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Thirst at Work Implies More Than Just Inadequate Facilities for Breaks

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Abstract Early signs of dehydration, such as headaches, are not unusual in the working population. Even slight deficiencies of water intake may have negative effects on both health and performance. However, little is known about work-related fluid intake. We expect the daily experience of interruptions to distract from perceived thirst, resulting in reduced daily fluid intake. This effect may be more pronounced when the workload is generally less predictable due to the assignment of tasks that are beyond the definition of the worker's professional role (unreasonable tasks). Data were gathered from 29 female service employees across five workdays. Multilevel analyses revealed daily work interruptions to be negatively associated with fluid intake, especially when there were frequent unreasonable task-assignments. Results suggest that interruptions at work might reduce daily fluid intake. However, adequate allocation of tasks by managers can protect employees against insufficient drinking.

Keywords Work stress · Work interruptions · Fluid intake · Unreasonable tasks · Diary

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Introduction

Early signs of dehydration include experience of light headaches, tiredness and dizziness, lack of appetite, mouth dryness, and stomach pain (Davidhizar et al. 2004; Kleiner 1999). Headache and stomach pains are amongst the seven most commonly experienced problems of European workers (Eurofound 2012). No one wants to experience any of these symptoms and yet behaviours that can cause them are so often accepted. Nygaard and Linder (1997) cross-sectionally investigated urinary tract infections and the voiding habits of 791 female teachers. They made a disturbing discovery: half of the participants stated they drank less during their working hours to avoid having to go to the bathroom. However, even mild dehydration has negative effects on people's physical fitness (e.g., Armstrong et al. 1985; Maughan and Shirreffs 1997) and their cognitive performance (e.g., Choma et al. 1998; Edmonds et al. 2013; Gopinathan et al. 1988). In addition, recent research has shown the consumption of tea and other beverages is beneficial not only with respect to performance but also to mood and health (Bryan et al. 2012; Gardner et al. 2007). This was also found true for coffee consumption (e.g., Dórea and Costa 2005; Glade 2010; Hindmarch et al. 2000).

Yet, although fluid intake seems to be beneficial, people tend to drink less or will suppress the desire to void during working hours (Bendtsen and Andersen 1991; Nygaard and

Linder 1997). This seemed to be due not only to inadequate opportunities for breaks but also because of being too busy to do so. Thus, reduced fluid intake might act as a behavioural indicator of stress.

Work Stress and Fluid Intake

The term *stress* is not always clearly classified, as it could refer to the stimulus, the response, or the process in between (Jex et al. 1992). We refer to stress as an individual strain response due to environmental stimuli or stressors (e.g., Beehr and Franz 2008). There are different pathways by which stress may impair health. For example, work-related stress is associated with health risk behaviours, such as more smoking, less exercise, and unhealthy diet (e.g., Mouchacca et al. 2013; O'Connor et al. 2008; Siegrist and Rödel 2006). To date, investigations of the relationship between work-related stress and diet have focused on food intake. However, fluid intake also could be seen as a health-related practice.

Up to now, fluid intake was mainly investigated with respect to physical intense working or training conditions, such as athletes (e.g., McCartney et al. 2017) and manual workers (e.g., military, fire fighters and labourers; e.g., Brake et al. 2003; Kenefick and Sawka 2007). Beside increased fluid loss due to extreme environmental conditions or physical excretion, an inadequate fluid intake—for instance, due to stressful (working) condition—might lead to deficits in the water balance (e.g., Ekpenyong and Akpan 2017). The stress reaction as well as thirst and drinking behaviour are regulated by the central nervous system (e.g., McEwen and Gianaros 2011). Neurons in circumventricular organs of the hypothalamus regulating the fluid intake (e.g., Oka et al. 2015). Thus, the hypothalamus in midbrain plays a role in regulation of thirst and is known to be sensitively activated by environmental stimuli, such as work-related stressors (e.g., Ganzel et al. 2010; Sapolsky 2004). The stress response includes activation of the Sympathetic-Adrenal-Medullary (SAM) system and the Hypothalamic–Pituitary–Adrenal (HPA) system that initiate the release of neuroendocrine hormones (e.g., catecholamine and cortisol) and cardiovascular responses (e.g., heart rate and blood pressure) that support the "fight or flight" response to environmental threats and demands (Sapolsky 2004). Moreover, the neurologically triggered ''fight-or-flight'' response stimulates neurosecretory cells in the supraortic and paraventricular nuclei of the hypothalamus resulting in secretion of vasopressin that causes hypertonic urine and decreases in urine volume and is involved in the regulation of thirst. Vasopressin, however also triggers ACTH, the releasing hormone of cortisol. Moreover, Angiotensin II is a stress-related neuropeptide and also involved in regulation of water-salt balance. Taken together, there is interplay in the regulation of stress and thirst. The stress response suppresses thirst (Sapolsky 2004) whilst drinking much water like animals at the waterhole seems to suppress stress, aggression, and anxiety (Pruimboom and Reheis 2016). Thus, occupational stress is expected to be related to lower perception of thirst and less drinking that may result in mild dehydration as shown in emergency physicians and nurses work conditions to relate to decreased fluid intake (Alomar et al. 2013). Studies on the risk of work-related urolithiasis hypothesized that a busy and stressful work schedules limit the workday fluid intake (e.g., in health care providers, Chen et al. 2016). Evidence increases that stress is related to the development of kidney stones because kidney stones can be seen as a renal consequences of the stress-related metabolic syndrom (Kalaitzidis et al. 2014). Behavioural changes in fluid intake might be part of a stress related vicious circle as consequences in well-being, such as anxiety or depressed mood, itself might have a negative impact nutrition behaviour (e.g., Luyster et al. 2009) and thus, might lead to a vicious circle. We focused on fluid intake as a rarely examined behaviour in response to work-related stress.

