5. Need satisfaction	3.99	0.59	-.22*	.11	.18	-.13			
6. Intrinsic motivation	3.86	0.64	-.00	.22*	.17	-.24*	.42**		
7. Negative prework attitude	1.39	0.69	.35**	-.33**	-.24*	.22*	-.16	-.22*	
8. Work-related boredom	1.71	0.70	.04	-.40**	-.24*	.08	-.27*	-.45**	.33**

Correlations based on aggregated person-means. Due to incidental missing values n varies between 89 and 91.

* $p < .05$; ** $p < .01$.

age was 36.7 years ($SD = 11.0$) and they worked on average 37.8 h a week ($SD = 6.0$).

Measures

Daily need satisfaction was measured in the after-work questionnaire by means of six items (two for each need) from the Work-Related Basic Need Satisfaction Scale (Van den Broeck et al., 2010). Items were slightly adapted to make them suitable for day-to-day measurement. Examples are "Today, I felt I had to do what other people ordered me to do at my work" (satisfaction of the need for autonomy; reversed coded), "Today, I didn't really feel connected to the other people at my work" (satisfaction of the need for relatedness; reversed coded), and "Today, I felt competent in my job" (satisfaction of the need for competence). Items were answered on a 5-point Likert scale (1 = *completely disagree*, 5 = *completely agree*; mean α across the workweek = .61).

Daily intrinsic motivation was measured in the after-work questionnaire by means of four slightly adapted items from the SIMS (Guay et al., 2000), for example "Today, I did my job, because it is fun". Items were answered on a 5-point Likert scale (1 = *completely disagree*, 5 = *completely agree*; mean α across the workweek = .91).

Daily work-related boredom was measured in the after-work questionnaire by means of three items adapted from Lee (1986). The items were "Today I felt bored during my work", "Today, I found my job boring", and "Today, my job went by slowly". Items were answered on a 5-point Likert scale (1 = *completely disagree*, 5 = *completely agree*; mean α across the workweek = .70).

Unfavourable prework attitude was measured with one item in the before-work questionnaire (i.e., "Today, I don't like the idea of my coming workday") with response options ranging from 1 = *completely disagree* to 5 = *completely agree*. Although the use of one-item scales is suboptimal, previous research has suggested that such measures can be as valid as multiple item measures in cases where the construct is sufficiently narrow and unambiguous, and are acceptable when time or space constraints prevent the use of multi-item scales (e.g., Wanous, Reichers, & Hudy, 1997). Unfavourable prework attitude is not a complex or ambiguous construct, and therefore we felt that it can be adequately represented by a single item, in order to avoid asking too many seemingly repetitious questions and to keep the daily questionnaire as short as possible.

Furthermore, a similar one-item approach has previously been proved to be a valid way to measure the extent to which employees looked forward to their upcoming workday (van Hooff, Geurts, Kompier, & Taris, 2007).

Control variables We included the same control variables as in Study 1 in our general questionnaire in Study 2: gender (0 = *male*, 1 = *female*), age (in years), tenure (in months), and education level (0 = *no bachelor/master degree*, 1 = *bachelor/master degree*). Additionally, we assessed participants' general experience of work-related boredom by means of three of the five items from Lee's (1986) boredom questionnaire that were used in Study 1 ($\alpha = .70$).

Results

Table 3 presents the means, standard deviations, and correlations (using aggregated person-means) of the Study 2 variables. Based on these correlations and using the same rationale as in Study 1, only age was included as control variable in our analyses.

Preliminary analyses

For the core variables under study, we computed the proportion of variance that was on the day-level. These proportions were substantial and varied between .60 (for intrinsic motivation) and .73 (for prework attitude). For work-related boredom, this figure was .61, indicating that of the variance in this measure 61% is between days and 39% is between individuals. This clearly underlines the value of studying work-related boredom from a day-to-day perspective.

Furthermore, we conducted a multilevel confirmatory factor analysis to examine if daily work-related boredom and daily intrinsic motivation can be empirically distinguished. A two-factor model ($CFI = .95$, $WRMR = .56$) fitted the data substantially better than a one-factor model ($CFI = .64$, $WRMR = 1.59$). In line with Study 1, we concluded that these two variables can indeed be considered separate constructs.

