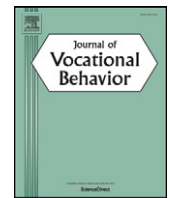




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Regulatory job stressors and their within-person relationships with ego depletion: The roles of state anxiety, self-control effort, and job autonomy[☆]



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ABSTRACT

Our research aimed at disentangling the underlying processes of the adverse relationship between regulatory job stressors and ego depletion. Specifically, we analyzed whether state anxiety and self-control effort would mediate the within-person relationships of time pressure, planning and decision-making, and emotional dissonance with ego depletion. In addition, we also tested potential attenuating effects of situational job autonomy on the adverse effects of regulatory job stressors on state anxiety, self-control effort, and ego depletion. Based on an experience sampling design, we gathered a sample of 97 eldercare workers who provided data on 721 experience-sampling occasions. Multilevel moderated serial mediation analyses revealed that time pressure and emotional dissonance, but not planning and decision-making, exerted significant serial indirect effects on ego depletion via state anxiety and self-control effort. Finally, we found conditional serial indirect effects of all three regulatory job stressors on ego depletion as a function of job autonomy. Theoretical implications for scholarly understanding of coping with regulatory job stressors are discussed.

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1. Introduction

Nowadays, employees are increasingly required to work under tight deadlines, to make plans and decisions independently, and to display specific emotions at work (Hülshager & Schewe, 2011; Kubicek, Paškván, & Korunka, 2015). To meet such requirements, employees have to control and regulate their attention, behavior, and emotions. A large body of evidence shows that such requirements to regulate oneself act as sources of work stress which tax and deplete limited self-regulatory resources (e.g. Alarcon, 2011, Schmidt & Diestel, 2015). In cases of depleted self-regulatory resources, employees are less able to cope with requirements to self-regulate and experience feelings of exhaustion. Such perceived states of a temporarily reduced capacity to regulate one's behavior, attention, and emotions reflect diminished resources and are referred to as ego depletion (Muraven & Baumeister, 2000).

In order to explain the effects of job stressors on employees' ego depletion, scholars have delineated different theoretical frameworks that expatiate upon underlying cognitive and emotional processes. On the one hand, from an action regulation perspective (e.g. Frese & Zapf, 1994, Hacker, 2003), some authors have argued that job stressors deplete employees' self-regulatory

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resources through overtaxing processes of goal-directed action regulation. Following from the model of self-control strength (Baumeister, Vohs, & Tice, 2007; Muraven & Baumeister, 2000), overtaxing goal-directed action regulation becomes manifest in high volitional self-control effort (Schmidt & Diestel, 2015). On the other hand, from a cognitive appraisal perspective (e.g., Lazarus, 1991), job stressors may deplete employees' self-regulatory resources by first triggering dysfunctional appraisal processes which cause emotions such as state anxiety. Coping with anxiety requires effort in volitional self-control and thus may explain the resource depletion (Eysenck, Derakshan, Santos, & Calvo, 2007). In sum, action regulation theory predicts that job stressors translate themselves into ego depletion by requiring high levels of self-control effort, whereas cognitive appraisal theory suggests that state anxiety mediates the relation of job stressors to self-control effort and ego depletion.

Although several studies have provided some support for the first theoretical explanation derived from action regulation theory (e.g., Diestel & Schmidt, 2012), scholarly understanding of the underlying psychological processes that determine the adverse effects of regulatory job stressors on ego depletion is largely limited in at least three ways. First, while some authors have proposed that certain job stressors (e.g., emotional dissonance in Diestel, Rivkin, & Schmidt, 2015, p. 810) put high demands on volitional self-control, thus far self-control processes have only been found to mediate the effects of workload on job strain (Diestel & Schmidt, 2012). Thus, we do not know whether self-control processes may also explain the deleterious effects of other regulatory job stressors. Second, most studies are primarily based on interindividual designs, which neglect the substantial within-person fluctuations of regulatory job stressors, emotions, self-control effort, and associated states of ego depletion (Kühnel, Sonnentag, & Bledow, 2012; Rivkin, Diestel, & Schmidt, 2015a). Moreover, all aforementioned theories propose psychological processes and mechanisms that emerge immediately and can therefore only be validly analyzed using an experience sampling design (Fisher & To, 2012). Third, past research has failed to examine other relevant processes that can be derived from the cognitive appraisal perspective and may explain why regulatory stressors cause employees to engage in self-control effort. Thus, scholarly knowledge on the effects of regulatory job stressors on states of ego depletion may benefit from a more integrative conceptual view that clearly differentiates between regulatory job stressors, elicited emotions, self-control processes, and resource depletion.

In light of these issues, our research aims at contributing to the literature in four ways. First, in testing the positive relationships of regulatory job stressors with ego depletion, we focus on three different regulatory job stressors which should cause employees to control and regulate their attention, behavior, and/or emotions: time pressure, planning and decision-making, and emotional dissonance. In doing so, we provide support for the notion that, despite their conceptual differences, all three regulatory job stressors exert their immediate adverse influences on employees' self-regulatory resources through the same mechanisms. Second, drawing on an experience sampling design, we analyze mediating variables, which explain the link of regulatory job stressors to ego depletion, with a design adequate for the proposed immediate within-person effects. Third, based on an integration of action regulation theory, cognitive appraisal theory, and the self-control strength model, we develop a serial mediation model to reveal how exactly regulatory job stressors contribute to resource depletion. By examining both state anxiety and self-control effort as serial mediators in the positive relationships of regulatory job stressors with ego depletion, we are able to integrate diverse explanatory mechanisms derived from theories with different conceptual foci. Fourth, our study also aims at clarifying the processes of how situational job autonomy facilitates coping with regulatory job stressors. Although both action regulation theory and cognitive appraisal theory argue that situational job autonomy should attenuate the adverse effects of regulatory job stressors, both theories postulate different mechanisms to explain its attenuating effects.