Work stressors, such as working under time pressure or dealing with interruptions, are common stress-inducing situations (Eurofound 2012; Paoli and Merllié 2005). However, people are not simply at the mercy of a stressful situation but can actively influence it and cope with it. Behavioral decisions concerning fluid intake can be a part of emotion-focused or problem-focused coping processes that are initiated by the worker (cf., Lazarus and Folkman 1984). Emotion- focused coping aims to reduce a person's negative emotional response to a stressor using distraction by other activities or increasing alcohol intake (Baker and Berenbaum 2007; Krischer et al. 2010). Problem-focused coping is aimed directly against the source of the stressful situation to change this situation. It includes setting priorities, so that concentration is focused on the stressful situation. Thus, people can, for example, cope with interruptions by hazarding the consequences of risk behaviour in terms of reduced fluid intake in order to re-orientate to the task, working continuously, avoiding other activities, such as bathroom breaks or fetching drinks. From the perspective of decision research, it is a decision to suspend an activity and instead pursue another activity (for reviews, see Critchfield and Kollins 2001; Frederick et al. 2002). People may have the perception that delaying fluid intake may not be directly associated with negative and possibly considerable consequences. In contrast, the alternative activity (to continue work) is connected with immediate positive consequences or the absence of immediate negative consequences. This is in line with previous research (cf., Bendtsen and Andersen 1991; Nygaard

and Linder 1997) indicating that a person's decision to take less fluid is associated with strong experiences with work stressors. In addition, work demands may be more than stressors; they can also be seen as challenges. Thus, increasing the concentration on the relevant work activities, leading to absorption in the task (Podsakoff et al. 2007; Schaufeli et al. 2008). This state can lead to the suppression of a person's perception of his or her own needs such as fluid intake (Csikszentmihalyi 1975; Goldberg et al. 2006); mastering a challenge comes at a cost (Rodell and Judge 2009).

Accordingly, we assume two aspects of daily work stressors are particularly important for daily fluid intake: (1) the stressors should impede the achievement of the task objective and, therefore, require additional effort from the person where (2) the activities necessary for the fulfilment of the task are clear (as opposed to role uncertainty; e.g., Wirtz et al. 2013). This should particularly be true for work stressors that pose additional load to working memory, such as interruptions. When there is an interruption, attention must be shifted to the interruption agent and away from the current activity. The goal of the interrupted action (for instance getting some water to drink after finishing the current task) and its position in the action sequence must be stored in working memory. Moreover, the goal of restarting the interrupted activity at a later time must be stored in prospective memory (Hofmann and Frese 2011). The negative consequences of interruptions on fluid intake arise from these growing costs of action regulation. A common consequence is omitting to drink: for example, the prospective goal of getting some water to drink after finishing the current task is forgotten after an agent was interrupted by a customer and continued to work on the current task at stored position of the action sequence. Alternatively, because of the lost time due to the interruption the agent might make the conscious decision not to drink.

Hypothesis 1 (H1): *the daily experience of interruptions is negatively related to the daily amount of fluid intake*.

There is evidence that more frequent daily work stressors was shown to precede experience of strain (e.g., Elfering et al. 2005). In addition, transition from normal hydration to mild dehydration corresponded to decreasing levels of self-reported well-being (Maughan 2003). Thus, mild dehydration may partly mediate the link between work stressors and strain.

Hypothesis 2 (H2): *fluid intake partly mediates the association between daily interruptions and experience of tension as an indicator of strain*.