Testing of hypotheses

The data had a two-level structure with repeated day-level measures (level 1: within-level) nested within individuals (level 2: between-level). Our hypotheses describe relationships at the within-individual level. These were tested with multi-level path analysis with the Mplus 7 statistical software package (Muthén & Muthén, 1998–2012), using maximum

likelihood estimation. We estimated one model to simultaneously test all our hypotheses. Because we were interested in within-person processes, we centred the independent variables (i.e., work-related need satisfaction and work-related boredom during the previous day) around the respective person-means (cf. Binnewies, Sonnentag, & Mojza, 2010). This removed the level 2 variance, and therefore these variables were only modelled at level 1. Unfavourable prework attitude, intrinsic motivation, and work-related boredom on the present day were not centred, because these were outcome measures (cf. Binnewies et al., 2010). The control variables age and general work-related boredom were centred around the grand mean.

Based on our hypotheses, on the within-level, our model included associations between work-related need satisfaction and intrinsic motivation, and between intrinsic motivation and work-related boredom on the present day. At this level, also the relations between work-related boredom on the previous day and unfavourable prework attitude, and the associations between this attitude and intrinsic motivation were included. On the between-level, paths between unfavourable prework attitude and intrinsic motivation, and between intrinsic motivation and work-related boredom on the present day were included. This level also included the between-individuals control variables age and general work-related boredom, which were modelled to be related to intrinsic motivation and work-related boredom on the present day.

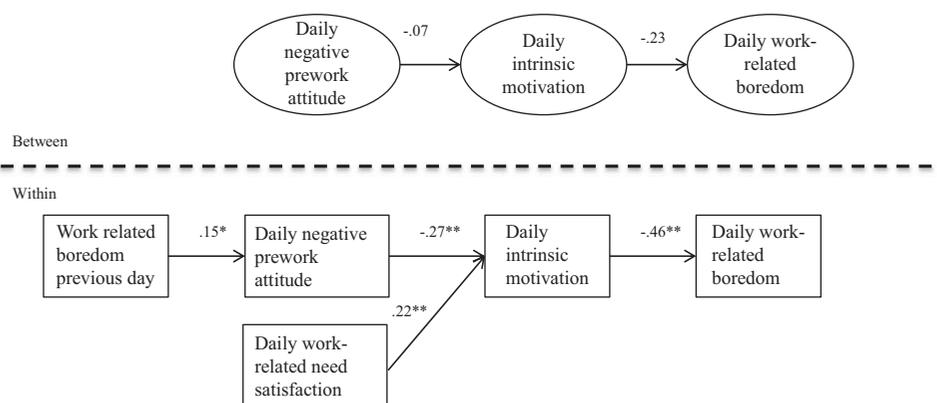
Our proposed model – which is graphically depicted in Figure 3 – provided a good fit to the data ($\chi^2 = 13.41$, $df = 6$, $CFI = .93$, $RMSEA = .07$, $SRMS$ within = .06, $SRMS$ between = .08). On the within-level, our model showed a positive association between work-related need satisfaction and intrinsic motivation, and a negative relationship between intrinsic motivation and work-related boredom, thus supporting Hypotheses 5 and 6. To additionally examine whether a direct association existed between work-related need satisfaction and work-related boredom, we estimated a second model which included a direct path between need satisfaction and work-related boredom. This model did not fit better than the original model ($\chi^2 = 9.63$, $df = 5$, $\Delta\chi^2 = 3.78$, $\Delta df = 1$, ns), which

implies that the association between need satisfaction and work-related boredom is fully mediated by intrinsic motivation. To formally test this mediating effect (Hypothesis 7), the significance of the indirect relation between need satisfaction and work-related boredom through intrinsic motivation was examined using Bayesian estimation in Mplus 7 (using the Mplus 7 default priors). In support of Hypothesis 7, the results of the analysis showed this indirect effect to be negative and significant ($B = -0.13$; 95% CI between -0.19 and -0.06).

