






RESEARCH NOTE

Work-related rumination as a mediator between hindrance demands and sleep quality

Janina Janurek¹  | Nina M. Junker²  | Sascha Abdel Hadi¹  |
Andreas Mojzisch³  | Jan A. Häusser¹ 

¹Department of Psychology, Justus Liebig University, Giessen, Germany

²Department of Psychology, University of Oslo, Oslo, Norway

³Department of Psychology, University of Hildesheim, Hildesheim, Germany

Correspondence

Jan A. Häusser, Department of Social Psychology, Justus Liebig University, Otto-Behagel-Straße 10D, D-35394 Giessen, Germany.
Email: janh@psy.jlug.de

Funding information

Deutsche Forschungsgemeinschaft

Abstract

Job demands can negatively affect sleep. However, previous studies have provided inconclusive results regarding the mediating role of work-related rumination in this relationship. Integrating prolonged activation theory with the challenge-hindrance framework, we hypothesized that – on a day level – hindrance demands, but not challenge demands, are negatively associated with sleep quality and sleep duration via work-related rumination. We tested this assumption in a 14-day ambulatory assessment study with a sample of employees ($N=175$). As predicted, we found that only hindrance demands, but not challenge demands, are related to sleep quality via work-related rumination. No relationships with sleep duration were found for any type of job demands.

KEYWORDS

challenge demands, hindrance demands, job demands, perseverative cognition, rumination, sleep

Practitioner points

- Job demands increase work-related rumination before sleep which, in turn, negatively affects sleep quality.
- This effect is evident only for hindrance demands, but not for challenge demands.
- Organizations should aim to reduce hindrance demands to mitigate their employees' work-related rumination before sleep.

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2024 The Authors. *Journal of Occupational and Organizational Psychology* published by John Wiley & Sons Ltd on behalf of The British Psychological Society.

BACKGROUND

Previous research in occupational health psychology has begun to examine when and why job demands compromise sleep. In particular, work-related rumination (perseverative cognitions cycling around work) has been brought into focus as a potential mediator (van Laethem et al., 2019). According to this notion, high job demands carry over into non-work time in the form of cognitive representations of work-related stressors. Following *prolonged activation theory* (Brosschot et al., 2005), such perseverative cognitive representations can increase negative stress responses in the aftermath of the actual stressor. The authors argue that particularly sleep (or trying to sleep) is a major ‘opportunity’ for perseverative cognitions to occur. Therefore, the cognitive process of prolonging a representation of a stressor has the potential to disturb sleep and reduce sleep quality.

Because job demands, rumination, sleep quality and sleep quantity show considerable variation on a day-to-day basis, we propose that the relationships between these variables are most likely to unfold within a short time frame, especially on the day level (see Ohly et al., 2010, for a discussion of temporal dynamics in work and organizational psychology). Thus far, however, only a few day-level studies have examined these associations, two of which did not find evidence for the proposed indirect effect of job demands on sleep via rumination (Cropley et al., 2006; Vahle-Hinz et al., 2014), whereas three provided support for such a mediation (Radstaak et al., 2014; Syrek et al., 2017; van Laethem et al., 2016). In this paper, we argue that a potential reason for this inconsistency might lie in the types of job demands examined. Unfortunately, however, prolonged activation theory (Brosschot et al., 2005) does not classify different types of stressors, such as job demands, in terms of their potential to produce prolonged cognitive representations. Thus, prolonged activation theory is a broader framework that describes *how* stressors (from all domains of life) can affect well-being through prolonged activation. However, it remains silent about *which* types of (job) demands are more likely to produce rumination than others.

Here, we integrate prolonged activation theory (Brosschot et al., 2005) with the *challenge-hindrance framework* (Cavanaugh et al., 2000) to shed light on the effects of different types of job demands on rumination and sleep. Differentiating between subtypes of job demands should allow for more specific predictions and might also contribute to clarifying the inconsistencies in earlier research. Hindrance demands (e.g., bureaucracy) impede the achievement of work-related goals due to constraints, whereas challenge demands (e.g., task complexity) provide opportunities to learn, develop and achieve work-related goals (Cavanaugh et al., 2000). In line with this classification, we predict that hindrance demands produce stronger work-related rumination compared to challenge demands, because hindrance demands impede goal attainment, resulting in frustration (Tuckey et al., 2015). Thus, hindrance demands are an obstacle to experience cognitive closure or the feeling that an issue has been resolved (cf. Kim et al., 2023): hindrances like bureaucracy persist even if successfully handled in one case. This lack of closure in turn, increases the likelihood of prolonged cognitive representations of these demands as a functional mechanism to cope with similar demands in the future. In contrast, challenge demands typically imply a finite timeframe of intense working which potentially implies less ‘spillover’ to the non-work domain. In conclusion, hindrance demands should be more strongly related to work-related rumination than challenge demands.