The Moderating Role of Unreasonable Tasks

Some might argue that work stressors are not always reducible; they are part of the job. However, especially in the services sector, staffing levels are often too low (e.g., LaGanga 2011; Sprigg and Jackson 2006). Qualified personnel must also increasingly take on tasks that need to be done but which do not belong to their occupational role or for which they are not qualified. For example, an experienced nurse may have to carry out a student nurse's work or need to do tasks perceived as non-nursing activities (Sabo 1990). These tasks are called *unreasonable tasks* (e.g., Semmer et al. 2007, 2015) and are often not part of the core work activity and job description but tend to consist of secondary activities (see Semmer et al. 2006). For example, secondary activities, such as cleaning due to clean desk policies, which are important when customers are affected and are required by the organization because other reasons as well.

Chronic stressors, such as frequent unreasonable task assignments, can be seen as background stressors that might impair the acute stress response that takes place against this rather consistent background (Elfering et al. 2005; Gump and Matthews 1999). The stressor does not have to be present in the momentary situation to interfere with the reaction (e.g., Wirtz et al. 2013). In other words, if the person is already susceptible to chronic assignments of unreasonable tasks at work, this susceptibility might worsen his or her reaction to daily work stressors. The person might worry that the assignment of such activities shortens the time and resources needed for the actual core work activity; compensatory effort is required and other necessities, such as fluid intake, might fade into the background. Moreover, beside classic work stressors, unreasonable tasks also represent a lack of respect or appreciation for they should not be expected from a person in a specific role (*stress as disrespect*; see Semmer et al. 2007, 2015). Yet, the customer is a second important source of appreciation (e.g., Ball et al. 2009; Jacobshagen and Semmer 2009), and when contact with customers is required, the person is expected to show accelerated effort. When unreasonable task assignments are common, core tasks should be even more salient. Based on these considerations, we expect daily interruptions to be associated with reduced daily fluid intake, especially when the person is experiencing comparatively more unreasonable tasks.

Hypothesis 3 (H3): *the association between daily interruptions and fluid intake is stronger when a person usually experiences unreasonable tasks*.

Methods

Participants and Design

Data were obtained from a paper–pencil based diary study across five consecutive working days. Altogether, the sample consisted of 29 female employees. Their age varied between 17 and 54 years ($M = 27.5$ years, $SD = 7.6$). Participants were working in the service sector with customer contact and followed a variety of occupations, such as saleswoman, medical assistant, teacher, beautician or hairdresser, and florist. One-third worked full-time, the remaining participants worked part time between 60 and 90%. On average, the participants worked for 9.47 h a day ($SD = 1.46$) during the data collection period. Fluid intake was not prohibited during working hours at any of the examined workplaces. None of the participants took diuretic drugs or suffered from any kidney problems or diabetes. All participants took part in the study for at least 3 consecutive days. Because previous studies in the field included only women (Bendtsen and Andersen 1991; Nygaard and Linder 1997) we decided to rely solely on women for comparability.

Participants first completed a general questionnaire assessing their general level of work stressors and unreasonable tasks as well as demographic variables. At the beginning of the following week, participants began completing paper–pencil based diaries at the end of their working hours. In addition, they kept a continuous record of their fluid intake the entire day (i.e., before, during and after work). In 15% of cases there were missing data (missing days; participants failed to complete the daily survey after day 4 or 5). Data of all participants were included in the analysis.

Measures

Work Interruptions

Daily interruptions were assessed after daily work was finished by means of a short version of the self-reporting Instrument for Stress Oriented Task Analysis (ISTA; Semmer et al. 1995) adapted for daily use (see Sonnentag and Jelden 2009). The scale consist of four items (e.g., "I was interrupted by other colleagues during the course of my work activity"). Participants rated each item on a 5-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Cronbach's alpha ranged between 0.71 and 0.85 across days.

Additionally, we measured the general level of the perceived work interruptions assessed by general questionnaire (ISTA): by four items (e.g., "How often are you interrupted by other colleagues during the course of your work activity?"). Participants rated each item on a 5-point Likert scale, ranging from 1 (*very rarely/never*) to 5 (*very often*). Cronbach's alpha was 0.86.

Unreasonable Tasks

Unreasonable tasks were assessed by assessed by general questionnaire with the Bern Illegitimate Tasks Scale (BITS; Semmer et al. 2010). The scale consists of four items, starting with "Do you have work tasks to take care of that you believe…" followed by statements, such as ".. . should be done by someone else?" or ".. . are going too far, and should not be expected from you?" Answers were on a 5-point Likert scale, ranging from 1 (*very rarely/never*) to 5 (*very often*). Cronbach's alpha was 0.86.

