



# Daily Work Stressors and Unhealthy Snacking: The Moderating Role of Trait Mindfulness

Dārta Vasiljeva<sup>1</sup> · Annika Nübold<sup>1</sup> · Ute R. Hülshager<sup>1</sup> · Chantal Nederkoorn<sup>2</sup>

Received: 7 March 2022 / Revised: 27 January 2023 / Accepted: 6 February 2023 /

Published online: 24 March 2023

© The Author(s) 2023

## Abstract

Unhealthy snacking is considered one of the main contributors to the current obesity pandemic. Initial research suggests that work-related stress may be an important predictor of unhealthy snacking, however, there is still much to learn about the underlying mechanisms and conditions of work-related snacking. To address this research gap, we investigated the effect of two prominent work stressors, workload and interpersonal conflict, on unhealthy snacking behaviors during work and in the evening after work. We propose that these effects may be explained through a homeostatic motive to restore energy following depletion and a hedonic motive to induce pleasure, thus investigating the potential mediating effect of emotional exhaustion and negative affect. Additionally, since individual differences play an important role for snacking behaviors, we examined the potential moderating effect of trait mindfulness. Results from diary data across two workweeks ( $N=118$ ) did not show a significant positive linear relationship between daily work stressors and unhealthy snacking. The protective nature of trait mindfulness became apparent in the relationship between after-work emotional exhaustion and unhealthy snacking, indicating that individuals high in trait mindfulness consume less unhealthy snacks in the evening after work when emotionally exhausted. Furthermore, a supplementary analysis revealed that employees especially snack in the evening after low workload days. Taken together, our results unfold the complex nature of work-related snacking and offer valuable input for practical implementations.

---

Previous versions of this article were presented in 2022 at the 46th Annual Meeting of the British Feeding and Drinking Group, online and at the 15th European Academy of Occupational Health Psychology Conference in Bordeaux, France.

---

✉ Dārta Vasiljeva  
d.vasiljeva@maastrichtuniversity.nl

<sup>1</sup> Department of Work and Social Psychology, Faculty of Psychology and Neuroscience, Maastricht University, P.O. Box 616, 6200 MD Maastricht, The Netherlands

<sup>2</sup> Department of Clinical Psychological Science, Faculty of Psychology and Neuroscience, Maastricht University, Maastricht, The Netherlands

**Keywords** Work stressors · Unhealthy snacking · Diary study · Trait mindfulness

Snacking, consumption of food or drinks besides main meals, is a common behavior that may take place at any time of the day, several times a day (Bellisle, 2014; Chaplin & Smith, 2011). Particularly snacking of products that have a high caloric, fat and sugar or salt content, such as chocolate, cookies and crisps, may be regarded a serious problem as it may contribute to weight gain and obesity, thus increasing the risk for cardiovascular diseases, diabetes and musculoskeletal disorders (Barnes et al., 2015; World Health Organization, 2021). Considering that obesity has almost tripled since 1975 with more than a third of the world's population being overweight or obese nowadays (World Health Organization, 2021), shedding light onto factors that may result in weight gain is crucial both from a theoretical and practical perspective.

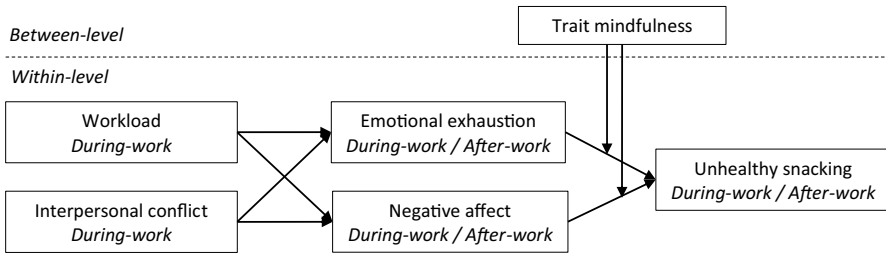
Stress has been reported as one of the main contributors to increased consumption of unhealthy food (O'Connor et al., 2008; Sproesser et al., 2013). Although work is a major source of stress in individuals' life and work stress has been identified as one of the leading occupational health issues in the scientific literature for nearly four decades now (Ganster & Rosen, 2013; Quick & Henderson, 2016), research on snacking in the context of work is still scarce (Clohessy et al., 2019). Although some studies on the impact of work-related stress on snacking behaviors emerged in the past years, they mainly focused on rather coarse and distal work stressors (e.g., work hours; Jones et al., 2007; Wardle et al., 2000) providing little insights into *when* and *why* work demands affect snacking. Furthermore, research on snacking has largely focused on rather chronic, between-person differences by using cross-sectional and qualitative research designs (Clohessy et al., 2019; O'Connor & Conner, 2011). However, snacking is a behavior that takes place on an *intrapersonal* level and naturally fluctuates from day to day, and such between-person studies can only consider higher-level aggregates of this day-to-day behavior. Therefore, while differences in people's average levels of snacking are considered, information on fluctuations in snacking *within* people from day to day and the processes driving them, are overlooked. These processes unfolding on the day-to-day level, however, are likely to provide novel and richer insights into the mechanisms underlying snacking in the work context. Yet surprisingly, within-person daily level research into these fundamental processes through which work experiences shape snacking behavior, is scarce (for an exception see Liu et al., 2017; Sonnentag et al., 2017).

Therefore, the overall goal of the present study is to adopt a within-person perspective in studying the conditions and fundamental mechanisms linking work stressors to unhealthy snacking behavior. Specifically, based on recent meta-analyses, we focus on workload and interpersonal conflict as two of the most common work stressors that have among the strongest effects on general health and physical symptoms (Bowling et al., 2015; Nixon et al., 2011). In doing so, we build upon two recent daily within-person studies on work stressors and unhealthy eating (Liu et al., 2017; Sonnentag et al., 2017) and extend them in three ways. First,

little is known about the timing and sustainability of the effects of daily work stressors on snacking. As work stressors may influence employee functioning in work as well as non-work domains (Danna & Griffin, 1999), one may wonder whether employees only snack during work while facing work stressors (i.e., an immediate effect) or whether effects are (also) lagged such that employees snack in the evening after a stressful day at work (i.e., a delayed effect). Findings about snacking frequency and intensity have been rather inconsistent, with some studies indicating that unhealthy snacking occurs mostly during work (e.g., Barnes et al., 2015; Liu et al., 2015), while others conclude that it is most prevalent during the evening hours after work (e.g., Allan et al., 2019; Driskell et al., 2005). Therefore, in the current study we investigate the relationship between work stressors and employee snacking in both a within-domain (during work) and cross-domain context (after work). Such knowledge about timing and duration of these effects is an important prerequisite of a comprehensive theoretical understanding of unhealthy snacking (Ployhart & Kim, 2013) and indispensable to optimally tailor prevention and intervention efforts.

Second, only mood regulation has been empirically studied as the underlying mechanism in the relationship between work stressors and unhealthy eating behavior (Liu et al., 2017; Sonnentag et al., 2017), leaving other potential explanations unaddressed. Snacking has been commonly associated with such a hedonic motive, in which palatability or appeal and tastiness of food plays the prominent role as eating occurs to induce pleasure. Thus, in the hedonic pathway, the intake of unhealthy food is a rewarding process based on its gustatory content that is believed to repair one's mood following the experience of work stressors (Lowe & Butryn, 2007). Nevertheless, research has shown that unhealthy eating may also occur through a homeostatic motive (Lowe & Butryn, 2007; Thayer, 1987). In the homeostatic pathway, eating takes place to regulate energy balance, especially after depletion of energy stores, such as emotional depletion following high workload or conflict (Lowe & Butryn, 2007; Lutter & Nestler, 2009). Thus, homeostatic processes allow for effective regulation of eating that typically takes place to reduce hunger, achieve satiety and thereby replete energy. Taken together, we argue and empirically test that *both* hedonic (through negative affect) and homeostatic (through emotional exhaustion) processes may explain the relationship of workload and interpersonal conflict with unhealthy snacking.

Third, although it is well established that eating behaviors differ between people (Greeno & Wing, 1994), to date, nothing is known about how inter-individual differences shape the day-to-day within-person processes involved in work-related stress and snacking. Learning more about dispositional factors that explain why some employees snack more when being exposed to work stressors, while others do not, will further theoretical understanding of workplace snacking. It will also critically inform how to tailor workplace interventions to employees' needs. Building on work from the wider eating behavior literature (e.g., Jordan et al., 2014; Pidgeon et al., 2013), we identified trait mindfulness as an individual difference variable that likely plays an important moderating role. This proposition is informed by mindfulness research documenting that individuals high in trait mindfulness are better able to cope with stressful and negative experiences in a non-judgmental way; therefore,



**Fig. 1** Research model

acting less impulsively (Brown et al., 2007). The conceptual model of our study is depicted in Fig. 1.

## Theory and Hypotheses

### Work Stressors and Snacking Behavior

Ample research has shown that work stressors may have a negative impact on employee psychological and physical well-being (Ganster & Rosen, 2013). In particular, meta-analyses have shown that two work stressors among the most important for employee health outcomes are workload and interpersonal conflict (Bowling et al., 2015; Nixon et al., 2011). Workload refers to the amount of work that has to be completed in a limited amount of time, with high workload indicating that too much needs to be done in too little time, thereby often leading to working at a high pace or working longer hours (Sonnetag & Bayer, 2005). Having a high workload may evoke feelings of uncertainty as one might worry whether it will be possible to complete the work tasks (Spector & Jex, 1998). It may also be perceived as frustrating since having too much to do might lead employees to neglect other aspects of their job or personal life (Spector & Jex, 1998). Similarly to experiencing high workload, having a conflict with someone at work is a taxing and stressful experience. Interpersonal conflict can be defined as “a broad range of interpersonal mistreatment behaviors in the workplace, such as rude behavior, yelling, or other interpersonally deviant acts” (Sliter et al., 2011, p. 425). Having interpersonal conflict may interfere with completing one’s goals, decrease feelings of control and increase uncertainty (Giebels & Janssen, 2005). Furthermore, interpersonal conflicts with others at work may threaten one’s self-esteem as being in a conflict with another group member makes it difficult to maintain a positive social identity and fulfill one’s need to belong (Berset et al., 2011; Giebels & Janssen, 2005).