Revisiting the inconsistent findings of earlier studies through the theoretical lens of the challenge-hindrance framework (Cavanaugh et al., 2000), it becomes evident that the studies that found the proposed indirect effect (i.e., rumination mediating the effect of job demands on sleep) used job demands that could be classified as hindrances (e.g., unfinished tasks). In contrast, the studies that did not (fully) support the indirect effect used demands that are typically classified as challenges (e.g., time pressure).

However, in a three-wave longitudinal study extending over 2 years, van Laethem et al. (2019) reported a mediation of affective rumination for the relationship between challenge demands, but not hindrance demands and sleep quality. These seemingly conflicting results can be reconciled with our theorizing when taking the temporal dynamics of the effects into account. According to our theorizing, hindrance demands should be particularly stressful the moment they occur, and, hence, increase work-related rumination after work on the day they occur. However, they should be less important to the

individual the next day, week or year. In contrast, challenge demands, such as having responsibilities in larger projects, might be more rumination-provoking in the long run.

In conclusion, by integrating prolonged activation theory (Brosschot et al., 2005) with the challenge-hindrance framework (Cavanaugh et al., 2000), we hypothesize daily indirect effects of hindrance demands – but not challenge demands – on sleep (quality and quantity) via work-related rumination.

METHODS

Participants and design

Participants ($N=287$ workers with diverse occupational backgrounds) were recruited via the panel provider *Respondi* and received financial compensation (max. 16 USD). One data set could not be matched and 30 participants did not meet pre-defined inclusion criteria: (a) working at least 19.5 hours on at least 4 days per week, (b) no diagnosed sleep disorders, (c) no regular intake of sleep medication, (d) no shift or night work and (e) working fully remotely. A further 81 participants were not included in the analyses because they completed less than 20% of the questionnaires.¹ The final sample comprised 175 participants (52% female) with an average age of 43.95 years ($SD=12.01$). Participants worked on average 39.82 hours per week ($SD=6.39$). Regarding their occupational background, 146 participants were employed, 21 were self-employed and 8 reported ‘other’. The proportion of sedentary work was 86.3%. Participants gave their informed consent. The study was approved by the local ethics committee (reference number: 2019-0008).

Participants received two emails with the survey link, one after waking up and one after finishing work, for 14 consecutive days.² In the analyses, after-work surveys were linked to morning surveys the following day. Compliance was good, with participants answering on average 76.64% of all daily morning and after-work questionnaires.

Measures³

Challenge and hindrance demands (after-work survey)

We assessed challenge and hindrance demands with eight items each, using the scale by Rodell and Judge (2009) (e.g., ‘Today, my job has required me to work very hard’, for challenge demands, and ‘Today, I have had to go through a lot of red tape to get my job done’, for hindrance demands) on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Work-related rumination (morning survey)

We assessed work-related rumination experienced the previous evening before sleeping with eight items from Du et al. (2018). The items were adapted to the work-to-home rumination context and the day level (e.g., ‘I thought about work issues that happened yesterday’) and presented together with a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

¹ When including these 81 participants in the analyses, the pattern of results remained the same.

² There was a third survey before going to sleep that is not part of the present study.

³ This study was part of a larger research project including additional measures.

TABLE 1 Means, standard deviations and correlations between study variables.

Variable	<i>M</i>	<i>SD</i>	<i>JCC</i>	1	2	3	4	5	6	7	8
1. Age	43.95	12.01		–	–.28**	.04	–.09**	–.23**	–.14**	.11**	.02
2. Gender ^a	.53	.51	–.32**		–	–.20**	.00	–.09**	–.02	–.03	–.02
3. Dependents (e.g., children) ^b	.33	.47	.04	–.20**		–	.05	.05	.02	–.08**	–.04
4. Challenge Demands (1–5)	2.93	.95	–.11	.07	–.05	.07	.89	.48**	.33**	–.04	–.11**
5. Hindrance Demands (1–5)	2.00	.74	–.29**	.03	–.08	.03	.52**	.78	.45**	–.11**	–.03
6. Rumination (1–7)	1.75	1.17	–.21**	–.04	.05	–.04	.36**	.57**	.95	–.29**	–.12**
7. Subjective sleep quality (1–4)	3.03	.73	.344	.12	–.05	–.06	.06	–.16*	–.34**	–	.29**
8. Self-reported sleep duration	432.48	75.05	.341	.07	.01	–.08	–.05	.01	–.07	.25**	–

Note: Values below the diagonal are correlations between person-level variables ($N = 175$). Values above the diagonal are correlations between day-level variables ($N = 1259$ – 1833). Significant correlations are highlighted in bold. In italics: Cronbach's alpha within. Sleep duration is indicated in minutes.