Fluid Intake

Fluid intake was assessed for every waking hour from 5 am to 12 pm during the whole research period. Participants filled out a fluid intake protocol at the beginning of work, at noon, after the end of work, and before going to bed. The participants were asked to record the amounts in decilitres of various types of fluids, such as water, soft drinks, fruit or vegetable juices, milk or yoghurt drinks, tea, coffee, stimulant drinks, and alcoholic beverages. Although some studies have demonstrated the diuretic effects of coffee, recent studies have shown that a diuretic effect rises only up to a certain threshold (Grandjean et al. 2000). This threshold is defined in regular and moderate coffee consumers (Arnaud 1999); thus, the diuretic effect cannot be expected in regular coffee drinkers. Accordingly, when consumed regularly, coffee may be considered as part of the water supply of the body and can be treated like any other beverage regarding fluid balance (Grandjean et al. 2000). In the analysis, we considered fluid intake in two versions—one including and one without taking into account coffee consumption. We aggregated data into daily values using every type of fluid other than alcoholic beverages and stimulant drinks due to their diuretic activity. Furthermore the number of toilet breaks during work was obtained at the end of working hours. In addition, participants were asked two "yes or no" questions, a) "Did you drink less today to avoid having to go to the bathroom?" and "Did you postponed the need to go to the bathroom today because you were tied up with business?"

Tension

Additionally, participants indicated their feelings of tension in the daily survey after work was done. Tension is a measure of strain and was added because the stressor—strain—reduced fluid intake mediation was tested in this study.

Participants reported their present state of tension with respect to five adjectives of the "tension" scale by Apenburg (1986) on a 6-point Likert scale. Cronbach's alpha ranged between 0.76 and 0.94 across the five days.

Results

Descriptive Statistics

Descriptive statistics are presented in Table 1. On average, the participants drank 1.58 L of liquid ($SD = 0.39$; or 1.38 L without including coffee, $SD = 0.34$) throughout the day. Considering the different types of beverages, this total amount comprised 30–40% water, 5–20% soft drinks, 5–11% fruit or vegetable juices, 4–9% milk or yoghurt drinks, 7–25% tea, and 6–13% coffee throughout the day. During working hours, the toilet was visited an average of three times ($SD = 1.24$). Overall, 14% of participants reported consciously drinking less to avoid toilet breaks and 52% said they postponed toilet breaks because of their work activity. Zero-order-correlations showed only the frequency of toilet breaks to be negatively correlated across all days. However, these correlations do not respect the dependent structure of the data of days being nested in persons.

We analysed the data using a hierarchical linear modelling approach with the program HLM 6.08 (Raudenbush et al. 2004). To analyse whether participants' fluid intake differed across the days, we calculated a null model that showed nearly equal proportions of the variance on both levels: for fluid intake including coffee, the intraclass correlation was 0.52 (without coffee: 0.46). Thus, 48–54% of the variance in fluid intake was attributable to within-person variance, indicating that examining intra-individual fluctuations by way of multilevel modelling was appropriate.

Multilevel Analyses

Results of the regression analyses are displayed in Table 2. Predictors at person-level were centred using a grand mean and daily work interruptions by group mean. Group-mean centring has been recommended in the context of testing cross-level interaction hypotheses (Aguinis et al. 2013). It allows estimating fluctuations of work interruptions on fluid intake within persons without differences between persons. Because of the directional hypothesis, alpha level was one-tailed (Wonnacott and Wonnacott 1984).

First, we examined the effect of work interruptions at the day-level (Level 1), controlling for general work interruptions (Level 2). In line with Hypothesis 1, daily work interruptions were negatively associated with the daily fluid intake (H1). No main effects of general work interruptions emerged (with coffee $b = 0.05$, $p > 0.05$ or, without taking into account coffee $b = 0.01$, $p > 0.05$, Table 2, Model 1).

Mediation Analyses

Then we examine fluid intake as a mediator between daily work interruptions and daily tension (H2). The intraclass correlation of tension was 0.66. With respect to both measures of fluid intake, fluid intake was negatively (with $b = -0.32$, $p > 0.05$ or without coffee $b = -0.51$, $p > 0.01$; one-tailed) and work interruptions were positively (with $b = 0.20$, $p > 0.05$, one-tailed) associated with tension. Work interruptions were negatively associated with fluid intake (with $b = -0.07$, $p > 0.05$ or without coffee $b = -0.08$, $p > 0.05$; one-tailed). When adding fluid intake

Table 1 Means (M), standard deviations (SD), and zero-order correlations of the study variables