In order to cope with such stressful work experiences, individuals may engage in unhealthy behaviors, such as sedentary inactivity or unhealthy eating, as these are often believed to have the ability to reduce stress (Ng & Jeffery, 2003). Thus, unhealthy snacking during or after a stressful workday may be used as a tool to counteract experienced stress as it may seem an effective strategy to alleviate strain

or distract from work stressors (Macht et al., 2005; Ng & Jeffery, 2003). Supporting this notion, work-related hassles have been generally found to be positively related to unhealthy snack intake (O'Connor et al., 2008). More specifically, initial studies have found that working long hours and having high workload periods is associated with greater consumption of high-fat and high-sugar foods (Jones et al., 2007; Wardle et al., 2000). Similarly, non-work-related interpersonal hassles have been previously linked to increased snacking behaviors (O'Connor et al., 2008).

Although these studies provide first important insights into daily predictors of snacking, they make use of aggregated, retrospective day-level data but do not investigate these processes as they occur. Furthermore, as work stressors may affect both work and non-work outcomes and snacking has been shown to commonly occur both at work and at home (Danna & Griffin, 1999; Liu et al., 2015), we suggest that work stressors may have immediate as well as delayed effects on unhealthy snacking within the workday, thereby advancing the prior studies in an important way. First, we propose that employees consume more unhealthy snacks during work on days when they experience high workload and interpersonal conflict at work.

*Hypothesis 1:* Daily (a) workload and (b) interpersonal conflict are positively related to during-work unhealthy snacking.

We further propose that employees may also increase their intake of unhealthy snacks on workday evenings after experiencing high workload and interpersonal conflict during work.

*Hypothesis 2:* Daily (a) workload and (b) interpersonal conflict are positively related to after-work unhealthy snacking.

## Homeostatic and Hedonic Pathways to Unhealthy Snacking

Although first studies have shown that work stressors are related to increased unhealthy snacking, not much is known about the underlying mechanisms in this relationship. We propose two parallel pathways that may explain how work stressors relate to unhealthy snacking: homeostatic and hedonic. In the homeostatic pathway, unhealthy snacking takes place to regulate energy balance, while in the hedonic pathway, unhealthy snacking is used to induce pleasure (Lowe & Butryn, 2007).

It is commonly known that experiencing high work stressors is exhausting. Indeed, numerous studies and meta-analysis have shown that high workload and interpersonal conflict are related to higher emotional exhaustion of employees (e.g., Bowling et al., 2015; De Dreu & Beersma, 2005). On days when such demands are high and resources are thus low, employees may look for ways to increase their energy levels. For this, individuals might turn to snacking as consuming snacks may have an immediate energizing effect for dealing with work tasks or counteracting stress (Thayer, 1987). Thus, snacking may be particularly common as a homeostatic response to replete energy when employees have experienced tension (e.g., interpersonal conflict) or high demands (e.g., high

workload; Thayer, 1987). In other words, when emotionally exhausted, employees may engage in unhealthy snacking because they believe that snacking could help to restore their energy levels following depletion. Surprisingly, however, no other study in the organizational sciences has investigated the role of (emotional) exhaustion for unhealthy snacking behaviors. To our knowledge, only one study has touched upon the topic showing that work fatigue, including emotional exhaustion, is a risk factor for weight gain (Lallukka et al., 2005).

Facing stressors at work may also elicit negative emotions because experiencing high demands is unpleasant and threatening (Hobfoll, 2002). For instance, high workload may elicit negative affect, due to individuals' inability to meet the required time and energy demands (van Emmerik & Jawahar, 2006). Similarly, having a conflict with someone at work is an unpleasant experience and may evoke emotions like anger, disgust and fear (De Dreu & Beersma, 2005). Accordingly, both workload and interpersonal conflict have been related to negative affect in prior research (e.g., Ilies et al., 2011; Paterson et al., 2010). In order to reduce such negative affect, individuals may seek hedonic strategies that are mostly focused on short-term gain, such as countering negative feelings with immediate pleasure (Allen & Armstrong, 2006). Since unhealthy food is considered to be especially tasty and rewarding, individuals often think that consuming unhealthy snacks will help them change and alleviate their negative mood (Schüz et al., 2015). In line with this, prior research has linked negative affect with increased consumption of unhealthy snacks (Gardner et al., 2014).

Taken together, we propose that the relationship between daily work stressors (workload and interpersonal conflict) and unhealthy snacking is mediated by emotional exhaustion in the homeostatic pathway and negative affect in the hedonic pathway. These effects may occur immediately during work, indicating that employees may snack to replenish their emotional resources for further work activities or try to make themselves feel better following high workload and interpersonal conflict during work.

*Hypothesis 3:* The positive relationships between daily (a) workload and during-work unhealthy snacking and (b) interpersonal conflict and during-work unhealthy snacking are mediated by during-work emotional exhaustion.

*Hypothesis 4:* The positive relationships between daily (a) workload and during-work unhealthy snacking and (b) interpersonal conflict and during-work unhealthy snacking are mediated by during-work negative affect.

Furthermore, as having high workload and interpersonal conflict during work may leave employees emotionally exhausted and feeling negative after work, they may also snack to restore their energy levels or compensate for the unpleasant workday in the evening after work.

*Hypothesis 5:* The positive relationships between daily (a) workload and after-work unhealthy snacking and (b) interpersonal conflict and after-work unhealthy snacking are mediated by after-work emotional exhaustion.

*Hypothesis 6:* The positive relationships between daily (a) workload and after-work unhealthy snacking and (b) interpersonal conflict and after-work unhealthy snacking are mediated by after-work negative affect.

### Trait Mindfulness as a Buffer

Although being emotionally exhausted and experiencing negative emotions may increase snacking, personal characteristics may help to alleviate such negative effects. In particular, an important personality trait that can increase one's ability to cope with stress and help limit unhealthy snacking is mindfulness (Cotter & Kelly, 2018; Mantzios et al., 2018). Mindfulness refers to “enhanced attention to and awareness of current experience or present reality” (p. 822), with a particular focus on an open and receptive attitude towards these present experiences (Brown & Ryan, 2003). Mindfulness has been conceptualized both as a trait (i.e., natural and rather stable individual tendency to be mindful) or as a state (i.e., referring to a specific moment or day in which individuals experience mindfulness; Hülshager et al., 2013). In the present study, we focus on the former, taking into consideration that trait mindfulness differs among individuals irrespective of any prior training (Brown & Ryan, 2003).

Trait mindfulness has been shown to facilitate tolerance and acceptance of unpleasant emotions and lower the experience of stress, thereby decreasing automatic or habitual responses individuals may typically show to stressful events (Brown et al., 2007). In this sense, high trait mindfulness helps to create a gap between a stimulus and behavioral response, thereby allowing individuals to consciously regulate their actions in line with more adaptive outcomes (Good et al., 2016). As a result, individuals with high trait mindfulness are able to experience stress or negative emotions without impulsively reacting on them (Alberts et al., 2012).

When applying this to the work context, mindfulness may act as a buffer between negative work-related experiences and habitual responses to such experiences (Good et al., 2016). Particularly, employees with high levels of trait mindfulness may be able to more effectively regulate their impulse to snack when faced with unpleasant feelings (Gilbert & Waltz, 2010). Indeed, prior research outside the organizational sciences shows that mindfulness contributes to decreased consumption of “comfort foods” in response to experienced stress and negative emotions (Daubenmier et al., 2011). Similarly, a study by Pidgeon et al. (2013) showed that trait mindfulness acts a moderator between stress experiences and eating, with higher trait mindfulness attenuating the effect of psychological distress on emotional eating. More generally, trait mindfulness has been found to moderate relationships between stress experiences and various health outcomes (e.g., de Frias & Whyne, 2015; Eddy et al., 2019).

Thus, drawing on mindfulness theory and research, we suggest that having a high level of trait mindfulness is instrumental in reducing the effect of stressful experiences on employees' unhealthy snacking choices. In particular, we propose that trait mindfulness buffers the relationship of daily emotional exhaustion and negative

affect with unhealthy snacking during work. Accordingly, employees high in trait mindfulness may snack less than those low in mindfulness when feeling emotionally exhausted or experiencing negative affect during work.

*Hypothesis 7:* The positive relationships between daily (a) during-work emotional exhaustion and during-work unhealthy snacking and (b) during-work negative affect and during-work unhealthy snacking are moderated by trait mindfulness such that these positive relationships are weaker for employees high as opposed to low in trait mindfulness.

We further propose that having high trait mindfulness may similarly be a protective factor when employees are emotionally exhausted or experience negative affect after a stressful workday, thus limiting their unhealthy snack intake in the evening after work.

*Hypothesis 8:* The positive relationships between daily (a) after-work emotional exhaustion and after-work unhealthy snacking and (b) after-work negative affect and after-work unhealthy snacking are moderated by trait mindfulness such that these positive relationships are weaker for employees high as opposed to low in trait mindfulness.

## Method

### Sample and Procedure

This study was approved by the ethical review board of the authors' home institution (ERCPN-OZL\_207\_05\_04\_2019). Data collection took place between May and July 2019. Overall, 203 individuals showed initial interest in our study and 169 of them agreed to participate but did not finish the baseline measurement. A further 48 participants never participated in daily surveys and three were excluded because they reported to be non-working students. Therefore, the final sample included 118 employees who had filled in the baseline measurement and at least one daily survey (response rate = 58.1%). Of these 118 respondents, 52.5% were female and the average age was 35.23 ( $SD = 12.38$ ). More than 65% of participants had obtained a university diploma (2.5% Doctoral degree, 33.1% Master's degree and 32.2% Bachelor's degree), while 8.5% had completed general higher education, 13.6% advanced technical college and 9.3% high school (and 0.8% were without school certificate). Participants worked in organizations of various sectors, such as healthcare and social work (16.9%), business and management (12.7%), public administration (10.2%), information technology (9.3%), manufacturing and engineering (7.6%), sales and marketing (7.6%) and human resources and consulting (6.8%). These companies were located in multiple countries including Germany (54.2%), India (12.7%), Norway (9.3%), Greece (8.5%) and others (15.3%). As about half of the sample was recruited in Germany, the questionnaires were provided in both German and English. The average organizational tenure was 6.84 years ( $SD = 8.36$ ; ranging from



1 month to 43.75 years). The average participant was slightly overweight (BMI:  $M = 25.05$ ;  $SD = 4.70$ ).

Participants were recruited through convenience sampling by a team of research assistants (e.g., via personal networks, advertising on social media and in face-to-face meetings). Respondents had to be at least 18 years old and work for a minimum of 20 hours a week (no shift work or night shifts). After giving their consent and filling in the baseline questionnaire, employees were invited to respond to two daily surveys for two consecutive workweeks (10 working days): an end of work survey (measuring variables during work; available from 4:00 p.m. to 7:00 p.m.) and a bedtime survey (measuring variables in the evening after work; available from 9:30 p.m. to 12:30 a.m.). All questionnaires were distributed via a mobile application mEMA, allowing us to send push notifications and reminders for each daily survey. This ensured that participants could fill in questionnaires frequently and in a timely matter rather than having to proactively check their e-mail for a survey invitation. From the total 1180 possible participation days (118 participants  $\times$  10 days), participants filled in surveys on 871 days, amounting to an average of 7.38 days per participant (range = 1–10 days,  $SD = 2.71$ ).