1.1. Self-control effort as a mediator between regulatory job stressors and ego depletion

According to action regulation theory (e.g. Frese & Zapf, 1994, Hacker, 2003, 2005), goal-directed work behavior can involve both automatic and cognitive processes. Whereas low-structure tasks or simple demands can be met through automatic processes, more complex job situations require analysis of goals and environmental conditions, problem solving, and decision-making, all of which involve high-level cognitive processing (Frese & Zapf, 1994; for examples also refer to Zapf, 2002). Drawing from this distinction, we define regulatory job stressors as those work characteristics that disturb action regulation and thus put high demands on cognitive processing. In particular, we will include time pressure, planning and decision-making, and emotional dissonance in our study to show that, despite their conceptual differences, high quantitative, qualitative, and emotional requirements trigger the same cognitive processes that draw on employees' limited self-regulatory resources.

Time pressure is commonly referred to as the extent to which employees feel that they need to work at a faster than usual pace or have insufficient time to finish their work tasks (Baer & Oldham, 2006; Kinicki & Vecchio, 1994). Based on action regulation theory, Diestel and Schmidt (2012) argued that time pressure (as an aspect of high workload) overtaxes processes of action regulation because employees need to shift and adapt action plans, focus on task-relevant information, and change their goal-related priorities. Such cognitive flexibility of executive mechanisms is effortful and thus puts high demands on volitional self-control. In support of this line of reasoning, Diestel and Schmidt (2012) found mediating effects of self-control processes in the positive relationship of workload (measured via time pressure and concentration demands) with job strain.

Similar arguments can be derived for planning and decision-making. Hacker (2005) theorized that the cognitive processes of flexible planning and complex decision-making are straining because of their requirement to focus attention, to elaborate on different action plans, and to involve working memory capacity. Consistent with this argument, Vohs et al. (2008) showed that high demands on decision-making cause ego depletion.

Finally, emotional dissonance as the most stressful aspect of emotional labor "occurs when an employee is required to express emotions which are not genuinely felt in the particular situation" (Zapf & Holz, 2006, p. 4). Effective coping with emotional dissonance requires employees either to align their emotions with display rules or to show the required emotions without feeling them. Both forms

of coping require action regulation because they imply behavioral control of one's emotional display (Zapf, 2002). Further, van Gelderen, Bakker, Konijn, and Demerouti (2011) showed that both forms are related to day-specific exhaustion. In line with the self-control view on emotional labor (Zapf & Holz, 2006), experimentally-induced emotional dissonance affects working memory operations and predicts sympathetic activation (Robinson & Demaree, 2007; Schmeichel, Vohs, & Baumeister, 2003).

In summary, both theoretical reasoning and empirical evidence provide strong support for the proposition that time pressure, planning and decision-making, and emotional dissonance require employees to invest cognitive effort in action regulation processes. Following from the self-control strength model (Muraven & Baumeister, 2000) and its application to work contexts (e.g., Schmidt & Diestel, 2015), such cognitive effort involves volitional self-control. Diestel and Schmidt (2012) argued that higher-order goal-directed action regulation is guided by self-control processes, such as overcoming inner resistances, resisting distractions, and impulse control, all of which tax the same self-regulatory resources (see also Rivkin, Diestel, & Schmidt, 2015b).

Because coping with regulatory job stressors requires effort in self-control processes, regulatory job stressors should be associated with perceived ego depletion. As noted above, we conceptualize experienced ego depletion as a temporary state characterized by perceived exhaustion and impaired willingness to engage in self-control. Our conceptualization derives from the experimental finding that experienced depletion or exhaustion corresponds with one's actual impaired ability to exert volitional self-control (Bertrams, Unger, & Dickhäuser, 2011). That is, consistent with recent diary studies on ego depletion (Barnes, Lucianetti, Bhawe, & Christian, 2015; Lanaj, Johnson, & Barnes, 2014; Rivkin et al., 2015a), we propose that perceived ego depletion reflects the actual depletion of self-regulatory resources. Based on action regulation theory as well as the self-control strength model, we predict:

Hypotheses 1. a–c: Regulatory job stressors, i.e., (a) time pressure, (b) planning and decision-making, and (c) emotional dissonance, exhibit positive indirect within-person relationships with ego depletion via increased self-control effort.

1.2. The role of state anxiety in self-control processes

Although action regulation theory emphasizes the role of cognitive processes to ensure goal achievement, it leaves aside the role of cognitive appraisals of job stressors and associated emotions elicited from such cognitive appraisals (e.g. Frese & Zapf, 1994, Hacker, 2003). However, we believe that the role of emotions is relevant for our understanding of underlying processes that determine the effects of job stressors on ego depletion. In particular, we predict mediating effects of state anxiety in the positive relationship of regulatory job stressors to increased self-control effort and ego depletion.