Variable	*M*	*SD*	1	2	3	4	5	6	7
Day-level variables									
1. frequency of toilet breaks	3.06	1.24	–	0.31**	0.27**	0.06	−0.16*	0.02	
2. fluid intake[a]	1.58	0.39	0.41*	–	0.92**	0.07	−0.09	−0.10	
3. fluid intake (without coffee)[a]	1.38	0.34	0.36*	0.90**	–	0.06	−0.08	−0.08	
4. alcohol consumption	0.27	1.01	0.22	0.15	0.22	–	−0.15	0.15	
5. daily work interruptions	2.81	0.94	−0.11	−0.01	−0.01	−0.24	–	0.11	
6. daily tension	2.85	0.95	0.10	−0.15	−0.07	0.39*	0.12	–	
Person-level variables									
7. general work interruptions	3.11	0.88	0.01	0.06	0.03	0.03	0.62**	−0.08	–
8. general unreasonable tasks	2.09	0.91	−0.14	−0.03	−0.06	−0.06	0.40*	−0.02	0.66**

Correlations below the diagonal reflect the between-person associations of the averaged Level-2 variables (person; $N = 29$). Correlations above the diagonal reflect the within-person associations of the Level-1 variables (measurement; $n \leq 145$)

*$p < 0.05$, **$p < 0.01$ (one-tailed)

[a]Fluid intake is given in litres

Table 2 Multilevel regression analyses predicting fluid intake

Variable	Fluid intake including coffee consumption								
	Model 1			Model 2			Model 3		
	B	SE_B	*t*	*B*	SE_B	*t*	*B*	SE_B	*t*
Intercept	1.59	0.08	20.77***	1.59	0.08	21.10***	1.59	0.08	20.10***
Level 2 (person)									
Work interruptions	0.05	0.08	0.64	0.11	0.12	0.96	0.04	0.10	0.43
Unreasonable tasks				−0.10	0.11	−0.86	−0.10	0.12	−0.86
Level 1 (day)									
Work interruptions	−0.09	0.05	−1.76**	−0.09	0.05	−1.76**	−0.04	0.07	−0.66
Work interruptions × unreasonable task							−0.09	0.07	−1.31*
Intercept	1.38	0.06	21.83***	1.38	0.06	22.12***	1.38	0.06	22.13***
Level 2 (person)									
Work interruptions	0.01	0.07	0.21	0.06	0.08	0.74	0.06	0.08	0.75
Unreasonable tasks				−0.07	0.09	−0.82	−0.07	0.08	−0.82
Level 1 (day)									
Work interruptions	−0.11	0.06	−1.80**	−0.11	0.06	−1.80**	−0.03	0.07	−0.46
Work interruptions × unreasonable task							−0.15	0.07	−2.32***

The main effect of work interruptions remain significant regarding fluid intake solely at work hours, but interaction term failed to reach significance

Sample size: $n \leq 145$ measures (Level 1) of 29 participants (Level 2)

B unstandardized regression coefficient, SE_B standard error, *t* t-value

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$ (one-tailed)

in the model, the direct association between work stressors and tension was reduced (with $b = 0.18$, $p > 0.05$ or, without coffee $b = 0.16$, $p = 0.06$; one-tailed). The Sobel z test was used to examine the significance of the indirect effect (with $z = 1.55$, $p = 0.06$ or, without coffee $z = 1.70$, $p = 0.04$; one-tailed).

Moderation analysis

Finally we tested the interaction of daily interruptions and unreasonably tasks (H3). In Model 2 of Table 2, we additionally entered general unreasonable tasks at person-level (Level 2). No main effect of unreasonable tasks emerged. In Model 3, we added the interaction term between daily work interruptions and general unreasonable tasks. In line with Hypothesis 3, there was at least a marginally significant interaction between tasks-related stressors and unreasonable tasks ($b = -0.09$, $p = 0.09$) predicting fluid intake including coffee consumption. With respect to the measure of fluid without coffee intake, this interaction effect became significant ($b = -0.15$, $p < 0.01$).

According to simple slope tests (Preacher et al. 2006), daily work interruptions were related to less fluid intake when there were many unreasonable tasks to be done (with $b = -0.12$, $t = -2.61$, $p < 0.01$ or, without coffee $b = -0.17$, $t = -3.38$, $p < 0.01$). However, no such effect emerged when there was an average number of unreasonable tasks (with $b = -0.04$, $t = -0.66$, $p > 0.05$ or, without coffee $b = -0.03$, $t = -0.46$, $p > 0.05$) or the level of unreasonable tasks was low (with $b = 0.04$, $t = 0.32$, $p > 0.05$ or, without coffee $b = 0.11$, $t = 0.92$, $p > 0.05$). This pattern is in line with Hypothesis 2 see Fig. 1). These results are independent of the perceived level of work interruptions.

Discussion

Fluid intake is a potentially important behavioural indicator of stress but has so far received little attention in the work context. According to our results, the average amount of all liquid beverages consumed during the day was 1.58 L indicating euhydration. For one quarter of all days, however, participants reported a fluid intake of below 1.3 L suggesting increasing dehydration (Armstrong et al. 2012). About half of the variance in fluid intake resided within the person. These daily fluctuations in fluid intake behaviour are, therefore, of particular interest.