## Measures

Measures for this study were adjusted to daily context from previously validated scales. For the German sample, we used validated German versions for our scales or applied a translation and back-translation procedure in consultation with two bilingual speakers who were proficient in both German and English (Brislin, 1970).

The baseline questionnaire included questions about employees' demographics and a trait mindfulness scale. Daily surveys included workload and interpersonal conflict (measured at the end of work) and emotional exhaustion, negative affect and unhealthy snacking (measured at the end of work and at bedtime).

## Trait Mindfulness

Trait mindfulness was measured with the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) or its German translation (Michalak et al., 2008), which includes 15 reversely coded items (e.g., "I find it difficult to stay focused on what's happening in the present"). The rating scale ranged from 1 (*never*) to 5 (*always*). Cronbach's alpha for the MAAS was 0.87.

## Daily Workload

Daily workload was assessed with four items based on the Job Content Questionnaire (JCQ; Karasek, 1985) previously used in Bakker et al. (2010). An example item is "Today at work, I had to work very fast." The items were rated on a scale

from 1 (*strongly disagree*) to 5 (*strongly agree*). Cronbach's alpha (averaged across days) was 0.78 ( $SD=0.07$ , ranging from 0.59 to 0.84).

### Daily Interpersonal Conflict

Daily interpersonal conflict was measured with the Interpersonal Conflict at Work Scale (ICAWS; Spector & Jex, 1998). This scale consists of four items (e.g., "I had a disagreement with someone at work today"), which were rated on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Cronbach's alpha (averaged across days) was 0.85 ( $SD=0.04$ , ranging from 0.77 to 0.90).

### Daily Emotional Exhaustion

Daily emotional exhaustion was assessed with three items from Gabriel et al. (2018). An example item is "Today at work, I felt used up" or "Tonight after work, I felt used up." The items were rated on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Cronbach's alpha (averaged across days) was 0.88 during-work ( $SD=0.04$ , ranging from 0.82 to 0.93) and 0.90 after-work ( $SD=0.04$ , ranging from 0.83 to 0.96).

### Daily Negative Affect

Daily negative affect was measured with the negative affect subscale of the Scale of Positive and Negative Experience (SPANE; Diener et al., 2010) suited to measure daily negative affect during work and in the evening after work (i.e., "Today at work, I felt..."; "Tonight after work, I felt..."). This subscale includes six items, namely "negative", "bad", "unpleasant", "sad", "afraid" and "angry". The rating scale ranged from 1 (*not at all*) to 5 (*to a very large degree*). Cronbach's alpha (averaged across days) was 0.87 during-work ( $SD=0.04$ , ranging from 0.81 to 0.93) and 0.89 after-work ( $SD=0.04$ , ranging from 0.79 to 0.96).

### Daily Unhealthy Snacking

In developing an unhealthy snacking measure that is suitable for use in a daily diary setting, we built on established measures used in the wider eating literature (Brown et al., 2008; Liu et al., 2015; Mouchacca et al., 2013; Powell et al., 2017). By combining these measures, we developed an adapted scale that encompasses all unhealthy snacking items in a slightly shortened form: we clustered some of the categories like pizza, deep fried food and fast food in order to reduce the study load on our participants (Fisher & To, 2012). The unhealthy snacking items measured in our study included the following processed foods: "Chips/salty or savory snacks", "Biscuits/cakes/pastries", "Chocolate/sweets", "Takeaway/fast food/deep fried food" and "Ice cream/frozen desserts". These items were rated from 1 (*none*) to 5 (*four or more portions*), where one portion referred to one piece of food item (e.g., one cookie, one piece of cake) or the recommended portion size as indicated on the product packaging (e.g., 30 g of chocolate, 30 g of

chips).<sup>1</sup> Similarly to prior studies, the ratings on each unhealthy snack item were summed up to calculate an overall number of consumed unhealthy snacks per occasion (during-work and after-work). Due to the nature of this variable (i.e., a sum), we did not calculate a reliability estimate for this scale. For during-work unhealthy snacking, participants were asked to indicate how many portions of the listed foods they had consumed between waking up and lunch (excluding what they had as a main meal for breakfast) and between lunch and the end of their workday (excluding what they had as a main meal for lunch) in order to reduce retrospection. For after-work unhealthy snacking, participants were asked to report how many portions of the listed foods they had consumed between the end of their workday and going to bed (excluding what they had as a main meal for dinner).

## Statistical Analysis

All 118 participants who responded to at least one daily measurement were included in the analyses, following recommendations in the literature to not exclude participants with missingness (Hox, 2002; Singer & Willett, 2003). To analyze our multi-level data (daily measurements were nested within people), we conducted multilevel Poisson regression modelling using Mplus 8.7 (Muthén & Muthén, 2017). Using a Poisson distribution was most appropriate as our outcome variable (unhealthy snacking) was a count variable (sum of the five unhealthy snacking items). In line with recommendations of Asparouhov and Muthén (2021), we used Bayesian estimation to compute more complex multilevel models with a count outcome. Bayesian estimation allows for unlimited number of latent variables in a model with a count outcome, while maximum likelihood estimation cannot handle more than three or four latent variables in such a model due to numerical integration (Asparouhov & Muthén, 2021).

The intra-class correlation coefficient (ICC; the proportion of variance that can be attributed to differences between individuals) ranged from 31 to 43% in our day level variables (see Table 1). The Level 1 predictors (workload, interpersonal conflict, emotional exhaustion and negative affect) were centered around the person-mean to ensure that they contain within-person variability only, aligning to the respective hypotheses which pertain to the within-person level. The Level 2 variable (trait mindfulness) was grand-mean centered. We modeled our predictors using fixed slopes for direct effects (Hypotheses 1–2) and indirect effects (Hypotheses 3–6) on

<sup>1</sup> As the mere act of assessing eating behaviors may decrease unhealthy food intake (Robinson et al., 2015), we aimed to make it as least obvious as possible for our participants that we are interested in their unhealthy snacking behaviors. Therefore, our measurement also included healthy and neutral snacks items: “Fresh or dried fruits”, “Raw vegetables/salad”, “Rice cakes/grain crackers”, “Dairy products (like yogurt)”, “Unsalted nuts”, “Cereal or fruit bars”. Since a list of all snacking items was presented in a random order, it was not visible that these snacks belong to different categories. Thus, because the healthy and neutral snack items were exclusively used to create a balanced snack reporting, they were not included in the analyses.

**Table 1** Means, Standard Deviations, Reliabilities and Correlations Among Study Variables

Variables	<i>M</i>	<i>SD</i>	$\alpha$	ICC	1	2	3	4	5	6	7	8
During-work												
1. Workload	3.06	0.98	0.78	0.39	-	0.11*	0.27***	0.03	0.02	0.18**	0.02	0.03
2. Interpersonal conflict	1.51	0.77	0.85	0.31	0.27*	-	0.33***	0.31***	-0.01	0.19***	0.12	0.02
3. Emotional exhaustion	2.13	1.09	0.88	0.40	0.18	0.57***	-	0.37***	-0.03	0.41***	0.26***	-0.03
4. Negative affect	1.40	0.66	0.87	0.43	-0.11	0.41***	0.73***	-	-0.02	0.26***	0.56***	0.17***
5. Unhealthy snacking	1.10	1.57	-	-	-0.03	0.15	0.15	0.12	-	0.06	-0.03	0.07
After-work												
6. Emotional exhaustion	2.19	1.07	0.90	0.38	0.25	0.48***	0.88***	0.52***	0.07	-	0.25***	-0.01
7. Negative affect	1.32	0.59	0.89	0.42	-0.14	0.38***	0.67***	0.98***	0.08	0.52***	-	0.08
8. Unhealthy snacking	1.15	1.53	-	-	-0.16	0.01	0.03	-0.09	0.76***	0.02	-0.10	-
Level 2												
9. Trait mindfulness	3.62	0.63	0.87	-	-0.12	-0.35**	-0.51***	-0.40***	-0.05	-0.46***	-0.37***	-0.04

*Note.* Correlations at the between-person level are indicated below the diagonal (*N* = 118). Correlations at the within-person level are indicated above the diagonal (*N* = 871). Cronbach's Alpha was calculated individually for every day and then averaged. *M* and *SD* are between-person.

\* *p* < .05. \*\* *p* < .01. \*\*\* *p* < .001 (two-tailed).

**Table 2** Multilevel Poisson Results for Direct Effects (Hypothesis 1-2)

Variables	During-work unhealthy snacking		After-work unhealthy snacking	
	Estimate	SE	Estimate	SE
Intercept	−0.22**	0.09	−0.24**	0.12
Workload	0.02	0.05	0.06	0.08
Interpersonal conflict	−0.01	0.06	0.04	0.09
Intercept variance	0.72***	0.14	0.92***	0.20

*Note.* During-work:  $N=798$  observations, 118 persons; After-work:  $N=800$  observations, 117 persons. *SE*=standard error. Residual variances of the count variable (i.e., unhealthy snacking) are not available with Poisson distribution.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

unhealthy snacking and random slopes - emotional exhaustion to unhealthy snacking and negative affect to unhealthy snacking - for moderation effects (Hypotheses 7–8). We ran and accordingly report separate models for estimating during-work and after-work unhealthy snacking. Running the two models together in one model did not affect our results. In line with recommendations from the literature, we allowed the two simultaneous predictors (workload and interpersonal conflict) and mediators (emotional exhaustion and negative affect) to covary at the within-person level (Koopman et al., 2016; Puranik et al., 2021) and all constructs to covary at the between-person level (Preacher et al., 2010). To estimate indirect effects, we used the model constraint function in Mplus. Furthermore, following recommendations of Preacher et al. (2010), we tested the indirect effects at the within-person level with a parametric bootstrap procedure. This procedure was used to compute 95% confidence intervals that reflect the asymmetric nature of the sampling distribution in indirect effects.

## Results

The means, standard deviations, reliabilities, ICCs and inter-correlations between study variables are presented in Table 1.<sup>2</sup> Table 2 shows Poisson regression analyses results for Hypotheses 1–2 (direct effects), Table 3 for Hypotheses 3–6 (indirect effects) and Table 4 for Hypotheses 7–8 (moderation effects).