Because regulatory job stressors threaten goal achievement (Hacker, 2003), they are likely to elicit anxiety (Skinner & Brewer, 2002). According to Lazarus (1991), anxiety is a response to uncertainty and stems from potential or actual threats to the self. Job stressors in general may contribute to the fear of not being capable of achieving organizational goals and may therefore cause anxiety. In particular, time pressure may create uncertainty about successful task completion or goal achievement; planning and decision-making may evoke uncertainty about the consequences of one's decisions; and emotional dissonance may create uncertainty regarding whether one is actually able to adhere to organizational display rules. Indeed, empirical research shows that job stressors trigger threat appraisals and elicit state anxiety (e.g. Diestel & Schmidt, 2012, Rodell & Judge, 2009).

Threat appraisals and feelings of anxiety entrain action tendencies to distance oneself from troubling situations (e.g. Lazarus, 1991, Mackey & Perrewé, 2014). In work settings, such withdrawal behavior is usually not adequate. Thus, employees have to engage in volitional self-control to overcome their inner resistance, which stems from negative emotions, and tackle their work tasks. Further, state anxiety impairs attentional control by increasing automatic processing of threat-related stimuli and disturbing the goal-directed attention that is required for efficient task performance (Eysenck et al., 2007). Therefore, additional effort has to be invested in central executive functions, such as inhibiting automatic reactions to task-irrelevant stimuli (Eysenck et al., 2007) or, in other words, to resist threat-related distractions in order to achieve work goals.

We argue that overcoming inner resistance attributable to withdrawal tendencies and resisting threat-related distractions require employees to increase their self-control effort. Thus, state anxiety, which results from cognitive appraisal processes, may explain why regulatory job stressors cause employees to engage in self-control effort (compare Fig. 1 for a graphical representation of our research model). Our arguments that regulatory job stressors increase state anxiety, that state anxiety increases self-control effort, and that self-control effort depletes limited self-regulatory resources, lead us to hypothesize:

Hypotheses 2. a–c: Regulatory job stressors, i.e., (a) time pressure, (b) planning and decision-making, and (c) emotional dissonance, exhibit positive serial indirect within-person relationships with ego depletion via increased state anxiety and consequently increased self-control effort.

1.3. Situational job autonomy as a moderator in self-control processes

According to recent meta-analyses (Alarcon, 2011), job autonomy, or the decision latitude one has over immediate tasks and time constraints, reduces aspects of job strain such as emotional exhaustion. Moreover, Kühnel et al. (2012) revealed that job autonomy exhibits meaningful fluctuations within persons. Both action regulation theory and cognitive appraisal theory imply that situational job autonomy attenuates the adverse effects of job stressors. However, both theories make different predictions of how exactly job autonomy affects the mechanisms that link job stressors to job strain.

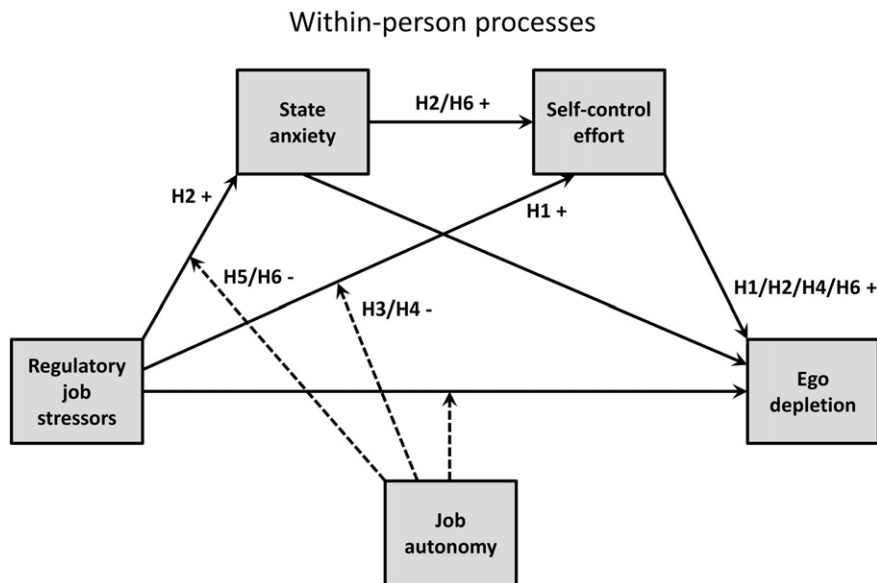


Fig. 1. Graphical representation of the research model.

From an action regulation perspective, some authors have argued that because job autonomy permits employees to address regulatory job stressors how and when they feel it is best, employees should be better able to utilize their self-regulatory resources (e.g., Schmidt & Diestel, 2011). In situations where employees experience higher levels of job autonomy, they are able to reduce the amount of invested willpower by facing regulatory job stressors at times or in ways that better fit their coping capacities. In contrast, in situations where employees experience low levels of job autonomy, they have no latitude in coping with regulatory job stressors and are required to immediately deal with these stressors. Consequently, ego depletion will be more likely in situations that are characterized by low job autonomy than in situations characterized by high job autonomy. Thus, we predict:

Hypotheses 3. a–c: Job autonomy moderates the positive within-person relationships of regulatory job stressors, i.e., (a) time pressure, (b) planning and decision-making, and (c) emotional dissonance, with self-control effort: The relationships are attenuated as a function of job autonomy.