Behavioural decisions concerning fluid intake can be a part of coping processes that are initiated by the worker (cf., Lazarus and Folkman 1984). Emotion-focused coping aims to reduce a person's negative emotional response to a stressor using distraction by other activities, but also by

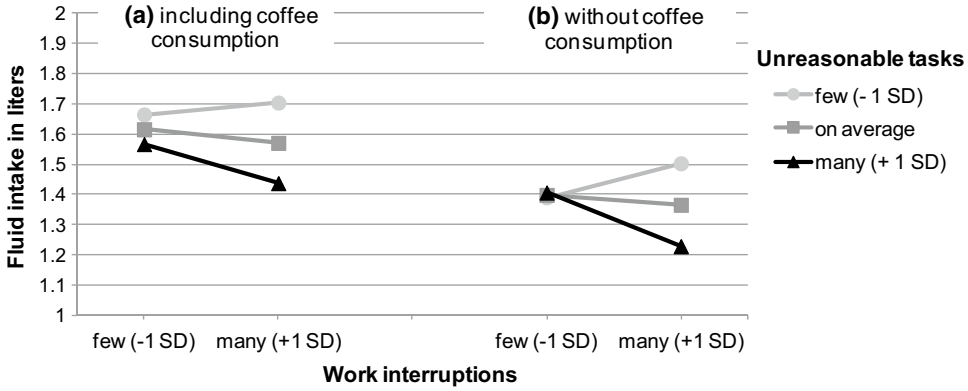

Fig. 1 Interaction between daily work interruptions and general unreasonable tasks predicting fluid intake, **a** including coffee consumption and **b** without coffee consumption during the workday

changing nutrition, such as choosing pleasant or distracting food (e.g., Macht et al. 2005; Spoor et al. 2007) or by increasing alcohol intake (Baker and Berenbaum 2007; Krischer et al. 2010). For instance, alcohol consumption is known to reduce feelings of anxiety (e.g., de Castro 1990). In line with these considerations, we found daily alcohol consumption to be positively related to daily feelings of tension (but unrelated to daily work interruptions). However, a reduction of fluid intake can also be done to actively cope with the source of the stressful situation. We hypothesized that daily work interruptions would reduce fluid intake over the course of the day. Such stressors might reduce employees' time to work on their core task and stop them from having opportunities to take in fluids. In addition, they might show increased concentration on relevant work activities because of the need to actively cope with the situation. Thereby the focus shifts to the performance within the work task suspending other secondary tasks and needs (e.g., fatigue; Veasey et al. 2002). As known from research on commuting accidents, performance in the work task could be sustained for a long time; however, stressful working conditions could lead to delayed consequences, such as commuting accidents (Chiron et al. 2008; Elfering et al. 2013). Moreover, stressful working conditions are known to be related to changes in person's body mass index (Kottwitz et al. 2014; Roberts et al. 2007). This might be due to rumination changing eating behaviour (e.g., less cooking, choosing unhealthy food) even after work was done (Cropley et al. 2012).

In line with previous research (Bendtsen and Andersen 1991; Nygaard and Linder 1997), our results revealed a main effect of reduced fluid intake resulting from the daily experience of work stressors like work interruptions. Bathroom breaks were avoided by 52% of our participants to prevent interruption of the current activity. Only 14% of participants reported consciously drinking less; however, they might not have always been aware of their drinking behaviour. Other motivational effects could play a part, although the motivation to drink when thirsty seems to be higher than to eat when hungry (Mattes 2010). Brake and Bates (2003) refer to voluntary dehydration (defined as inadequate or delayed thirst response) as "a function of poor access to water, workplace practices (particularly a lack of self pacing), inadequate education, or insufficient quality or palatability of water" (p. 95). In addition, working conditions define if employees are able and willing to look for possibilities of fluid consumption; especially in jobs with low risk of fluid loss where employees are not specifically alert about their hydration status. Reducing fluid intake may be a consciously active way of dealing with work stressors, such as time pressure. The amount of fluid intake was moderately correlated with the frequency of toilet breaks for both individual and daily levels. All involved organizations allowed their employees to fluid consumption and toilet breaks during working hours, however, participants were working in the service sector with customer contact. Thus, leaving the workplace for an unplanned break might be particularly complicated and difficult. Future research should also address the distance to the toilet and the availability of fluid as the proximity might have an influence on decision behaviour (e.g., Zenk et al. 2013). Lower fluid intake may represent adaptive behavior; fewer toilet breaks facilitate quicker task completion because interruptions would require re-orientation to the task. However, this situation can also imply that the person has a strong focus on his or her current work activities—that he or she is absorbed by work (Podsakoff et al. 2007). This state can lead to suppression of the perception of one's needs (Csikszentmihalyi 1975; Goldberg et al. 2006), such as fluid intake.