As Table 2 shows, neither workload ( $\gamma=0.02$ ,  $p=.33$ ) nor interpersonal conflict ( $\gamma = -0.01$ ,  $p=.41$ ) were significantly related to during-work unhealthy snacking. Similarly, neither workload ( $\gamma=0.06$ ,  $p=.24$ ) nor interpersonal conflict ( $\gamma=0.04$ ,

<sup>2</sup> ICC cannot be calculated for count variables (i.e., during-work and after-work unhealthy snacking).

**Table 3** Multilevel Poisson Results for Single Path Coefficients and Indirect Effects (Hypotheses 3–6)

Variables	During-work		After-work	
	Estimate	SE	Estimate	SE
Intercept	-0.24**	0.09	-0.24*	0.11
Single Path: Work stressor – mediator				
Workload → Emotional exhaustion	0.25***	0.04	0.15**	0.05
Workload → Negative affect	0.01	0.03	0.01	0.03
Interpersonal conflict → Emotional exhaustion	0.40***	0.05	0.22***	0.06
Interpersonal conflict → Negative affect	0.25***	0.03	0.07*	0.03
Single Path: Mediator – outcome				
Emotional exhaustion → Unhealthy snacking	-0.07	0.06	-0.07	0.06
Negative affect → Unhealthy snacking	0.01	0.08	0.20*	0.08
Indirect effects (Hypotheses 3–6)	Estimate	95% CI	Estimate	95% CI
Workload → Emotional exhaustion → Unhealthy snacking	-0.02	[-0.05, 0.01]	-0.01	[-0.03, 0.01]
Workload → Negative affect → Unhealthy snacking	0.00	[-0.00, 0.00]	0.00	[-0.01, 0.02]
Interpersonal conflict → Emotional exhaustion → Unhealthy snacking	-0.03	[-0.07, 0.02]	-0.02	[-0.05, 0.01]
Interpersonal conflict → Negative affect → Unhealthy snacking	0.00	[-0.04, 0.04]	0.01	[-0.00, 0.03]
Intercept variance	0.74***	0.15	0.90***	0.20

*Note.* During work:  $N = 798$  observations, 118 persons. After work:  $N = 801$  observations, 117 persons.  $SE$  = standard error.  $CI$  = confidence interval. Work stressors (workload and interpersonal conflict) are measured during-work, mediators (emotional exhaustion and negative affect) and outcome (unhealthy snacking) are measured concurrently, that is, either during-work or after-work (please see the respective column). Residual variances of the count variable (i.e., unhealthy snacking) are not available with Poisson distribution.

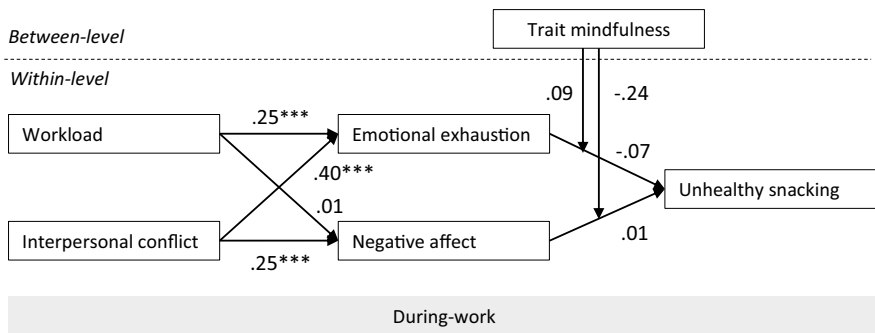
\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

**Table 4** Multilevel Poisson Results for Cross-level Moderations (Hypotheses 7–8)

Variables	During-work unhealthy snacking		After-work unhealthy snacking	
	Estimate	SE	Estimate	SE
<b>Fixed effects</b>				
Intercept	−0.28***	0.10	−0.29**	0.11
Emotional exhaustion	−0.15*	0.09	−0.09	0.08
Negative affect	−0.15	0.17	−0.08	0.19
Trait mindfulness	−0.07	0.16	−0.08	0.18
<b>Cross-level moderations</b>				
Emotional exhaustion x Trait mindfulness	0.09	0.12	−0.28*	0.12
Negative affect x Trait mindfulness	−0.24	0.22	−0.24	0.21
<b>Random effects</b>				
Intercept variance	0.82***	0.17	1.01***	0.21
Emotional exhaustion	0.12***	0.06	0.05***	0.04
Negative affect	0.37***	0.20	0.23***	0.20

*Note.*  $N=871$  observations, 118 persons.  $SE$ =standard error. Emotional exhaustion, negative affect, and unhealthy snacking are measured concurrently, that is, either during-work or after-work (please see the respective column). Residual variances of the count variable (i.e., unhealthy snacking) are not available with Poisson distribution.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

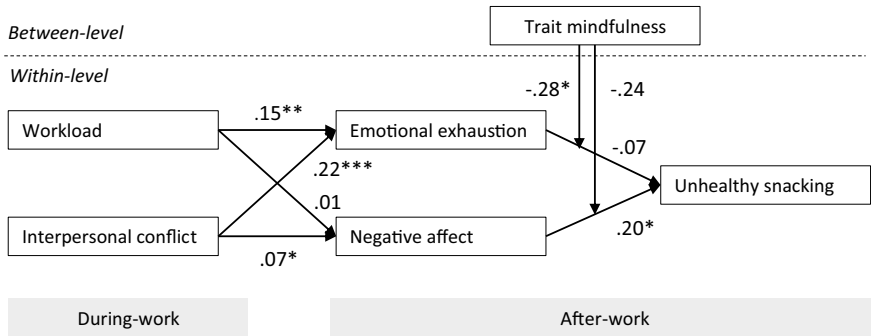


\*\*\*  $p < .001$ .

**Fig. 2** Single path coefficients for during-work effects. *Note.* Results of the direct effects of work stressors on unhealthy snacking (Hypotheses 1–2) are reported in Table 2 and indirect effects through emotional exhaustion and negative affect (Hypotheses 3–6) are reported in Table 3

$p = .33$ ) were significantly related to after-work unhealthy snacking. Therefore, Hypothesis 1 and Hypothesis 2 were not confirmed.

Hypotheses 3–6 proposed that the relationship between work stressors (workload and interpersonal conflict) and unhealthy snacking is mediated by homeostatic (emotional exhaustion) and hedonic (negative affect) motives. Results of the individual path coefficients (work stressors to mediators and mediators to unhealthy



\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

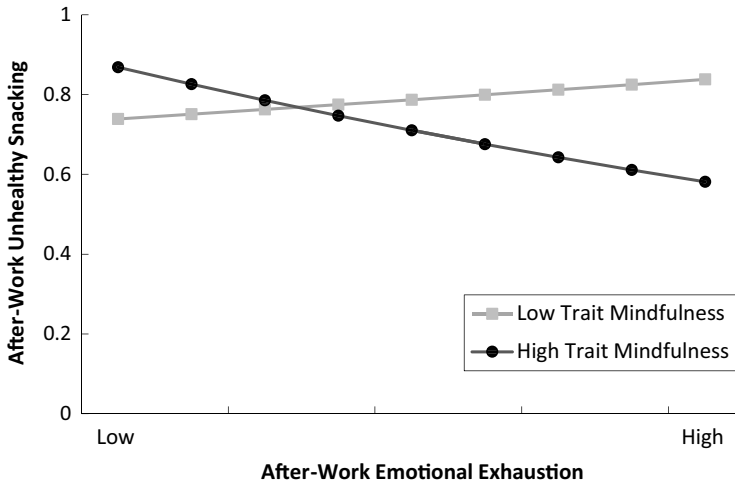
**Fig. 3** Single path coefficients for after-work effects. *Note.* Results of the direct effects of work stressors on unhealthy snacking (Hypotheses 1–2) are reported in Table 2 and indirect effects through emotional exhaustion and negative affect (Hypotheses 3–6) are reported in Table 3

snacking) are displayed in Fig. 2 for during-work unhealthy snacking and Fig. 3 for after-work unhealthy snacking. Since our hypotheses did not pertain to these individual paths, we only shortly summarize the main findings here. Nearly all of the relationships between work stressors and mediating mechanisms were in expected positive direction both during-work and after-work, except for the non-significant relation between workload and negative affect at both time points. However, we found little evidence for relationships between our mediators and unhealthy snacking: only after-work negative affect was significantly positively related to after-work unhealthy snacking ( $\gamma = 0.20$ ,  $p = .01$ ). Considering this lack of significant results, it is not surprising that we found no significant indirect effects, as reported in Table 3.

In particular, Hypothesis 3 was not confirmed as during-work emotional exhaustion did neither mediate the relationship between (a) workload and during-work unhealthy snacking ( $\gamma = -0.02$ , 95% CI [-0.05, 0.01]) nor (b) interpersonal conflict and during-work unhealthy snacking ( $\gamma = -0.03$ , 95% CI [-0.07, 0.02]). Similarly, during-work negative affect did not act as a mediator in the relationship between (a) workload and during-work unhealthy snacking ( $\gamma = 0.00$ , 95% CI [-0.00, 0.00]) and (b) interpersonal conflict and during-work unhealthy snacking ( $\gamma = 0.00$ , 95% CI [-0.04, 0.04]), thereby not supporting Hypothesis 4. Further, after-work emotional exhaustion did not mediate the relationship between (a) workload and after-work unhealthy snacking ( $\gamma = -0.01$ , 95% CI [-0.03, 0.01]) and (b) interpersonal conflict and after-work unhealthy snacking ( $\gamma = -0.02$ , 95% CI [-0.05, 0.01]). Thus, Hypothesis 5 was not confirmed. Lastly, Hypothesis 6 was not supported as after-work negative affect did neither mediate the relationship between (a) workload and after-work unhealthy snacking ( $\gamma = 0.00$ , 95% CI [-0.01, 0.02]) nor (b) interpersonal conflict and after-work unhealthy snacking ( $\gamma = 0.01$ , 95% CI [-0.00, 0.03]).

The results of our moderation tests are reported in Table 4. Specifically, Hypothesis 7 predicted that the relationships between (a) during-work emotional exhaustion and during-work unhealthy snacking and (b) during-work negative affect and during-work unhealthy snacking are moderated by trait mindfulness.