Hypotheses 4. a–c: The indirect within-person relationships of regulatory job stressors, i.e., (a) time pressure, (b) planning and decision-making, and (c) emotional dissonance, with ego depletion via self-control effort are moderated (attenuated) by job autonomy.

From a cognitive appraisal perspective, job autonomy may affect cognitive appraisal processes and thus attenuate affective reactions to regulatory job stressors. If an employee actively decides to face certain regulatory job stressors in situations with high job autonomy, the employee's knowledge that he or she can control the work situation and theoretically avoid the regulatory job stressor should reduce anxiety (Lazarus, 1991). In contrast, knowledge of powerlessness will not soothe the employee's anxiety in situations with low job autonomy. Thus, we predict:

Hypotheses 5. a–c: Job autonomy moderates the positive within-person relationships of regulatory job stressors, i.e., (a) time pressure, (b) planning and decision-making, and (c) emotional dissonance, with state anxiety: the relationships are attenuated as a function of job autonomy.

Hypotheses 6. a–c: The serial indirect within-person relationships of regulatory job stressors, i.e., (a) time pressure, (b) planning and decision-making, and (c) emotional dissonance, with ego depletion via state anxiety and self-control effort are moderated (attenuated) by job autonomy.

2. Method

2.1. Participants

We recruited a sample of eldercare workers because we expected substantial within-person fluctuations in time pressure, planning and decision-making, and emotional dissonance based on previous research (Kubicek, Ulferts, & Korunka, 2013; Thompson, Aitken, Doran, & Dowding, 2013). Ninety-seven Austrian eldercare workers took part in the present study, 89 of whom were women and 8 were men. Their mean age was 39.6 years ($SD = 9.5$), and mean job tenure was 8.9 years ($SD = 8.3$).

2.2. Procedure

We recruited study participants by contacting nursing homes. If managers of the nursing homes expressed interest in the study, we presented the study procedure to potential participants, namely, registered nurses, orderlies, and nursing aides. We guaranteed that participation was voluntary and anonymous. We also made the goals of the study fully transparent. As an incentive for participation, we provided feedback regarding the study results.

Because we were specifically interested in within-person processes, we conducted an experience sampling study (Fisher & To, 2012). Participants were asked to complete a general survey and then received a smartphone for five consecutive work shifts. In the week that preceded data collection, all participants received training on the usage of the smartphone devices, which were subsequently used to gather experience-sampling data. On the smartphones, participants had to answer short surveys at shift onset, at random time intervals during the shift, and at shift's end. Participants were instructed to fill in the short survey at shift onset, right before they started their work, and at shift's end just after finishing their work. Surveys during the shift were to be completed whenever participants were signaled during their shifts. For signaling purposes, the smartphones were programmed to beep once every 4 h at a random time point during that 4 h period. Because the signals occurred at random time points, the duration between two consecutive signals was not fixed and the number of signals a participants received per shift varied as a function of shift length. However, we ensured that consecutive signals were at least one and at most 7 h apart from one another and that participants received at least one signal per shift.

Originally, 111 persons registered to participate and completed the general survey. Out of these 111 participants, 14 persons failed to respond to at least 20% of the signals and were thus excluded from our analyses (McCabe, Mack, & Fleenon, 2012). In the final sample, participants responded on average to 67.8% of their signaled occasions within 60 min and thus provided data at 721 signaled occasions that could be used in data analysis.

2.3. Measures

We used shortened scales from valid and reliable questionnaires for all measures to reduce the burden on participants of completing long scales multiple times (Fisher & To, 2012). We first measured the outcome (ego depletion), then the mediators (state anxiety and self-control effort), followed by the predictors (time pressure, planning and decision-making, and emotional dissonance), and finally the moderator (job autonomy). At each experience sampling occasion, participants responded to three items per scale on 5-point scales (1 = *not at all*, 5 = *completely* for state anxiety and ego depletion; 1 = *strongly disagree*, 5 = *strongly agree* for all other measures). All items were administered in German.

Time pressure was assessed with three items (e.g., "During the last hour, I was pressed for time.") that were adapted from the Instrument for Stress-oriented Job Analysis (Semmer, Zapf, & Dunckel, 1999).

Planning and decision-making was assessed with three items (e.g., "During the last hour, my job required me to make decisions on the priority of tasks on my own.") that were adapted from the job-related planning and decision-making subscale of the Intensification of Job Demands Scale (Kubicek et al., 2015).

Emotional dissonance was assessed with three items (e.g., "During the last hour, I had to display emotions that were different from my actual emotions.") that were adapted from the Frankfurt Emotion Work Scales (Zapf, Vogt, Seifert, Mertini, & Isic, 1999).

Job autonomy was assessed with three items (e.g., "During the last hour, I could determine by myself which way to carry out my work.") that were adapted from the job control subscale of the Instrument for Stress-oriented Job Analysis (Semmer et al., 1999).

State anxiety was assessed with three items (e.g., "During the last hour, I felt nervous.") that were adapted from the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970).