Yet, human beings badly tolerate variations in their water balance. Many commonly experienced everyday problems, such as headaches, have a clear link to water imbalance; indeed, these problems are increasingly recognized as symptoms of mild dehydration (e.g., Davidhizar et al. 2004; Kleiner 1999). Mild dehydration refers to a slight deficiency of water, such as 1–2% loss of body weight and is also known to have negative effects on performance. Our

mediation analyses point to daily fluid intake as a mediator between daily work interruptions and perceived tension. Low fluid intake might affect attention and concentration and, thus, a person's performance. Both hunger and thirst are primary needs. Hunger can systematically alter cognitive appraisal and decision-making processes. For example, Danziger et al. (2011) found the percentage of favourable rulings by judges to drop if the judges are hungry. Similarly, fluid intake especially affects job performance when the individual is thirsty (Edmonds et al. 2013; Rogers et al. 2001). Dehydration should therefore be associated with cognitive features, such as cognitive failure, risk taking, etc. Further research should concentrate on distal outcomes and differentiate the effects of fluid intake from taking breaks.

Furthermore, we hypothesized that the reduction of fluid intake due to work interruptions is particularly apparent when, in general, there is a background of comparatively many tasks that do not correspond to one's occupational role. Social roles that include behavioural expectations often become part of the incumbents' identity (Ashforth 2001; Haslam et al. 2009), and thus, the self (Sluss and Ashforth 2007). Typically, maintaining a positive sense of self—by enhancing or protecting it—is an urgent motivational priority (e.g., Sedikides and Strube 1997). Behaviour, such as the assignment of unreasonable tasks, indicates disrespect or a lack of appreciation and constitutes a threat to the persons' self-esteem. Yet, maintaining a positive sense of self requires additional resources. Since priority is given to self-esteem, other needs (such as thirst, hunger, or tiredness; e.g., Pereira et al. 2014) might become less important.

Previous research found illegitimate tasks to be particularly burdensome when the self-regulatory capacity is already limited due to compromised health (Kottwitz et al. 2013). Under stressful working conditions unreasonable tasks might further reduce the self-regulation of primary needs. We assume unreasonable background tasks to be accompanied by employee attempts to reduce time on core tasks (including self-esteem relevant attributions) and to increase concentration on core work activities. In accordance with this hypothesis, the reduction of fluid intake due to work interruptions reveals when the background conditions of work include many tasks assigned to a person that actually do not correspond to his or her occupational role. Yet, lower staffing levels and the tendency not to invest in extended vocational training makes unreasonable tasks unavoidable (Grebner et al. 2011). Unreasonable tasks may well require additional effort beyond the one that is needed to fulfil the core task. The core role is expected to be associated with the person's identity (cf. Ashforth 2001; Stets and Burke 2000). Within the service sector, dealing with customers is a core activity that is known as an important source of appreciation (e.g., Jacobshagen and Semmer 2009). Therefore, being engaged in this kind of activity is likely to be highly relevant. Interaction with a customer cannot easily be disrupted for drinking or a visit to the toilet. One might argue that being interrupted while interacting with a customer could be a good opportunity to drink something (or to go to the kitchen to prepare a tea) or even to go to the bathroom; however, in customer interaction such behaviour conflicts with the important rule not to let customers wait.

In customer-free periods and breaks, there is the opportunity for fluid intake. However, unreasonable tasks during customer-free periods (for unnecessary tasks as a related dimension in the concept of illegitimate tasks in service work and mental health, see Madsen et al. 2014) may trigger ruminating thoughts about the self that are likely to distract from the goal of fluid intake during customer-free periods. Thus, the general assignment of tasks that are perceived as unreasonable (e.g., delay in being able to hand over work at shift changes because colleagues are arriving late or having do to the administrative work of the previous shift that should have been done by those who already left) seems to be an aggravating factor. Previous research suggests time pressure to be particularly strongly associated with depressive symptoms if it exceeds occupational norms (Ford and Jin 2013). Our results show that low fluid intake in response to work stressors is stronger if the person experienced inadequate task assignment. Such behavioural decisions or habits of people exposed to work stressors are expected to be an indirect pathway to impaired well-being and health (e.g., Siegrist and Rödel 2006).

Strengths and Limitations

To the best of our knowledge, this is the first study to investigate continuous fluid intake during a working week in relation to the daily experience of work interruption. Assessment took place within appropriate, but arbitrary, situations. Fluid intake was monitored every waking hour over a 19-h period. Work interruptions were assessed each day at the end of work.