**Fig. 4** High trait mindfulness moderates the effect of after-work emotional exhaustion on after-work unhealthy snacking

Neither the relationship between during-work emotional exhaustion and during-work unhealthy snacking ( $\gamma = 0.09$ ,  $p = .24$ ) nor the relationship between during-work negative affect and during-work unhealthy snacking ( $\gamma = -0.24$ ,  $p = .14$ ) was moderated by trait mindfulness. Hypothesis 8 predicted that the relationships between (a) after-work emotional exhaustion and after-work unhealthy snacking and (b) after-work negative affect and after-work unhealthy snacking are moderated by trait mindfulness. The moderation effect of trait mindfulness in the relationship between after-work emotional exhaustion and after-work unhealthy snacking was significant ( $\gamma = -0.28$ ,  $p = .01$ ). Following the approach of Dawson (2014), Fig. 4 shows the plotted interaction effect at conditional values of trait mindfulness (1 *SD* above and below the mean). In particular, for participants with generally low trait mindfulness levels, after-work emotional exhaustion was not significantly related to after-work unhealthy snacking ( $\gamma = 0.09$ ,  $SE = 0.11$ ,  $p = .29$ ). However, for participants high in trait mindfulness, after-work emotional exhaustion was significantly and negatively related to after-work unhealthy snacking ( $\gamma = -0.27$ ,  $SE = 0.12$ ,  $p = .01$ ). That is, a one-unit increase in emotional exhaustion led to a decrease in unhealthy snacking in the evening after work by a factor of 0.76 ( $e^{-0.27} = 0.76$ ), meaning that individuals high in trait mindfulness reduce unhealthy snacking especially when emotionally exhausted after work. Nevertheless, this pattern of results is not congruent to what we expected and Hypothesis 8(a) could not be confirmed. As suggested by the review team, we further assessed whether this moderating role of high trait mindfulness extends to work stressors (workload and interpersonal conflict). As a post-hoc analysis we therefore tested the moderated mediation of the work stressor-unhealthy snacking

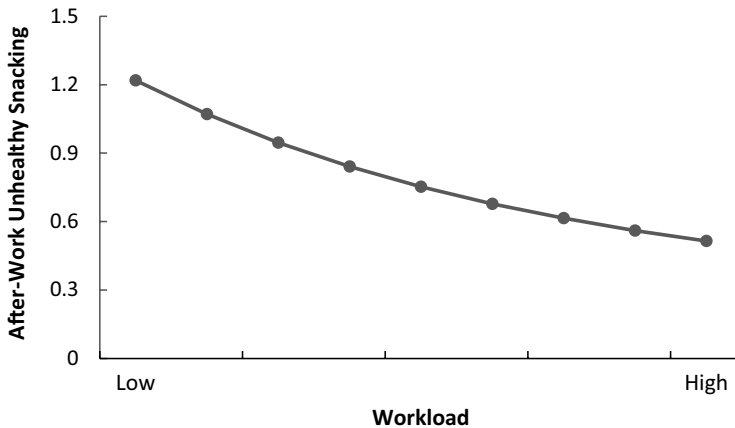
link (through after-work emotional exhaustion). The results showed that high trait mindfulness significantly moderated the indirect effect of workload on after-work unhealthy snacking via after-work emotional exhaustion ( $\gamma = -0.04$ , 95% CI [-0.03, -0.00]). Similarly, high trait mindfulness moderated the indirect effect of interpersonal conflict on after-work unhealthy snacking through after-work emotional exhaustion ( $\gamma = -0.06$ , 95% CI [-0.05, -0.00]). As for negative affect, trait mindfulness did not moderate the relationship between after-work negative affect and after-work unhealthy snacking ( $\gamma = -0.24$ ,  $p = .13$ ).

### Supplementary Analysis

For exploratory purposes, we conducted a supplementary analysis in which we controlled for emotional exhaustion and negative affect during work, while estimating the effects of the work stressors on after-work emotional exhaustion and negative affect, and consequent effects on after-work unhealthy snacking. Effectively, this means that the change in emotional exhaustion and negative affect from during-work to after-work is predicted by workload and interpersonal conflict, rather than the absolute levels of after-work emotional exhaustion and negative affect. This additional analysis did not result in any different conclusions regarding the prediction of unhealthy snacking. However, the previously significant effects of workload and interpersonal conflict on the mediators were now insignificant because during-work emotional exhaustion and negative affect naturally were strong predictors of after-work levels of emotional exhaustion ( $\gamma = 0.34$ ,  $p < .001$ ) and negative affect ( $\gamma = 0.44$ ,  $p < .001$ ). Importantly, these findings do not have any implication for the test of our hypotheses, as this supplementary model tested effects of workload and interpersonal conflict on *change in* the mediators, while we hypothesized that *levels* of workload and interpersonal conflict are related to *levels* of after-work emotional exhaustion and negative affect.

Since we did not find a positive linear relationship between workload and during-work or after-work unhealthy snacking, we further explored the possibility that the relationship between workload and unhealthy snacking might be curvilinear. Thus, unhealthy snacking might be most pronounced when employees experience either low workload (e.g., not being busy at work; Payne et al., 2005; Payne et al., 2013) or high workload (having a lot to do and working under time pressure, in line with the proposed positive linear relationship between workload and unhealthy snacking during and after work). We therefore computed post-hoc analyses with a quadratic term for workload.<sup>3</sup> Although we did not find a significant curvilinear effect on during-work unhealthy snacking ( $\gamma = 0.02$ ,  $p = .34$ ), the quadratic workload term had a significant effect on after-work unhealthy snacking ( $\gamma = 0.11$ ,  $p < .001$ ). Figure 5 shows the plotted effect at conditional values of daily workload (1 *SD* above and below the mean), indicating that lower daily workload was related to higher after-work

<sup>3</sup> We did not examine curvilinear effects of interpersonal conflict on unhealthy snacking because we believe that a positive linear relationship would be most suitable from a theoretical standpoint; as proposed in our Hypothesis 1(b) and Hypothesis 2(b).



**Fig. 5** Low workload predicts after-work unhealthy snacking

unhealthy snack intake compared to moderate levels of daily workload. At moderate levels of daily workload, effects on after-work unhealthy snacking leveled off but did not increase again.

## Discussion

The aim of the current study was to understand the influence of immediate (during-work) and delayed (after-work) effects of daily work stressors, workload and interpersonal conflict, on employee unhealthy snacking behaviors. In particular, we investigated two pathways through which work stressors relate to unhealthy snacking: homeostatic, through emotional exhaustion and hedonic, through negative affect. Lastly, as individual differences play an important role for eating behaviors, we explored the potential role of trait mindfulness to act as a buffer in the relationship between emotional exhaustion and unhealthy snacking and negative affect and unhealthy snacking.

Our results show support for most relationships between work stressors (workload and interpersonal conflict) and homeostatic and hedonic mechanisms (emotional exhaustion and negative affect) both as immediate during-work effects and delayed after-work effects; therefore, reinforcing findings from numerous studies in the work and organizational psychology literature. Interestingly, however, we did not find support for the hypothesized relations of work stressors and mechanisms on unhealthy snacking. Specifically, we did not find support for a positive relationship between work stressors (neither workload nor interpersonal conflict) and during-work or after-work unhealthy snacking. This might seem surprising since two recent daily diary studies have found support for similar relationships during-work (i.e., work-related self-control demands and snacking; Sonnentag et al., 2017) and after-work (i.e., job demands and unhealthy eating; Liu et al., 2017). However, it has to be noted that besides focusing on different work stressors, these studies significantly differ from our work also with regard to their snacking measurement (i.e.,

only sweet snacks in Sonnentag et al., 2017) and sample (i.e., only Chinese participants in Liu et al., 2017). Given that Chinese dietary habits significantly differ from other cultures (e.g., while in the United States 35% of individuals obtain more than 3% of their daily energy intake from unhealthy foods, this is only 5% in the Chinese population; Kim et al., 2003), the results of these studies are not directly comparable to our findings. Similarly to our results, however, a recent experience-sampling study conducted outside organizational sciences did also not confirm the hypothesized main effect of daily stress on food intake (Reichenberger et al., 2021) and a recent meta-analysis by Hill et al. (2021) found only a small positive effect size for the relationship between stress and unhealthy eating. Taken together, this suggests that main effects of work stressors on snacking may be less robust and/or more complex than previously thought and other factors, such as moderators and non-linear relations, may play a prominent role.

Indeed, our supplementary post-hoc analyses revealed some interesting insights. The results showed that rather than snacking on a high workload day, individuals snacked more during evenings of low workload days, speaking to a delayed effect of low workload on unhealthy snacking. A potential explanation for this effect may be that on low (vs. high) workload days, employees have more time, and, thus, more opportunity to snack (after-work) in the first place. Prior research has indeed shown that time availability is an important predictor of food consumption (Waterhouse et al., 2003), while being too busy precludes unhealthy snacking (Payne et al., 2005, 2013). As can be seen in Fig. 5, on days with low workload, the estimated unhealthy snacking after work is 1.2 portions. Although this may not seem much initially, research has shown that, on the long run, daily intake of already 100 kcal could have major implications for weight gain. For example, a US study estimated that a decrease of 100 kcal intake per day would prevent weight gain in 90% of the population (Hill et al., 2003). Given that one portion of an unhealthy snack contains more than 100 kcal (e.g., 165 kcal in one portion (30 g) of chips (Lays classic), 240 kcal in a Snickers bar (50 g); Open Food Facts, 2023a, b), our findings offer important insight into clinically relevant predictors of unhealthy snacking. Future research should therefore not only focus on high work stressors but also consider that low workload may lead employees to engage in (after-work) unhealthy snacking.

Regarding our moderation hypotheses, our results show that trait mindfulness acts as a moderator in the relationship between daily after-work emotional exhaustion and after-work unhealthy snacking. In particular, we find that individuals high in trait mindfulness snack less particularly when they are emotionally exhausted after work. Furthermore, this effect extends to work stressors as well, indicating that employees high in trait mindfulness consume less unhealthy snacks in the evening after a day of high workload and interpersonal conflict when they are emotionally exhausted after work. The finding that employees high in trait mindfulness consume less unhealthy snacks when they are emotionally exhausted as compared to when they are not might indicate that, in emotionally taxing times, they are particularly aware of, and, thus, able to resist the temptation to snack as a short-term, homeostatic strategy for restoring energy (Thayer, 1987). Consequently, they may instead be able to use other, more effective strategies that have longer-lasting effects to address emotional exhaustion, such as engaging in physical exercise or taking a nap, since mindfulness helps to enhance self-regulated behavior by engaging in activities

that are consistent with ones needs (Bajaj et al., 2016; Good et al., 2016). Although this effect is not fully in line with what was expected (i.e., high trait mindfulness weakens the *positive* relationship between emotional exhaustion and unhealthy snacking), it aligns with recent findings outside the organizational sciences. Finkelstein-Fox et al. (2020) found that students high in trait mindfulness decreased their “comfort food” consumption especially on highly stressful days (rather than on non-stressful days), thus being able to effectively regulate their behavioral response to daily stress. They also did not find significant moderation effects for low or average trait mindfulness levels, thus emphasizing the unique role of high trait mindfulness.