Furthermore, in support of Hypotheses 8, Figure 3 reveals a negative relation between work-related boredom on the previous day and an unfavourable prework attitude (supporting Hypothesis 8a), and between unfavourable prework attitude and intrinsic motivation (supporting Hypothesis 8b). We examined if a direct association existed between work-related boredom on the previous day and work-related boredom on the present day, but the model including this path did not fit better than the original model ($\chi^2 = 10.11$ $df = 5$ $\Delta\chi^2 = 3.30$, $\Delta df = 1$, ns). Hence, we conclude that the association between work-related boredom on the previous day and on the present day is fully mediated by unfavourable prework attitude and intrinsic motivation. Bayesian estimation in Mplus 7 (using the Mplus 7 default priors) indeed showed the indirect effect of boredom on the previous day to boredom on the present day, through unfavourable prework attitude and intrinsic motivation to be positive and significant ($B = 0.02$; 95% CI between 0.001 and 0.05), which supports Hypothesis 8c.

Discussion

In Study 2, we aimed to obtain insight in the daily motivational process underlying the development of work-related boredom, and to examine the spillover of boredom to predict next day work-related boredom. Results first showed substantial variation in the experience of work-related boredom within employees on the day-level, supporting our day-to-day approach of studying boredom. This finding implies that although some employees experience more boredom at work than others, feelings of boredom within employees also substantially fluctuate day by day. Second, the Study 1 findings on



Age and general work-related boredom are included as control variable, but not depicted in the figure for reasons of clarity

Figure 3. Results of analyses examining the association between daily work-related need satisfaction, daily intrinsic work motivation, and daily work-related boredom (Study2).

the motivational process underlying the development of work-related boredom between individuals were replicated in this study within individuals on the day-level. Specifically, daily work-related satisfaction of the basic psychological needs turned out to be negatively related to daily work-related boredom, and this association was mediated by daily intrinsic work motivation, both within and between individuals. Third, in line with our expectations, work-related boredom on a given day was positively related to work-related boredom experienced during the next day through its relationship with unfavourable prework attitudes on that day and subsequent intrinsic work motivation. This pattern of findings suggests a negative spiral whereby daily boredom at work induces feelings of boredom the next day, indicating how “enduring” experiences of work-related boredom may develop from more momentary day-to-day experiences of this affective state.

General discussion

Despite work-related boredom being a common experience for many employees, the motivational origins of this affective state have remained relatively understudied. Therefore, in the two studies presented in this paper, we examined work-related need satisfaction and the quality of work motivation as mechanisms underlying the development of work-related boredom, relying on SDT (Deci & Ryan, 2000). These associations were examined from two different perspectives. In Study 1, we employed a between-individuals design and focused on the associations between more general, “enduring” experiences of these constructs. Study 2, in contrast, employed a daily within-individuals perspective, focusing on day-to-day variations in these work-related concepts. Additionally, in Study 1, we examined how the work characteristics defined by the JCM impinge on this motivational process, and in Study 2, we further aimed to uncover how boredom develops within individuals over time by disentangling how this motivational process spills over from one day to the other.

Main findings

We believe that our results enhance insight in the work-related processes associated with the development of boredom at work in at least three ways. First, we provide insight in the work characteristics that are associated with work-related boredom. That is, Study 1’s findings show that although skill variety shows the strongest negative relationship, all five work characteristics of Hackman and Oldham (1975) JCM correlate negatively with work-related boredom. These results support Fisher’s (1993) theorizing and extend previous research by showing that not only monotony (or low skill variety) may induce boredom at work but that also a lack of task identity, low autonomy, low task significance, and little task feedback may contribute to the development of boredom at work.

Second, we were able to shed light on the underlying mechanisms explaining the relationship of work characteristics with work-related boredom, both on an “enduring” between-person level and on a daily within-person level. In accordance with our hypotheses, Study 1 supported work-related need

satisfaction and subsequent quality of work motivation as the mediating mechanism, but only for skill variety, task identity, and autonomy. Despite their significant zero-order correlations, task significance, and feedback did not explain unique variance in need satisfaction. This may be for statistical rather than theoretical reasons, as all task characteristics were inter-related. For example, the finding that only task identity reached significance in our analyses may be caused by its relatively strong correlation with task significance ($r = .51$).

Furthermore, the associations between the work characteristics and work-related boredom were only partially mediated by work-related need satisfaction and quality-of-work motivation: Results also revealed direct associations between task significance and skill variety and intrinsic motivation, and between skill variety and work-related boredom. This indicates that there are additional mechanisms that may explain why the work characteristics of the JCM relate to the development of work-related boredom. For example, lack of variety may induce certain physiological responses or attentional difficulties that relate to boredom, besides from work-related need satisfaction and motivation. Also, the JCM proposes that skill variety and task significance relate to the experienced meaningfulness of one’s work, which may also (partly) act as a mediator in the relation between work characteristics and work-related boredom.