Self-control effort was assessed at each experience sampling occasion with three items (e.g., "During the last hour, starting certain tasks required me to use a lot of willpower.") that were adapted from Schmidt and Neubach (2010); see also van Hooff & Geurts, 2015). The scale originally measured demands on self-control, including impulse control, resisting distractions, and overcoming inner resistance. Consistent with previous research (Schmidt & Diestel, 2015), we operationalized self-control effort with a compound measure given that all forms of self-control are expected to draw on and deplete a common self-regulatory resource.

Ego depletion was assessed using three reverse-coded items (e.g., "My mental energy is running low.") from the State Self-Control Capacity Scale (Bertrams et al., 2011; also see Christian & Ellis, 2011), which refers to the experience of self-regulatory resource depletion as proposed by Muraven and Baumeister (2000). In addition to all experience sampling occasions, we included this scale in the daily surveys at shift onset and at shift's end.

To test construct validity of our study variables, we conducted multilevel confirmatory factor analyses (MCFAs) with Mplus 7.3 (Muthén & Muthén, 1998–2012). The MCFAs showed a good fit of the hypothesized seven-factor model ($\chi^2 = 747.7$, $df = 336$, RMSEA = .04, CFI = .95, AIC = 32,912.3) that was superior to the best-fitting six-factor model with time pressure and self-control effort as one factor ($\chi^2 = 849.2$, $df = 348$, RMSEA = .05, CFI = .93, AIC = 32,989.8) as well as the one-factor model ($\chi^2 = 4849.5$, $df = 378$, RMSEA = .13, CFI = .40, AIC = 36,930.0).

2.4. Data analysis

Because our data had a nested data structure with measurement occasions nested within persons, we tested our hypotheses using multilevel structural equation modeling (Preacher, Zhang, & Zyphur, 2011) in Mplus 7.3 (Muthén & Muthén, 1998–2012). This technique allows for conducting analyses at multiple levels simultaneously and is less prone to biases than other techniques of multilevel

mediation analysis. In three separate multilevel analyses, we adapted the moderated serial multiple mediation model (Hayes, 2015). In each analysis, we added moderations by job autonomy to the relationships of one of the three regulatory job stressors with both mediators as well as the outcome. To remove any between-person variance in interaction terms, we centered the moderator and focal regulatory job stressor at their respective person-means before creating the interaction terms (van Hooff & Geurts, 2015).

Further, because we investigated the imminent within-person relationships of regulatory job stressors with state anxiety, self-control effort, and ego depletion, our analyses focused on the relationships between variables obtained at the same measurement occasions. However, we controlled for serial dependency in the data by controlling for the lagged effects from mediators and outcome at the preceding observations to their current observations. Because state anxiety and self-control effort were only measured at signaled measurement occasions during the shifts, lagged values from shift onset were missing at the first signaled measurement occasion per shift. Nevertheless, controlling for lagged effects implies that we are predicting changes in both the mediators and the outcome.

Finally, because our analyses included tests of significance of (moderated) indirect relationships and the distribution of indirect relationships is skewed in most cases, we used Bayesian estimators with Mplus 7.3 (Muthén & Muthén, 1998–2012) default (non-informative) priors and means for point estimates in our analyses.

3. Results

3.1. Preliminary analyses

Table 1 reports the descriptive statistics and correlations of our variables. To estimate internal consistencies, we analyzed Cronbach's alphas and McDonald's omegas (cf. Dunn, Baguley, & Brunson, 2014). Although internal consistency was somewhat low for self-control effort, all factor loadings were significant, with signs corresponding to expectations.

Before we tested our hypotheses, we examined the degree of within-person variation in our data. There was substantial within-person variation, ranging between 26% (for emotional dissonance) and 55% (for planning and decision-making), which called for a multilevel approach to the data analysis (see Column 4 in Table 1).

3.2. Hypothesis testing

The results from our multilevel moderated serial mediation analyses are shown in Table 2. With posterior predictive *p* values close to the ideal value of .500 (cf. Muthén & Asparouhov, 2012, p. 315), all three models showed excellent model fits.

Hypotheses 1a–c and 2a–c predicted indirect and serial indirect relationships, or, in other words, the effects of predictors on outcomes via one or more mediators. To test these assumptions, we interpreted the respective indirect and serial indirect relationships at average levels of job autonomy (shown in Table 3). In line with Hypotheses 1a, 2a, 1c, and 2c, the indirect relationships of time pressure and emotional dissonance with ego depletion via self-control effort (Hypotheses 1a and c), as well as serially via state anxiety and self-control effort (Hypotheses 2a and c), were significant at average levels of job autonomy. However, contrary to Hypotheses 1b and 2b, the respective indirect and serial indirect relationships of planning and decision-making were not significant. Thus, although Hypotheses 1a, 1c, 2a, and 2c were supported, Hypotheses 1b and 2b had to be rejected.

Hypotheses 3a–c predicted that job autonomy would moderate the relationships between regulatory job stressors and self-control effort, and Hypotheses 4a–c proposed conditional indirect effects of regulatory job stressors on ego depletion via self-control effort as a function of job autonomy. To test these assumptions, we interpreted the interaction terms from the models (shown in Table 2) and calculated indices of moderated mediation (Hayes, 2015) for the indirect relationships (shown in Table 3). Contrary to Hypotheses 3a–c, none of the interaction terms that predicted self-control effort reached significance. Consequently, the indices of moderated mediation also indicated that job autonomy did not moderate the indirect relationships of regulatory job stressors with ego depletion via self-control effort (see Table 3), and thus, Hypotheses 3a–c and 4a–c were not supported.