### Limitations and Suggestions for Future Research

Despite the strengths of our study, it also has several limitations. First, all measures in our study were self-reports, raising the issue of common method bias. In order to address this, we separated our measurements in time when possible: predictors were measured at the end of work, outcomes were measured across two time points at the end of work and at bedtime, and trait mindfulness was assessed before the start of the daily surveys. Our self-report measures may have also affected the accuracy of reported snacking. Research has shown that participants tend to underreport their snack intake (Poppitt et al., 1998) and merely monitoring one’s eating behaviors decreases food intake, especially when measuring consumption of energy-dense foods (Robinson et al., 2015). Although these are general challenges for research on eating behaviors, this type of measurement is still the most common and most applicable manner to assess snacking (Conway et al., 2004; O’Connor et al., 2008). Future research could, however, use more objective measures (see e.g., Höchsmann & Martin, 2020 for using pictures of snacks) but should also emphasize the importance of honest reporting and study participation. Furthermore, as suggested by an anonymous reviewer, it may be important for future research to consider other food consumed during the workday. For instance, if the main meal was very large, one might not engage in further snacking because of being full. In addition, it may be interesting to investigate other types of snacking (e.g., healthy snacking) and more distinctively distinguish particular types of snacks (e.g., unhealthy and healthy take-away food). Such measurements could lead to a more thorough overview of daily employee eating behaviors.

Second, our sample is rather homogeneous in terms of educational level: more than 65% of participants had obtained a degree from a university. As highly educated individuals are generally around 1.5 times less likely to engage in unhealthy snacking than those with a vocational or high school diploma (Liu et al., 2015), it is likely that our results might be different in samples with lower educational levels. An anonymous reviewer suggested that this may be due to limited access to and affordability of healthy food for lower educated employees (Drewnowski & Darmon, 2005). In order to counter this, organizations should remunerate their employees sufficiently so that everyone has equal opportunities

to eat healthy. Future research should therefore test our results in various sampling populations.

Third, inter-individual differences, such as trait self-control (e.g., Adriaanse et al., 2014; Haynes et al., 2016), may play an important role for snacking behaviors. Our sample may consist of a mixed population of individuals possessing low and high levels of this trait, thereby potentially cancelling out the positive relationship between work stressors and unhealthy snacking. Indeed, prior research suggests, that individuals with low trait self-control base their behaviors on impulsive reactions much more than those with high self-control (Wang et al., 2015), indicating that self-control may act as a buffer between stress and impulsive snacking. Similarly, as prior research has shown that some people eat typically less (hypophagics; 40–50%) and others more (hyperphagics; 38–40%) when stressed (Oliver & Wardle, 1999; Sproesser et al., 2013), our sample may have also included a mixed population of both. Nevertheless, it has to be noted that findings about why some individuals eat more and others eat less in response to stress and how personality differences relate to it are still inconsistent. For instance, a review by Bongers and Jansen (2016) showed that self-report measures for such traits (in their case, emotional eating) do not correspond to actual eating in response to negative emotions, and, therefore, lacking predictive and discriminant validity. Future research should therefore more carefully consider how to assess the role of such personality traits while also taking the type of stress and curvilinear relations into account.

Last, although the MAAS is a validated and widely used measure of trait mindfulness, it solely focuses on the awareness component of mindfulness (Grossman, 2011). Recently, more comprehensive mindfulness measures that address the multi-dimensional nature of mindfulness have been developed (e.g., the Five Factor Mindfulness Questionnaire; Baer et al., 2006, and the Mindfulness@Work Scale; Hülshager & Alberts, 2021). Future research may consider employing such measures in order to account for potentially differential effects of each mindfulness component on snacking behavior (e.g., “Nonreactivity to inner experience” - accepting thoughts and feelings without reacting to them, may be most relevant for work-related snacking, while “Describing” - describing observed phenomena in words, might be less relevant for snacking behaviors). Indeed, prior research has shown that dimensions of mindfulness are differentially related to eating behaviors (e.g., “Nonreactivity to inner experience” is linked to more restrained eating, while “Acting with awareness” is related to less emotional eating; Tak et al., 2015).

## Practical Implications

Our study shows that having high levels of trait mindfulness may enable more effective behavioral regulation when feeling emotionally exhausted in the evening after work, thus leading individuals to consume less unhealthy snacks. From a practical point of view, this is promising, as mindfulness can be improved with training (van de Veer et al., 2012). A mindfulness training could help particularly those employees with low levels to increase their mindfulness and consequently, improve their ability to cope with stressful workdays and after-work emotional exhaustion in a way that reduces after-work unhealthy snacking. In line with this idea, studies have found that mindfulness-based interventions can

decrease unhealthy food intake, especially when experiencing high stress (e.g., Daubenmier et al., 2011; Dutt et al., 2019). More generally, mindfulness training has been associated with reduced cravings and food intake as well as decreased impulsive and emotional eating (Román & Urbán, 2019). Altogether, results confirming the protective nature of mindfulness for unhealthy eating offer promising prospects for future interventions aimed at reducing unhealthy behaviors of employees.

Furthermore, our study revealed only significant relationships for after-work unhealthy snacking (rather than during-work). Together with the insight that trait mindfulness decreased unhealthy snacking behaviors specifically in response to high after-work emotional exhaustion, these findings may inform future (mindfulness) interventions about the circumstances under which unhealthy snacking is most prevalent and when mindfulness is particularly effective. Thus, our results complement prior findings, which suggest that interventions should be applied at times and locations where snacking already takes place and where individuals have opportunities to change their behaviors (e.g., towards healthier choices; Allan et al., 2019). Consequently, future interventions should consider that unhealthy snacking may be most problematic and mindfulness may be most effective in altering employees' eating behaviors during the evening hours after work.

**Acknowledgements** We would like to thank Jeremy Dawson for his advice and help with plotting the multilevel Poisson moderation results. We are also grateful to René Finger for his assistance with setting up and monitoring the study on the mobile application and all research assistants for their help with data collection.

**Author Contributions** All authors contributed to all phases of study development, data collection and manuscript preparation. All authors read and approved the final manuscript.

## Declarations

**Ethics Approval** This study was approved by the Ethics Review Committee Psychology and Neuroscience of Maastricht University (ERCPN-OZL\_207\_05\_04\_2019).

**Consent to Participate** Informed consent was obtained from all individual participants included in the study.

**Competing Interests** The authors have no relevant financial or non-financial interests to disclose.

**Conflict of Interest** On behalf of all authors, the corresponding author states that there is no conflict of interest.

**Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.



## References

- Adriaanse, M. A., Kroese, F. M., Gillebaart, M., & De Ridder, D. T. D. (2014). Effortless inhibition: habit mediates the relation between self-control and unhealthy snack consumption. *Frontiers in Psychology*, 5, 1–6. <https://doi.org/10.3389/fpsyg.2014.00444>
- Alberts, H. J. E. M., Thewissen, R., & Raes, L. (2012). Dealing with problematic eating behaviour. The effects of a mindfulness-based intervention on eating behaviour, food cravings, dichotomous thinking and body image concern. *Appetite*, 58(3), 847–851. <https://doi.org/10.1016/j.appet.2012.01.009>
- Allan, J., McMinn, D., & Powell, D. (2019). Tracking snacking in real time: time to look at individualised patterns of behaviour. *Nutrition and Health*, 25(3), 179–184. <https://doi.org/10.1177/0260106019866099>
- Allen, T. D., & Armstrong, J. (2006). Further examination of the link between work-family conflict and physical health: the role of health-related behaviors. *American Behavioral Scientist*, 49(9), 1204–1221. <https://doi.org/10.1177/0002764206286386>
- Asparouhov, T., & Muthén, B. (2021). Expanding the bayesian structural equation, multilevel and mixture models to logit, negative-binomial, and nominal variables. *Structural Equation Modeling: A Multidisciplinary Journal*, 28(4), 622–637. <https://doi.org/10.1080/10705511.2021.1878896>
- Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, 13(1), 27–45. <https://doi.org/10.1177/1073191105283504>
- Bajaj, B., Gupta, R., & Pande, N. (2016). Self-esteem mediates the relationship between mindfulness and well-being. *Personality and Individual Differences*, 94, 96–100. <https://doi.org/10.1016/j.paid.2016.01.020>
- Bakker, A. B., Van Veldhoven, M., & Xanthopoulou, D. (2010). Beyond the demand-control model: thriving on high job demands and resources. *Journal of Personnel Psychology*, 9(1), 3–16. <https://doi.org/10.1027/1866-5888/a000006>
- Barnes, T. L., French, S. A., Harnack, L. J., Mitchell, N. R., & Wolfson, J. (2015). Snacking behaviors, diet quality, and body mass index in a community sample of working adults. *Journal of the Academy of Nutrition and Dietetics*, 115(7), 1117–1123. <https://doi.org/10.1016/j.jand.2015.01.009>
- Bellisle, F. (2014). Meals and snacking, diet quality and energy balance. *Physiology & Behavior*, 134, 38–43. <https://doi.org/10.1016/j.physbeh.2014.03.010>
- Berset, M., Semmer, N. K., Elfering, A., Jacobshagen, N., & Meier, L. L. (2011). Does stress at work make you gain weight? A two-year longitudinal study. *Scandinavian Journal of Work Environment & Health*, 37(1), 45–53.
- Bongers, P., & Jansen, A. (2016). Emotional eating is not what you think it is and emotional eating scales do not measure what you think they measure. *Frontiers in Psychology*, 7, 1932–1942. <https://doi.org/10.3389/fpsyg.2016.01932>
- Bowling, N. A., Alarcon, G. M., Bragg, C. B., & Hartman, M. J. (2015). A meta-analytic examination of the potential correlates and consequences of workload. *Work & Stress*, 29(2), 95–113. <https://doi.org/10.1080/02678373.2015.1033037>
- Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology*, 1(3), 185–216. <https://doi.org/10.1177/135910457000100301>
- Brown, K. A., Ogden, J., Vögele, C., & Gibson, E. L. (2008). The role of parental control practices in explaining children's diet and BMI. *Appetite*, 50(2), 252–259. <https://doi.org/10.1016/j.appet.2007.07.010>
- Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, 84(4), 822–848. <https://doi.org/10.1037/0022-3514.84.4.822>
- Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: theoretical foundations and evidence for its salutary effects. *Psychological Inquiry*, 18(4), 211–237. <https://doi.org/10.1080/10478400701598298>
- Chaplin, K., & Smith, A. P. (2011). Definitions and perceptions of snacking. *Current Topics in Nutritional Research*, 9(1/2), 53–59.
- Clohessy, S., Walasek, L., & Meyer, C. (2019). Factors influencing employees' eating behaviours in the office-based workplace: a systematic review. *Obesity Reviews*, 20(12), 1771–1780. <https://doi.org/10.1111/obr.12920>
- Conway, J. M., Ingwersen, L. A., & Moshfegh, A. J. (2004). Accuracy of dietary recall using the USDA five-step multiple-pass method in men: an observational validation study. *Journal of the American Dietetic Association*, 104(4), 595–603. <https://doi.org/10.1016/j.jada.2004.01.007>