The small sample size was moderate with 145 daily observations in 29 individuals. The power to detect small effects was small and therefore the risk of missing a small significant effect cannot be excluded (e.g., Bortz and Döring 2006). In addition, the act of self-monitoring fluid intake can change the person's behaviour. However, we assume that this change is equally dependent on stressful working conditions. To enhance usability (Bolger et al. 2003), participants were asked to fill out a fluid intake protocol time-based at certain intervals (at the beginning of work, at noon, after the end of work, and before going to bed). With respect to the risk of retrospection bias, shorter intervals or an event based approach assessing fluid

intake each time after fluid consumption would be advisable (Stone and Shiffman 2008). However, this method very demanding for the participants increasing the risk to reduce compliance (Bolger et al. 2003). In this context, detection by trained observers would be interesting (cf., Semmer et al. 2004). Since we could not monitor the participants, we cannot be sure of their compliance. Subjective (reported by the respondent) and monitored response time behaviour are often far apart (Hufford 2008; Stone and Shiffman 2008). In future, a digital recording could allow controlling for the time of measurement. According to our results, work-related stressors reduce daily fluid intake and do not allow for compensation at any time (during working hours or after work was done). Disentangling the time of fluid intake before, during and after work was done would bin be highly necessary to answer if work-related stressors reduce fluid intake during working hours and/or during leisure time. In addition, fluid intake is only a very rough indirect measure of individual hydration status; differences in extrarenal water loss were not considered. In addition, the amounts of all fluids including that in food should also be considered (Armstrong et al. 2012; Manz et al. 2002). Thus, our results only point to a potential problem of individual hydration depending on work-related stressors; more precise measures are required. Moreover, there are several influences on water balance in the human body; the total water balance varies depending on age, gender, body weight, and body fat percentage (Kavouras 2002). As we investigated only young women, generalization is limited. So far, almost all studies on this issue have been conducted with women (e.g., Bendtsen and Andersen 1991; Nygaard and Linder 1997). Since older workers feel less thirst, perhaps the stressor-fluid intake relationship could be stronger for older people. Moreover, there is an urgent need to replicate these findings for men.

Theoretical and Practical Implications

Results suggest that interruptions at work might reduce daily fluid intake, which is known to be related to impaired well-being and performance. At times when participants experience more work interruptions they tend to drink less. However, adequate allocation of tasks by managers can protect employees against restricting their fluid intake, while concentrating on core or secondary tasks. Yet, further research should investigate the process more comprehensively, for instance, by investigating fluid intake as a mediator between stressors and symptoms of dehydration. We found fluid intake to mediate the association of daily work interruption and perceived tension. Most individuals accept to postpone the satisfaction of primary needs (hunger, thirst, sleep, security, etc.) while performing tasks that belong to the core work role and are considered unavoidable. Having to carry out tasks that are considered unreasonable will change the entire picture. These tasks make it worse to have no breaks or to delay breaks or to work overtime. Also, risky work due to unreasonable tasks is particularly stressful. In consequence, to conjoin these two aspects, a moderated mediation model (including unreasonable tasks as a moderator) is needed. Given that our sample size is rather small, we have not approached this analysis. Future research should also shed light on more distal outcomes. Dehydration comes with tiredness and metabolic changes in fluid balance and electrolyte levels (e.g., Montain and Coyle 1992). This could affect mental performance; in particular attention and concentration. Regarding health, beside headaches and stomach pain, gastrointestinal and renal function might be considered, as well as skin problems.

Our results point in the direction that fluid intake can be an interesting indicator of stress-related behaviour in occupational health psychology. Health-related behaviour can be nudged by environmental factors promoting good health and well-being (Li and Chapman 2013; Thaler and Sunstein 2008). Beyond providing information about risks or gains of fluid intake, increasing the accessibility could change the decision context in the sense of increasing the consumption. However, these strategies also have limits. With respect to our sample, participants work in the service sector with costumer contact and no fix office. The accessibility to fluid, food or going to the toilet should be mainly limited to the regular break. Installing water dispensers is a health-promoting measure that might fail if stressful working conditions prevail. Intervention measures should not be addressed without reference to the working conditions. Accordingly, future research should focus on the relationship of daily working conditions to fluid intake. What conditions at work can promote daily fluid intake? As unreasonable tasks might thwart the need for autonomy, which is important within the scope of self-determined motivation (Gagné and Deci 2005), daily resources, such as personal control might buffer the effects of work stressors on fluid intake.

Our findings are particularly relevant for supervisors, as they underline the practical relevance of the concept that unreasonable tasks are outside the range of one's occupation. Consequently, assigning unreasonable tasks might impair well-being. The health-promoting approach to fluid intake at work includes measures like installing water dispensers and providing clean toilets. Above all, the health-promoting aspect of fluid intake at work is a matter of instituting good leadership and work design.

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Compliance with Ethical Standards

Conflict of interst Authors declare to have not conflict of interest.

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

Research Involving Human and Animal Rights All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

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