Hypotheses 5a–c predicted that job autonomy would moderate the relationships between regulatory job stressors and state anxiety. In addition, according to Hypotheses 6a–c, we expected that the serial indirect effects of regulatory job stressors on

Table 1

Means, standard deviations, within-person variation, indicators of scale reliability, and within-person correlations of the study variables.

	<i>M</i>	<i>SD</i>	1-ICC ^a	α ^b	ω ^c	1	2	3	4	5	6	7
1 Time pressure	2.78	0.91	50%	.88	.84	–						
2 Planning and decision-making	3.86	0.76	55%	.89	.82	.28	–					
3 Emotional dissonance	2.06	1.00	26%	.93	.76	.33	.12	–				
4 Job autonomy	3.92	0.76	44%	.88	.77	.03	.47	–.06	–			
5 State anxiety	1.56	0.63	41%	.86	.79	.36	.08	.38	–.08	–		
6 Self-control effort	2.47	0.82	46%	.69	.61	.49	.21	.36	.06	.32	–	
7 Ego depletion	2.03	0.74	48%	.93	.86	.15	.03	.25	–.03	.34	.28	–

Note. Numbers in bold indicate *p* < .05 for within-person correlations.

^a 1-ICC = percentage of variance at the day level; ICC = variance at person level / (variance at day level + variance at person level).

^b Cronbach's alphas calculated from disaggregated data without considering the nested data structure.

^c McDonald's omegas are indices of within-person measurement reliability considering the nested data structure.

Table 2

Within-person path estimates and explained variance at within-person level as well as model fit information from multilevel moderated serial mediation analyses.

	Model 1	Model 2	Model 3
Predicting state anxiety (R ²)	(.262)	(.264)	(.263)
State anxiety at previous occasion	0.274	0.268	0.267
Time pressure	0.145	0.138	0.143
Planning and decision-making	−0.012	−0.010	−0.010
Emotional dissonance	0.177	0.174	0.174
Job autonomy	− 0.084	− 0.086	− 0.076
Time pressure × job autonomy	− 0.105		
Planning and decision-making × job autonomy		− 0.084	
Emotional dissonance × job autonomy			− 0.145
Predicting self-control effort (R ²)	(.294)	(.309)	(.305)
Self-control effort at previous occasion	0.079	0.082	0.079
State anxiety	0.113	0.121	0.119
Time pressure	0.291	0.285	0.287
Planning and decision-making	0.040	0.043	0.042
Emotional dissonance	0.210	0.207	0.209
Job autonomy	0.033	0.037	0.039
Time pressure × job autonomy	−0.058		
Planning and decision-making × job autonomy		−0.021	
Emotional dissonance × job autonomy			−0.064
Predicting ego depletion (R ²)	(.228)	(.230)	(.226)
Ego depletion at previous occasion	0.298	0.299	0.299
State anxiety	0.283	0.287	0.284
Self-control effort	0.151	0.153	0.152
Time pressure	−0.030	−0.037	−0.034
Planning and decision-making	−0.027	−0.028	−0.026
Emotional dissonance	0.092	0.090	0.096
Job autonomy	0.009	0.005	0.014
Time pressure × job autonomy	−0.039		
Planning and decision-making × job autonomy		−0.045	
Emotional dissonance × job autonomy			−0.025
Model fit information			
Posterior predictive <i>p</i> value (ppp)	.501	.486	.481
Deviance information criterion (DIC)	12,742.1	12,716.2	12,273.7

Note. Numbers in bold indicate $p < .05$.

ego depletion via state anxiety and self-control effort would be contingent upon job autonomy. To test our predictions, we again interpreted the interaction terms from the models (shown in Table 2) and calculated indices of moderated mediation for the serial indirect relationships (shown in Table 3). In line with Hypotheses 5a–c, the interaction terms that predicted state anxiety were significant for all three regulatory job stressors. Fig. 2 illustrates the interactions of the three regulatory job stressors with job autonomy on state anxiety as well as simple slope estimates. Job autonomy mitigated the relationships of time pressure and emotional dissonance with state anxiety (compare Fig. 2). Furthermore, the relationship between planning and decision-making and state anxiety tended to be positive at low levels of job autonomy and negative at high levels (compare Fig. 2). The indices of moderated mediation showed that the serial indirect relationships of all three regulatory job stressors with ego depletion via state anxiety and self-control effort were moderated by job autonomy (see Table 3). In sum, our results lend strong support for Hypotheses 5a–c and 6a–c.

Table 3

Indices of moderated mediation and specific indirect and serial indirect relationships at low, average, and high levels of job autonomy.