- Cotter, E. W., & Kelly, N. R. (2018). Stress-related eating, mindfulness, and obesity. *Health Psychology, 37*(6), 516–525. <https://doi.org/10.1037/hea0000614>
- Danna, K., & Griffin, R. W. (1999). Health and well-being in the workplace: a review and synthesis of the literature. *Journal of Management, 25*(3), 357–384. [https://doi.org/10.1016/S0149-2063\(99\)00006-9](https://doi.org/10.1016/S0149-2063(99)00006-9)
- Daubenmier, J., Kristeller, J., Hecht, F. M., Maninger, N., Kuwata, M., Jhaveri, K., Lustig, R. H., Kemeny, M., Karan, L., & Epel, E. (2011). Mindfulness intervention for stress eating to reduce cortisol and abdominal fat among overweight and obese women: An exploratory randomized controlled study. *Journal of Obesity, 2011*, 1–13. <https://doi.org/10.1155/2011/651936>
- Dawson, J. F. (2014). Moderation in management research: what, why, when, and how. *Journal of Business and Psychology, 29*(1), 1–19. <https://doi.org/10.1007/s10869-013-9308-7>
- De Dreu, C. K. W., & Beersma, B. (2005). Conflict in organizations: beyond effectiveness and performance. *European Journal of Work and Organizational Psychology, 14*(2), 105–117. <https://doi.org/10.1080/13594320444000227>
- de Frias, C. M., & Whyne, E. (2015). Stress on health-related quality of life in older adults: the protective nature of mindfulness. *Aging & Mental Health, 19*(3), 201–206. <https://doi.org/10.1080/13607863.2014.924090>
- Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D., Oishi, S., & Biswas-Diener, R. (2010). New well-being measures: short scales to assess flourishing and positive and negative feelings. *Social Indicators Research, 97*(2), 143–156. <https://doi.org/10.1007/s11205-009-9493-y>
- Drewnowski, A., & Darmon, N. (2005). Food choices and diet costs: an economic analysis. *The Journal of Nutrition, 135*(4), 900–904. <https://doi.org/10.1093/jn/135.4.900>
- Driskell, J. A., Kim, Y. N., & Goebel, K. J. (2005). Few differences found in the typical eating and physical activity habits of lower-level and upper-level university students. *Journal of the American Dietetic Association, 105*(5), 798–801. <https://doi.org/10.1016/j.jada.2005.02.004>
- Dutt, S., Keyte, R., Egan, H., Hussain, M., & Mantzios, M. (2019). Healthy and unhealthy eating amongst stressed students: considering the influence of mindfulness on eating choices and consumption. *Health Psychology Report, 7*(2), 113–120. <https://doi.org/10.5114/hpr.2019.77913>
- Eddy, P., Wertheim, E. H., Hale, M. W., & Wright, B. J. (2019). Trait mindfulness helps explain the relationships between job stress, physiological reactivity, and self-perceived health. *Journal of Occupational and Environmental Medicine, 61*(1), e12–e18. <https://doi.org/10.1097/JOM.00000000000001493>
- Finkelstein-Fox, L., Gnall, K. E., & Park, C. L. (2020). Mindfulness moderates daily stress and comfort food snacking linkages: a multilevel examination. *Journal of Behavioral Medicine, 43*(6), 1062–1068. <https://doi.org/10.1007/s10865-020-00164-z>
- Fisher, C. D., & To, M. L. (2012). Using experience sampling methodology in organizational behavior. *Journal of Organizational Behavior, 33*(7), 865–877. <https://doi.org/10.1002/job.1803>
- Gabriel, A. S., Koopman, J., Rosen, C. C., & Johnson, R. E. (2018). Helping others or helping oneself? An episodic examination of the behavioral consequences of helping at work. *Personnel Psychology, 71*(1), 85–107. <https://doi.org/10.1111/peps.12229>
- Ganster, D. C., & Rosen, C. C. (2013). Work stress and employee health: a multidisciplinary review. *Journal of Management, 39*(5), 1085–1122. <https://doi.org/10.1177/0149206313475815>
- Gardner, M. P., Wansink, B., Kim, J., & Park, S. B. (2014). Better moods for better eating?: how mood influences food choice. *Journal of Consumer Psychology, 24*(3), 320–335. <https://doi.org/10.1016/j.jcps.2014.01.002>
- Giebels, E., & Janssen, O. (2005). Conflict stress and reduced well-being at work: the buffering effect of third-party help. *European Journal of Work and Organizational Psychology, 14*(2), 137–155. <https://doi.org/10.1080/13594320444000236>
- Gilbert, D., & Waltz, J. (2010). Mindfulness and health behaviors. *Mindfulness, 1*(4), 227–234. <https://doi.org/10.1007/s12671-010-0032-3>
- Good, D. J., Lyddy, C. J., Glomb, T. M., Bono, J. E., Brown, K. W., Duffy, M. K., Baer, R. A., Brewer, J. A., & Lazar, S. W. (2016). Contemplating mindfulness at work: an integrative review. *Journal of Management, 42*(1), 114–142. <https://doi.org/10.1177/0149206315617003>
- Greeno, C. G., & Wing, R. R. (1994). Stress-induced eating. *Psychological Bulletin, 115*(3), 444–464. <https://doi.org/10.1037/0033-2909.115.3.444>
- Grossman, P. (2011). Defining mindfulness by how poorly I think I pay attention during everyday awareness and other intractable problems for psychology's (re)invention of mindfulness: Comment on Brown et al. (2011). *Psychological Assessment, 23*(4), 1034–1040. <https://doi.org/10.1037/a0022713>

- Haynes, A., Kemps, E., & Moffitt, R. (2016). Does trait self-control predict weaker desire for unhealthy stimuli? A lab-based study of unhealthy snack intake. *Personality and Individual Differences*, *89*, 69–74. <https://doi.org/10.1016/j.paid.2015.09.049>
- Hill, D., Conner, M., Clancy, F., Moss, R., Wilding, S., Bristow, M., & O'Connor, D. B. (2021). Stress and eating behaviours in healthy adults: a systematic review and meta-analysis. *Health Psychology Review*, 1–25. <https://doi.org/10.1080/17437199.2021.1923406>
- Hill, J. O., Wyatt, H. R., Reed, G. W., & Peters, J. C. (2003). Obesity and the Environment: where do we go from Here? *Science*, *299*(5608), 853–855. <https://doi.org/10.1126/science.1079857>
- Hobfoll, S. E. (2002). Social and psychological resources and adaptation. *Review of General Psychology*, *6*(4), 307–324. <https://doi.org/10.1037/1089-2680.6.4.307>
- Höchsmann, C., & Martin, C. K. (2020). Review of the validity and feasibility of image-assisted methods for dietary assessment. *International Journal of Obesity*, *44*(12), 2358–2371. <https://doi.org/10.1038/s41366-020-00693-2>
- Hox, J. (2002). *Multilevel analysis: techniques and applications*. Lawrence Erlbaum Associates.
- Hülshöger, U. R., & Alberts, H. J. E. M. (2021). Assessing facets of mindfulness in the context of work: the Mindfulness@Work Scale as a work-specific, multidimensional measure of mindfulness. *Applied Psychology: an International Review*, *70*(4), 1728–1783. <https://doi.org/10.1111/apps.12297>
- Hülshöger, U. R., Alberts, H. J. E. M., Feinholdt, A., & Lang, J. W. B. (2013). Benefits of mindfulness at work: the role of mindfulness in emotion regulation, emotional exhaustion, and job satisfaction. *Journal of Applied Psychology*, *98*(2), 310–325. <https://doi.org/10.1037/a0031313>
- Ilies, R., Johnson, M. D., Judge, T. A., & Keeney, J. (2011). A within-individual study of interpersonal conflict as a work stressor: dispositional and situational moderators. *Journal of Organizational Behavior*, *32*(1), 44–64. <https://doi.org/10.1002/job.677>
- Jones, F., O'Connor, D. B., Conner, M., McMillan, B., & Ferguson, E. (2007). Impact of daily mood, work hours, and iso-strain variables on self-reported health behaviors. *Journal of Applied Psychology*, *92*(6), 1731–1740. <https://doi.org/10.1037/0021-9010.92.6.1731>
- Jordan, C. H., Wang, W., Donatoni, L., & Meier, B. P. (2014). Mindful eating: trait and state mindfulness predict healthier eating behavior. *Personality and Individual Differences*, *68*, 107–111. <https://doi.org/10.1016/j.paid.2014.04.013>
- Karasek, R. A. (1985). *Job content questionnaire and user's guide*. University of Massachusetts Lowell, Department of Work Environment.
- Kim, S., Haines, P. S., Siega-Riz, A. M., & Popkin, B. M. (2003). The Diet Quality Index-International (DQI-I) provides an effective tool for cross-national comparison of diet quality as illustrated by China and the United States. *The Journal of Nutrition*, *133*(11), 3476–3484. <https://doi.org/10.1093/jn/133.11.3476>
- Koopman, J., Lanaj, K., & Scott, B. A. (2016). Integrating the bright and dark sides of OCB: a daily investigation of the benefits and costs of helping others. *Academy of Management Journal*, *59*(2), 414–435. <https://doi.org/10.5465/amj.2014.0262>
- Lallukka, T., Laaksonen, M., Martikainen, P., Sarlio-Lähteenkorva, S., & Lahelma, E. (2005). Psychosocial working conditions and weight gain among employees. *International Journal of Obesity*, *29*(8), 909–915. <https://doi.org/10.1038/sj.ijo.0802962>
- Liu, J. L., Han, B., & Cohen, D. A. (2015). Associations between eating occasions and places of consumption among adults. *Appetite*, *87*, 199–204. <https://doi.org/10.1016/j.appet.2014.12.217>
- Liu, Y., Song, Y., Koopmann, J., Wang, M., Chang, C. H., & Shi, J. (2017). Eating your feelings? Testing a model of employees' work-related stressors, sleep quality, and unhealthy eating. *Journal of Applied Psychology*, *102*(8), 1237–1258. <https://doi.org/10.1037/apl0000209>
- Lowe, M. R., & Butryn, M. L. (2007). Hedonic hunger: a new dimension of appetite? *Physiology & Behavior*, *91*(4), 432–439. <https://doi.org/10.1016/j.physbeh.2007.04.006>
- Lutter, M., & Nestler, E. J. (2009). Homeostatic and hedonic signals interact in the regulation of food intake. *The Journal of Nutrition*, *139*(3), 629–632. <https://doi.org/10.3945/jn.108.097618>
- Macht, M., Haupt, C., & Ellgring, H. (2005). The perceived function of eating is changed during examination stress: a field study. *Eating Behaviors*, *6*(2), 109–112. <https://doi.org/10.1016/j.eatbeh.2004.09.001>
- Mantzios, M., Egan, H., Hussain, M., Keyte, R., & Bahia, H. (2018). Mindfulness, self-compassion, and mindful eating in relation to fat and sugar consumption: an exploratory investigation. *Eating and Weight Disorders - Studies on Anorexia Bulimia and Obesity*, *23*(6), 833–840. <https://doi.org/10.1007/s40519-018-0548-4>