With respect to the associations between quality of work motivation and work-related boredom, in support of control-value theory (Pekrun, 2006; Pekrun et al., 2007), both studies showed intrinsic motivation to be negatively related to boredom. These findings extend previous research in educational settings (e.g., Ntoumanis, 2001; Pekrun et al., 2010) to the workplace by showing that performing one’s job because one finds it interesting and enjoyable is negatively related to experiencing boredom at work.

Contrary to our expectations, however, the three types of extrinsic motivation included in this study (external, introjected, and identified regulation) did not explain unique variance in work-related boredom (although they were correlated with work-related boredom in the expected direction). These findings suggest that although engaging in work for the reason of complying with one’s goals (i.e., identified regulation) is negatively related to boredom, and being motivated for one’s job for extrinsic reasons – whether it is due to external rewards or in order to avoid guilt or anxiety – is positively related to boredom, intrinsic motivation can be considered as the most important factor in this respect. Future research should investigate the stability of these findings by examining the associations between quality of work motivation and work-related boredom in other samples and with other scales (e.g., Gagné et al., 2015).

In Study 2, we found the experience of work-related boredom to show substantial day-to-day variation. This finding extends previous research on work-related boredom which often viewed boredom in relation to monotonous jobs assuming that boredom is invariably high in such jobs, and empirically supports the conceptualization of boredom as an emotion (e.g., Fisher, 1993; Pekrun et al., 2010; Van Tilburg & Igou, 2012), being transient and varying from one day to the other. This day-to-day variation further underlines the relevance of examining

boredom not only from a between-individuals perspective but also from a daily within-individuals perspective. As an important extension to the boredom literature, which has focused on boredom at the more general between-individuals level, Study 2 further showed that the association between daily need satisfaction and daily work-related boredom was mediated by daily intrinsic motivation. As similar results were found in Study 1 with respect to the indicators of the “enduring” experience of these three constructs, this underlines the validity of our hypothesized theoretical model.

Third, the present study extends previous research by proposing and testing a spillover hypothesis of boredom, increasing our understanding on how daily feelings of boredom may eventually result in a more generic experience of boredom at work. Although feelings of boredom likely disappear once the boring task has ended (cf. Pekrun et al., 2010), cognitive “after effects” of boredom (e.g., thinking about the boring work situation during off-job time) were proposed to induce negative prework attitudes the next day, such as feeling resistance towards one’s job and as such leading to reduced work motivation. In support of our spillover hypothesis, Study 2 results demonstrate that work-related boredom experienced at one day positively relates to next-day work-related boredom through its associations with an unfavourable prework attitude and decreased daily intrinsic motivation. These findings suggest that the experience of the more “enduring” experience of work-related boredom may develop as a result of a downward spiral in which each day’s boredom affects the next day’s boredom through employees’ motivational states before and during work.

Limitations and suggestions for future research

We think several issues regarding the present study need attention. First, our study relied on self-report measures, which may have resulted in an overestimation of the associations among variables due to common method variance. We nonetheless feel that replicating our findings in two different studies, adopting different research designs may attenuate this concern. Besides, many of the constructs of interest in this study refer to subjective experiences, which can best be mapped by means of reports by those who are involved in these experiences. Furthermore, not all hypothesized relations in this study were supported and several correlations were low and/or not significant, suggesting that common method variance is not a very likely alternative explanation that may threaten our conclusions. More generally, research (e.g., Spector, 2006) has demonstrated that using self-reports does not guarantee finding significant results, potential biasing variables (e.g., negative affectivity) do not generally inflate correlations among study variables, and mono-method correlations are not necessarily higher than multi-method correlations. In spite of this, it would be valuable if future studies made an effort to replicate our findings using other types of measures. For example, job descriptions or observational data could be used to measure work characteristics more objectively and examine how these relate to perceived work

characteristics, need satisfaction, motivation quality, and feelings of boredom.