Within-person indirect effects	Index of moderated mediation	Job autonomy		
		Low (−1 SD)	Average	High (+1 SD)
Time pressure → state anxiety → ego depletion	− 0.030	0.059	0.041	0.024
Time pressure → self-control effort → ego depletion	−0.009	0.049	0.044	0.039
Time pressure → state anxiety → self-control effort → ego depletion	− 0.002	0.004	0.002	0.001
Planning and decision-making → state anxiety → ego depletion	− 0.024	0.011	−0.003	−0.017
Planning and decision-making → self-control effort → ego depletion	−0.003	0.008	0.007	0.005
Planning and decision-making → state anxiety → self-control effort → ego depletion	− 0.002	0.001	0.000	−0.001
Emotional dissonance → state anxiety → ego depletion	− 0.041	0.074	0.049	0.025
Emotional dissonance → self-control effort → ego depletion	−0.010	0.038	0.032	0.026
Emotional dissonance → state anxiety → self-control effort → ego depletion	− 0.003	0.005	0.003	0.002

Note. Numbers in bold indicate $p < .05$.

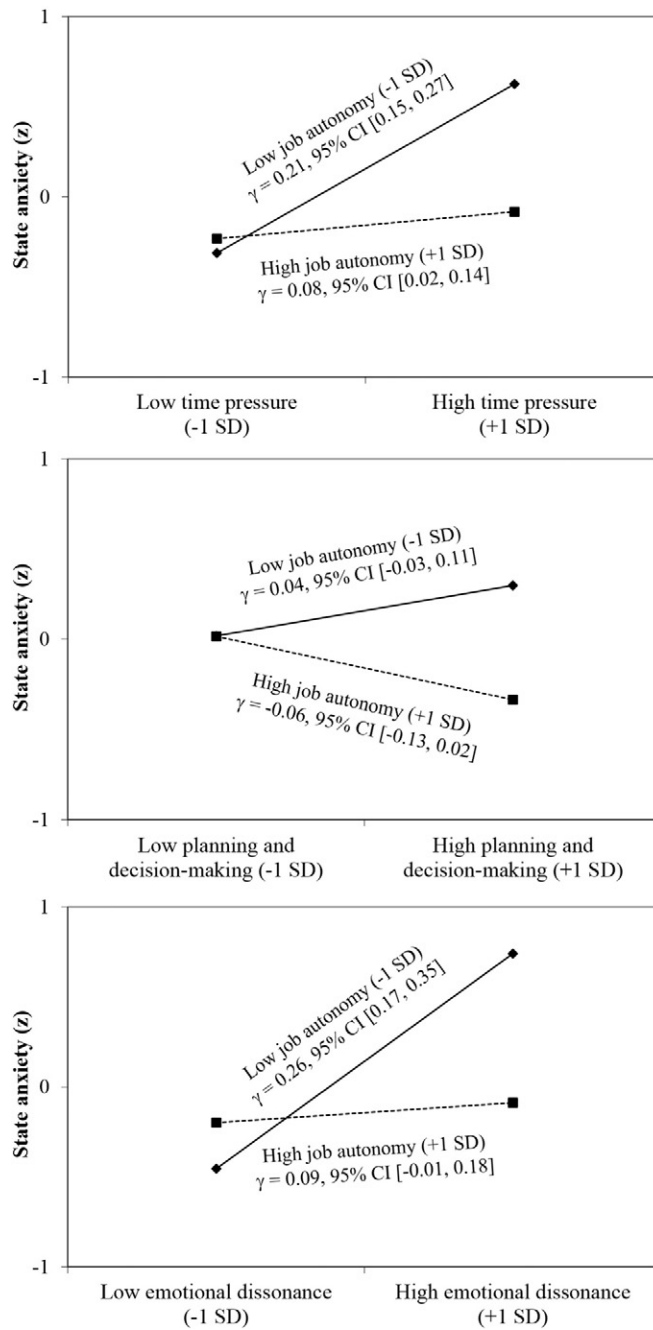


Fig. 2. Interaction diagrams showing within-person moderating effects of job autonomy in relationships of regulatory job stressors with state anxiety as well as simple slope estimates at ± 1 SD from average levels of job autonomy. Note. CI = Bayesian credibility interval.

4. Discussion

In the present research, we proposed and examined indirect relationships via state anxiety and self-control effort in the within-person processes that underlie the relationships of regulatory job stressors with ego depletion. Drawing on action regulation theory (e.g. Frese & Zapf, 1994, Hacker, 2003), the self-control strength model (Muraven & Baumeister, 2000) and cognitive appraisal theory (e.g., Lazarus, 1991), we proposed a serial process to explain how regulatory job stressors deplete employees' self-regulatory resources and how job autonomy might attenuate the adverse effects of regulatory job stressors. By simultaneously testing mechanisms derived from multiple theoretical frameworks in an integrative model, we were able to advance scholarly knowledge of the underlying psychological processes that link regulatory job stressors to ego depletion.

Our experience sampling study revealed that time pressure and emotional dissonance, but not planning and decision-making, were serially linked to ego depletion through state anxiety followed by self-control effort. Moreover, we uncovered that job autonomy moderated the relationships between regulatory job stressors and state anxiety but not between regulatory job stressors and self-control effort. When considering the moderating effects of job autonomy, we found conditional serial indirect relationships of all three regulatory job stressors via state anxiety and self-control effort with ego depletion.