^a0 = male, 1 = female, 2 = non-binary.

^b0 = no, 1 = yes.

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

TABLE 2 Multilevel estimates for mediation models predicting effects of demands on sleep parameters via rumination.

Demands//sleep	a (demands → rumination)		b (rumination → sleep)		Indirect effect a × b		Direct effect c'	
	Estimate (SE)	95% CI	Estimate (SE)	95% CI	Estimate (SE)	95% CI	Estimate (SE)	95% CI
Within level								
Challenge//Quality	.07 (.05)	[-.01; .16]	-.12*** (.03)	[-.17; -.07]	-.01 (.01)	[-.02; .00]	-.08* (.04)	[-.15; -.01]
Challenge//Duration	.07 (.05)	[-.01; .16]	-4.30 (2.80)	[-9.79; 1.19]	-.32 (.31)	[-1.07; .14]	-3.77 (3.85)	[-11.33; 3.78]
Hindrance//Quality	.19*** (.05)	[.08; .29]	-.12*** (.03)	[-.17; -.07]	-.02** (.01)	[-.04; -.01]	.05 (.05)	[-.03; .14]
Hindrance//Duration	.19*** (.05)	[.08; .29]	-4.30 (2.80)	[-9.79; 1.19]	-.80 (.59)	[-2.13; .21]	.76 (4.70)	[-8.46; 9.97]
Between level								
Challenge//Quality	.15 (.10)	[-.04; .34]	-.19*** (.04)	[-.28; -.10]	-.03 (.02)	[-.07; .01]	.12* (.05)	[.02; .22]
Challenge//Duration	.15 (.10)	[-.04; .34]	-4.98 (4.93)	[-14.71; 4.75]	-.75 (1.00)	[-3.17; .77]	-6.74 (5.81)	[-18.22; 4.74]
Hindrance//Quality	.84*** (.13)	[.59; 1.09]	-.19*** (.04)	[-.28; -.10]	-.16*** (.04)	[-.25; -.08]	-.03 (.08)	[-.18; .12]
Hindrance//Duration	.84*** (.13)	[.59; 1.09]	-4.98 (4.93)	[-14.71; 4.75]	-4.18 (4.23)	[-12.91; 3.93]	10.85 (8.66)	[-6.25; 27.96]

Abbreviation: CI, confidence interval.

*p < .05. **p < .01. ***p < .001.

Sleep quality and sleep duration (morning survey)

We assessed subjective sleep quality with a single item ('How would you rate your sleep quality during the past night overall?') from the *Pittsburgh Sleep Quality Index* (Buysse et al., 1989) on a 4-point Likert scale ranging from 1 (*very bad*) to 4 (*very good*). We assessed sleep duration by asking participants at what time they had fallen asleep the previous night and at what time they had woken up in the morning.

RESULTS

Descriptives can be found in Table 1. Supporting our within-person approach, a high share of the total variance of sleep quality (66%) and sleep duration (66%) can be attributed to within-person variation. A multilevel confirmatory factor analysis (MCFA) revealed that a three-factor model with challenge demands, hindrance demands and work-related rumination showed a good fit, $\chi^2 = 1825.711$, $df = 495$, $p < .001$, RMSEA = .050, CFI = .882 (sleep parameters were measured with single items; hence, they were not included in the MCFA). The three-factor model was superior to a two-factor (combining challenge and hindrance demands) and a one factor model (also including rumination), minimum $\Delta\chi^2 = 485.76$, $p < .001$.

Table 2 presents the multilevel estimates for the mediation models, calculated using the SPSS macro MLmed, to predict the effects of challenge demands and hindrance demands on sleep parameters through work-related rumination. Lower level predictor variables were within-group centred. When examining challenge demands as a predictor, hindrance demands were considered as a covariate in the model and vice versa. Only day-level effects are reported.