- Michalak, J., Heidenreich, T., Ströhle, G., & Nachtigall, C. (2008). Die deutsche Version der Mindful attention and awareness scale (MAAS) Psychometrische Befunde zu einem Achtsamkeitsfragebogen. *Zeitschrift für Klinische Psychologie und Psychotherapie*, 37(3), 200–208. <https://doi.org/10.1026/1616-3443.37.3.200>
- Mouchacca, J., Abbott, G. R., & Ball, K. (2013). Associations between psychological stress, eating, physical activity, sedentary behaviours and body weight among women: a longitudinal study. *BMC Public Health*, 13(1), 828–839. <https://doi.org/10.1186/1471-2458-13-828>
- Muthén, L. K., & Muthén, B. O. (2017). *Mplus user's guide* (8th ed.). Muthén & Muthén.
- Ng, D. M., & Jeffery, R. W. (2003). Relationships between perceived stress and health behaviors in a sample of working adults. *Health Psychology*, 22(6), 638–642. <https://doi.org/10.1037/0278-6133.22.6.638>
- Nixon, A. E., Mazzola, J. J., Bauer, J., Krueger, J. R., & Spector, P. E. (2011). Can work make you sick? A meta-analysis of the relationships between job stressors and physical symptoms. *Work & Stress*, 25(1), 1–22. <https://doi.org/10.1080/02678373.2011.569175>
- O'Connor, D. B., Jones, F., Conner, M., McMillan, B., & Ferguson, E. (2008). Effects of daily hassles and eating style on eating behavior. *Health Psychology*, 27(1, Suppl), S20–S31. <https://doi.org/10.1037/0278-6133.27.1.S20>
- O'Connor, D. B., & Conner, M. (2011). Effects of stress on eating behavior. In R. J. Contrada & A. Baum (Eds.), *The handbook of stress science: Biology, psychology, and health* (pp. 275–286). Springer.
- Oliver, G., & Wardle, J. (1999). Perceived effects of stress on food choice. *Physiology & Behavior*, 66(3), 511–515. [https://doi.org/10.1016/S0031-9384\(98\)00322-9](https://doi.org/10.1016/S0031-9384(98)00322-9)
- Open Food Facts (2023a, January 12). *Chips Lays nature*. <https://world.openfoodfacts.org/>
- Open Food Facts (2023b, January 12). *Snickers bar*. <https://world.openfoodfacts.org/>
- Paterson, J. L., Dorrian, J., Pincombe, J., Grech, C., & Dawson, D. (2010). Mood change and perception of workload in Australian midwives. *Industrial Health*, 48(4), 381–389. <https://doi.org/10.2486/indhealth.MSSW-01>
- Payne, N., Jones, F., & Harris, P. R. (2005). The impact of job strain on the predictive validity of the theory of planned behaviour: an investigation of exercise and healthy eating. *British Journal of Health Psychology*, 10(1), 115–131. <https://doi.org/10.1348/135910704X14636>
- Payne, N., Jones, F., & Harris, P. R. (2013). Employees' perceptions of the impact of work on health behaviours. *Journal of Health Psychology*, 18(7), 887–899. <https://doi.org/10.1177/1359105312446772>
- Pidgeon, A., Lacota, K., & Champion, J. (2013). The moderating effects of mindfulness on psychological distress and emotional eating behaviour. *Australian Psychologist*, 48(4), 262–269. <https://doi.org/10.1111/j.1742-9544.2012.00091.x>
- Ployhart, R. E., & Kim, Y. (2013). Dynamic longitudinal growth models. In J. Cortina & R. Landis (Eds.), *Frontiers of methodology in organizational research*. Routledge.
- Poppitt, S. D., Swann, D., Black, A. E., & Prentice, A. M. (1998). Assessment of selective under-reporting of food intake by both obese and non-obese women in a metabolic facility. *International Journal of Obesity*, 22(4), 303–311. <https://doi.org/10.1038/sj.ijo.0800584>
- Powell, D. J. H., McMinin, D., & Allan, J. L. (2017). Does real time variability in inhibitory control drive snacking behavior? An intensive longitudinal study. *Health Psychology*, 36(4), 356–364. <https://doi.org/10.1037/hea0000471>
- Preacher, K. J., Zyphur, M. J., & Zhang, Z. (2010). A general multilevel SEM framework for assessing multilevel mediation. *Psychological Methods*, 15(3), 209–233. <https://doi.org/10.1037/a0020141>
- Puranik, H., Koopman, J., & Vough, H. C. (2021). Excuse me, do you have a minute? An exploration of the dark- and bright-side effects of daily work interruptions for employee well-being. *Journal of Applied Psychology*. Advance online publication. <https://doi.org/10.1037/apl0000875>
- Quick, C. J., & Henderson, F. D. (2016). Occupational stress: preventing suffering, enhancing wellbeing. *International Journal of Environmental Research and Public Health*, 13(5), 459–469. <https://doi.org/10.3390/ijerph13050459>
- Reichenberger, J., Pannicke, B., Arend, A. K., Petrowski, K., & Bleichert, J. (2021). Does stress eat away at you or make you eat? EMA measures of stress predict day to day food craving and perceived food intake as a function of trait stress-eating. *Psychology & Health*, 36(2), 129–147. <https://doi.org/10.1080/08870446.2020.1781122>
- Robinson, E., Hardman, C. A., Halford, J. C. G., & Jones, A. (2015). Eating under observation: a systematic review and meta-analysis of the effect that heightened awareness of observation has on

- laboratory measured energy intake. *The American Journal of Clinical Nutrition*, 102(2), 324–337. <https://doi.org/10.3945/ajcn.115.111195>
- Román, N., & Urbán, R. (2019). Mindful awareness or self-regulation in eating: an investigation into the underlying dimensions of mindful eating. *Mindfulness*, 10(10), 2110–2120. <https://doi.org/10.1007/s12671-019-01170-2>
- Schüz, B., Bower, J., & Ferguson, S. G. (2015). Stimulus control and affect in dietary behaviours. An intensive longitudinal study. *Appetite*, 87, 310–317. <https://doi.org/10.1016/j.appet.2015.01.002>
- Singer, J. D., & Willett, J. B. (2003). *Applied longitudinal data analysis: modeling change and event occurrence*. Oxford University Press.
- Sliter, M. T., Pui, S. Y., Sliter, K. A., & Jex, S. M. (2011). The differential effects of interpersonal conflict from customers and coworkers: trait anger as a moderator. *Journal of Occupational Health Psychology*, 16(4), 424–440. <https://doi.org/10.1037/a0023874>
- Sonnentag, S., & Bayer, U. V. (2005). Switching off mentally: predictors and consequences of psychological detachment from work during off-job time. *Journal of Occupational Health Psychology*, 10(4), 393–414. <https://doi.org/10.1037/1076-8998.10.4.393>
- Sonnentag, S., Pundt, A., & Venz, L. (2017). Distal and proximal predictors of snacking at work: a daily-survey study. *Journal of Applied Psychology*, 102(2), 151–162. <https://doi.org/10.1037/apl0000162>
- Spector, P. E., & Jex, S. M. (1998). Development of four self-report measures of job stressors and strain: interpersonal conflict at Work Scale, Organizational Constraints Scale, quantitative workload inventory, and physical symptoms Inventory. *Journal of Occupational Health Psychology*, 3(4), 356–367. <https://doi.org/10.1037/1076-8998.3.4.356>
- Sproesser, G., Schupp, H. T., & Renner, B. (2013). The bright side of stress-induced eating: eating more when stressed but less when pleased. *Psychological Science*, 25(1), 58–65. <https://doi.org/10.1177/0956797613494849>
- Tak, S. R., Hendrieckx, C., Nefs, G., Nyklíček, I., Speight, J., & Pouwer, F. (2015). The association between types of eating behaviour and dispositional mindfulness in adults with diabetes. Results from diabetes MILES. *The Netherlands Appetite*, 87, 288–295. <https://doi.org/10.1016/j.appet.2015.01.006>
- Thayer, R. E. (1987). Energy, tiredness, and tension effects of a sugar snack versus moderate exercise. *Journal of Personality and Social Psychology*, 52(1), 119–125. <https://doi.org/10.1037/0022-3514.52.1.119>
- van de Veer, E., van Herpen, E., & van Trijp, J. C. M. (2012). Body and mind: how mindfulness enhances consumers' responsiveness to physiological cues in food consumption. *Advances in Consumer Research*, 39, 783–803.
- van Emmerik, I. J. H., & Jawahar, I. M. (2006). The independent relationships of objective and subjective workload with couples' mood. *Human Relations*, 59(10), 1371–1392. <https://doi.org/10.1177/0018726706071649>
- Wang, Y., Wang, L., Cui, X., Fang, Y., Chen, Q., Wang, Y., & Qiang, Y. (2015). Eating on impulse: implicit attitudes, self-regulatory resources, and trait self-control as determinants of food consumption. *Eating Behaviors*, 19, 144–149. <https://doi.org/10.1016/j.eatbeh.2015.09.011>
- Wardle, J., Steptoe, A., Oliver, G., & Lipsey, Z. (2000). Stress, dietary restraint and food intake. *Journal of Psychosomatic Research*, 48(2), 195–202. [https://doi.org/10.1016/S0022-3999\(00\)00076-3](https://doi.org/10.1016/S0022-3999(00)00076-3)
- Waterhouse, J., Buckley, P., Edwards, B., & Reilly, T. (2003). Measurement of, and some reasons for, differences in eating habits between night and day workers. *Chronobiology International*, 20(6), 1075–1092. <https://doi.org/10.1081/CBI-120025536>
- World Health Organization (2021, June 9). *Obesity and overweight*. <https://www.who.int/news-room/factsheets/detail/obesity-and-overweight>

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.