4.1. Theoretical implications

From an action regulation perspective, the mediating effects of self-control effort in the positive relationship of time pressure and emotional dissonance to ego depletion provide support for the notion that regulatory job stressors deplete self-regulatory resources because those stressors cause employees to engage in volitional self-control (Diestel & Schmidt, 2012). However, using a within-person approach, we were able to demonstrate that coping with regulatory job stressors requires a high level of self-control effort, which immediately results in ego depletion. In particular, our experience sampling approach allowed us to test the intra-individual processes that relate regulatory job stressors to ego depletion. Because high levels of regulatory job stressors require employees to immediately control inner states and behavioral responses, they drain self-regulatory resources at the very moment in which self-control is exerted. Although we did not find a mediation via self-control effort for planning and decision-making, our findings, in conjunction with prior research by Diestel and Schmidt (2012; for a review also see Schmidt and Diestel, 2015), largely speak to the conceptual adequacy of self-control effort as a mediator between regulatory job stressors and ego depletion.

From a cognitive appraisal perspective, our results further show that the depleting effects of regulatory job stressors can also be explained in part via experienced emotions. Given previous empirical evidence, we proposed that regulatory job stressors elicit state anxiety. We further argued that overcoming withdrawal tendencies as well as increased effort in resisting threat-related distractions explained how experiences of anxiety led to increases in self-control effort. For time pressure and emotional dissonance, we found the proposed serial mediations via state anxiety and self-control effort on ego depletion. For planning and decision-making, however, we found no direct relationship with state anxiety. An explanation for this finding may be that planning and decision-making is only perceived as a threat in certain work situations, such as when lacking job autonomy.

In addition to analyzing the processes that link regulatory job stressors to ego depletion, we were interested in whether and how job autonomy would influence the underlying mechanisms. Our results indicated that having discretion over how and when regulatory job stressors were approached did not directly attenuate the relationships of regulatory job stressors with self-control effort. Instead, job autonomy moderated the relationships between regulatory job stressors and state anxiety. These effects were found for all three regulatory job stressors, including planning and decision-making. Thus, not only did job autonomy mitigate the relationships of time pressure and emotional dissonance with state anxiety, but the direction of the relationship between planning and decision-making with state anxiety also varied as a function of job autonomy. Our data suggest that planning and decision-making only leads to state anxiety when job autonomy is low, consistent with our previous explanation for the lack of an overall relationship.

Overall, our data support the assumptions of attenuating effects by job autonomy as derived from cognitive appraisal theory but not from action regulation theory. This suggests that action regulation theory could benefit from including cognitive appraisals of stressors as well as emotions elicited in these appraisals in its models. Furthermore, our study suggests that planning and decision-making may only act as a regulatory job stressor in situations characterized by low levels of job autonomy.

4.2. Strengths, limitations, and avenues for future research

A major strength of our study of within-person processes is the measurement precision afforded by conducting an experience sampling study. Using an intra-individual approach allowed us to contribute to the literature on job stress, cognitive appraisal, self-control effort, and ego depletion. Although the model of self-control strength proposed immediate effects of self-control on ego depletion, previous research on self-control at work had largely ignored within-person fluctuations in regulatory job stressors and ego depletion.

However, our study also has some limitations. Because all of our measures were based on self-reports, concerns about common-method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003) could be raised. Further, because our analyses focused on relationships between variables obtained at the same time point, inferences about causality are limited. To dissipate some of these concerns, we measured the outcome prior to the mediators, the predictors, and the moderator to reduce common method bias that could stem from item-priming effects (Podsakoff et al., 2003). In addition, controlling for lagged effects from preceding observations in our analyses enabled us to investigate changes in the mediators and the outcome. We think that our study was optimally designed for investigating immediate within-person processes. However, future research could attempt to obtain data from different sources (e.g., coworker ratings of regulatory job stressors, psychophysiological measures of state anxiety) to further reduce common-method bias and allow stronger inferences about causality.

Further, experimental research on ego depletion typically measures ego depletion via its effects on behavior in self-control situations (e.g., Baumeister, Bratslavsky, Muraven, & Tice, 1998). In contrast to perceived ego depletion, such behavioral measures are not contaminated by self-report bias. However, scholars have provided evidence for the construct validity of perceived ego depletion and demonstrated that self-report measures of ego depletion reflect the outcome of behavioral measures of ego depletion (Bertrams et al., 2011). Nevertheless, future research could also benefit from obtaining behavioral measures of ego depletion.

Finally, although the reliability of our measure for self-control effort was somewhat low, MCFA results provided convincing evidence for the validity of our scales. Moreover, one has to keep in mind that low internal consistencies result in inflated standard errors, reducing the likelihood of detecting significant relationships. We suggest that future studies use more items when adapting Schmidt and Neubach's (2010) scale for experience sampling.

4.3. Practical implications

Our experience sampling study showed that state anxiety and self-control effort play a pivotal role in the underlying mechanisms that link time pressure and emotional dissonance to ego depletion. Because our study showed that fluctuations in regulatory job stressors immediately affect employees' energy levels, practitioners might focus not only on average levels but also on the peak levels of regulatory job stressors when redesigning jobs.

Furthermore, practitioners should keep the moderating role of job autonomy in mind. Our results suggest that job autonomy is most beneficial in work situations in which employees have to cope with high levels of regulatory job stressors. Thus, practitioners should consider how job autonomy can be increased in general as well as in situations where employees have to cope with high levels of regulatory job stressors.

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