As predicted, results showed a significant mediation of the relationship between hindrance demands and sleep quality by work-related rumination ($ab = -.02$, $p = .009$, 95% CI [-.04; -.01]): Hindrance demands were positively related to work-related rumination before sleep (a -path = .19, $p < .001$), and work-related rumination was negatively related to sleep quality (b -path = -.12, $p < .001$). In contrast, we did not find a mediation by work-related rumination for the relationship between challenge demands and sleep quality ($ab = -.01$, $p = .133$, 95% CI [-.02; .00]). However, we found a significant negative remaining direct effect of challenge demands on sleep quality ($c' = -.08$, $p = .035$, 95% CI [-.15; -.01]).

With respect to sleep duration, we did not find any indirect effects via work-related rumination (challenge demands: $ab = -.32$, $p = .305$, 95% CI [-1.07; .14]; hindrance demands: $ab = -.80$, $p = .176$, 95% CI [-2.13; .21]). We also found no direct effects.

DISCUSSION

In line with our theorizing, we found that hindrance demands but not challenge demands were associated with sleep quality through work-related rumination. This finding contrasts van Laethem et al. (2019), who reported a mediation by affective rumination for the relationship between challenge, but not hindrance demands and sleep quality in a 2-year longitudinal study. There are two potential reasons for these diverging findings: First, as argued above, the relationship between hindrance and challenge demands with rumination might unfold with different temporal dynamics. Second, van Laethem et al. (2019) operationalized hindrance demands in terms of job insecurity, which was very low in their sample. Moreover, job insecurity might vary less over time compared to other hindrance demands (e.g., role conflict).

Future research should systematically investigate the temporal dynamics of the relationships between challenge and hindrance demands with rumination (and their downstream consequences for sleep). In particular, it would be interesting to further examine which specific demands are likely to produce immediate (day-level) rumination versus more chronic (long-term) rumination. A critical events approach (i.e., identifying specific work events that trigger rumination) might also be fruitful.

Our results also show an unpredicted negative remaining direct association between challenge demands and sleep quality. Albeit speculatively, this finding might be due to an association of challenge demands with pre-sleep arousal, which, in turn, is associated with more sleep disturbances (cf. Mulder et al., 2000). Finally, both types of demands were unrelated to sleep duration. Because demands as well as rumination are related to psychological and physical exhaustion, this might increase the need for sleep. Speculatively, this association might even trump the potential of ruminative thoughts to keep one awake.

From a practical perspective, our results highlight the merits of differentiating between challenge and hindrance demands, when keeping an eye on employees' sleep. Even though hindrance demands can be problematic for organizational outcomes per se (when employees' goal attainment is prevented), hindrance demands' potential to disturb sleep can even further impair employees' performance. Organizations should therefore be aware of these negative consequences and should aim to reduce hindrance demands (e.g., by reducing bureaucracy) whenever possible.

AUTHOR CONTRIBUTIONS

Janina Janurek: Conceptualization; data curation; formal analysis; investigation; methodology; project administration; visualization; writing – original draft; writing – review and editing. **Nina M. Junker:** Conceptualization; writing – review and editing. **Sascha Abdel Hadi:** Conceptualization; data curation; investigation; methodology; project administration; writing – review and editing. **Andreas Mojzisch:** Conceptualization; funding acquisition; resources; writing – review and editing. **Jan A. Häusser:** Conceptualization; funding acquisition; methodology; resources; supervision; writing – review and editing.

ACKNOWLEDGEMENT

Open Access funding enabled and organized by Projekt DEAL.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data are available on the Open Science Framework (https://osf.io/38vyf/?view_only=675fb660ce40424fa3e2dc8660f60301).

ORCID

Janina Janurek  <https://orcid.org/0000-0003-1029-1852>
 Nina M. Junker  <https://orcid.org/0000-0001-9446-9413>
 Sascha Abdel Hadi  <https://orcid.org/0000-0001-6129-0724>
 Andreas Mojzisch  <https://orcid.org/0000-0002-8130-0579>
 Jan A. Häusser  <https://orcid.org/0000-0001-8993-9919>