Second, our studies were based on correlational data (with concurrent assessments of need satisfaction, motivation, and work-related boredom). Therefore, causality can only be assumed on theoretical rather than empirical grounds. Even though theory (e.g., JCM, SDT, AET, TPB) supports our proposed order, be possible that the causal chain, or part of it, also operates in the opposite direction. Our data from Study 2 seem to support an additional reversed causal process to some extent, as it showed that work-related boredom on one day was related to work-related boredom on the next day through its association with decreased motivation on this second day. This indicates the existence of a downward spiral in which work motivation and work-related boredom mutually influence each other. Future studies could start to provide further insight in causality by conducting (field) experiments and/or employing longitudinal, full-panel designs, preferably with a substantial number of measurement waves (Taris & Kompier, 2003). Such designs would not only make it possible to obtain insight in the hypothesized causal processes connecting work characteristics with work-related boredom, but would also allow for a more detailed examination of reversed and reciprocal causal processes. Moreover, for the daily examination of the mechanisms underlying the development of work-related boredom, it would be valuable if multiple measurement points during a single workday were employed. Furthermore, (part of) the causal chain could also be examined using experimental designs in which – for example – motivation is manipulated to examine its effects on levels of boredom.

Third, future research should seek to uncover to what extent the spillover of boredom to next day motivation and boredom is similar for all employees, or whether it depends on personal characteristics or on contextual factors outside of work. For example, psychological detachment from work (e.g., Sonnentag & Fritz, 2015) or engagement in need satisfying activities after work may counteract the negative downward spiral of work-related boredom. Furthermore, future research over a longer time span is needed to test if and how such a downward spiral may ultimately lead to overall, more generalized work-related boredom.

Fourth, although the positioning and conceptualization of the construct of prework attitudes originates in extant theory (i.e., AET and the TPB), the construct is relatively novel in the context of daily diary research. Our study provides promising initial support for the value of this construct, by showing that it functions as a mediator linking the experience of work-related boredom on two consecutive days. Nevertheless, future research is needed to further establish its validity and theoretical and practical relevance.

Last, in the present study we focused on the work characteristics of the JCM. It would be interesting for future research to test our proposed model using other models and conceptualizations of job characteristics (e.g., based on the job-demands control model; Karasek, 1979). In addition, future research should examine to what extent perceptions of work characteristics fluctuate on a day-to-day basis, and how such fluctuating perceptions combine with previous day effects and prework attitudes in predicting work motivation and feelings of boredom at work.

Theoretical and practical implications

Despite the limitations, we feel that our studies contribute to the understanding of work-related boredom in both theoretical and practical ways. From a theoretical perspective, we shed light on the mediating mechanisms linking work characteristics to the development of work-related boredom. The present study illustrates the relevance of SDT (Deci & Ryan, 2000) in understanding the underlying mechanisms that explain the experience of boredom at the workplace, by demonstrating the importance of work-related need satisfaction and the quality of work motivation in this respect. Furthermore, we found that the experience of work-related boredom shows significant day-to-day variation, and demonstrated that the motivational processes underlying its development not only explained between-person variation in work-related boredom, but also played an important role in employees' within-person day-to-day development of boredom at work. Moreover, we were able to give a first indication of how the "enduring" experience of work-related boredom may develop from the daily experience of this affective state, by introducing and supporting a spillover hypothesis of work-related boredom.

From a practical point of view, it is important to know that even low levels of experienced work-related boredom lead to increases in severe negative outcomes such as reduced performance, job dissatisfaction, absenteeism, counterproductive work behaviour, and work injuries (e.g., Bruursema et al., 2011; Frone, 1998; Kass et al., 2001; Reijseger et al., 2013; Spector et al., 2006; Van Hooff & Van Hooft, 2014). The present study highlights the importance of employees' perceived work characteristics in predicting work-related boredom. Its results suggest that appropriate job design in terms of sufficient skill variety, task identity, and autonomy are of particular importance. Additionally, given the association between need satisfaction and boredom, boredom may be reduced by providing employees other means – apart from well-designed jobs – to fulfil their psychological needs at work, for example, by stimulating employees to give each other social support (which may contribute to satisfaction of the needs for relatedness and competence). Our finding that boredom experienced at one day affects boredom experienced on the next day further underlines the importance for employers as well as employees to be aware of employees' boredom experienced on a daily basis, and to intervene if boredom-levels are above an acceptable point, to prevent the development of a downward spiral in which levels of boredom gradually increase.

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