REFERENCES

- Brosschot, J. F., Pieper, S., & Thayer, J. F. (2005). Expanding stress theory: Prolonged activation and perseverative cognition. *Psychoneuroendocrinology*, 30(10), 1043–1049. <https://doi.org/10.1016/j.psyneuen.2005.04.008>
- Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh sleep quality index: A new instrument for psychiatric practice and research. *Psychiatry Research*, 28(2), 193–213. [https://doi.org/10.1016/0165-1781\(89\)90047-4](https://doi.org/10.1016/0165-1781(89)90047-4)
- Cavanaugh, M. A., Boswell, W. R., Roehling, M. V., & Boudreau, J. W. (2000). An empirical examination of self-reported work stress among U.S. managers. *Journal of Applied Psychology*, 85(1), 65–74. <https://doi.org/10.1037//0021-9C10.85.1.65>
- Cropley, M., Dijk, D.-J., & Stanley, N. (2006). Job strain, work rumination, and sleep in school teachers. *European Journal of Work and Organizational Psychology*, 15(2), 181–196. <https://doi.org/10.1080/13594320500513913>
- Du, D., Derks, D., & Bakker, A. B. (2018). Daily spillover from family to work: A test of the work-home resources model. *Journal of Occupational Health Psychology*, 23(2), 237–247. <https://doi.org/10.1037/ocp0000073>
- Kim, H., Shin, K., & Hwang, J. (2023). Too much may be a bad thing: The difference between challenge and hindrance job demands. *Current Psychology*, 1–13. Advance online publication. <https://doi.org/10.1007/s12144-023-04790-z>
- Mulder, G., Mulder, L. J. M., Meijman, T. F., Veldman, J. B. P., & van Roon, A. M. (2000). A psychophysiological approach to working conditions. In R. W. Backs & W. Boucsein (Eds.), *Engineering psychophysiology: Issues and applications* (pp. 139–159). Lawrence Erlbaum Associates.

- Ohly, S., Sonnentag, S., Niessen, C., & Zapf, D. (2010). Diary studies in organizational research. *Journal of Personnel Psychology, 9*(2), 79–93. <https://doi.org/10.1027/1866-5888/a000009>
- Radstaak, M., Geurts, S. A. E., Beckers, D. G. J., Brosschot, J. F., & Kompier, M. A. J. (2014). Work stressors, perseverative cognition and objective sleep quality: A longitudinal study among Dutch helicopter emergency medical service (HEMS) pilots. *Journal of Occupational Health, 56*(6), 469–477. <https://doi.org/10.1539/joh.14-0118-OA>
- Rodell, J. B., & Judge, T. A. (2009). Can 'good' stressors spark 'bad' behaviors? The mediating role of emotions in links of challenge and hindrance stressors with citizenship and counterproductive behaviors. *Journal of Applied Psychology, 94*(6), 1438–1451. <https://doi.org/10.1037/a0016752>
- Syrek, C. J., Weigelt, O., Peifer, C., & Antoni, C. H. (2017). Zeigarnik's sleepless nights: How unfinished tasks at the end of the week impair employee sleep on the weekend through rumination. *Journal of Occupational Health Psychology, 22*(2), 225–238. <https://doi.org/10.1037/ocp0000031>
- Tuckey, M. R., Searle, B. J., Boyd, C. M., Winefield, A. H., & Winefield, H. R. (2015). Hindrances are not threats: Advancing the multidimensionality of work stress. *Journal of Occupational Health Psychology, 20*(2), 131–147. <https://doi.org/10.1037/a0038280>
- Vahle-Hinz, T., Bamberg, E., Dettmers, J., Friedrich, N., & Keller, M. (2014). Effects of work stress on work-related rumination, restful sleep, and nocturnal heart rate variability experienced on workdays and weekends. *Journal of Occupational Health Psychology, 19*(2), 217–230. <https://doi.org/10.1037/a0036009>
- van Laethem, M., Beckers, D. G. J., de Bloom, J., Sianoja, M., & Kinnunen, U. (2019). Challenge and hindrance demands in relation to self-reported job performance and the role of restoration, sleep quality, and affective rumination. *Journal of Occupational and Organizational Psychology, 92*(2), 225–254. <https://doi.org/10.1111/joop.12239>
- van Laethem, M., Beckers, D. G. J., van Hooff, M. L. M., Dijksterhuis, A., & Geurts, S. A. E. (2016). Day-to-day relations between stress and sleep and the mediating role of perseverative cognition. *Sleep Medicine, 24*, 71–79. <https://doi.org/10.1016/j.sleep.2016.06.020>

How to cite this article: Janurek, J., Junker, N. M., Abdel Hadi, S., Mojzisch, A., & Häusser, J. A. (2024). Work-related rumination as a mediator between hindrance demands and sleep quality. *Journal of Occupational and Organizational Psychology, 97*, 783–790. <https://doi.org/10.1111/joop.12501>