

ORIGINAL ARTICLE

Non-Work Time Activities Predicting Teachers' Work-Related Fatigue and Engagement: An Effort-Recovery Approach

Adam Garrick ¹, Anita S Mak,¹ Stuart Cathcart,¹ Peter C Winwood,² Arnold B Bakker,³ and Kurt Lushington²

¹Faculty of Health, University of Canberra, ²Division of Education, Arts and Social Sciences, University of South Australia, and ³Department of Work and Organizational Psychology, Erasmus University Rotterdam

Objective: Drawing on the effort-recovery model of work stress, this study examined the effects of school teachers' sleep quality and time spent in various non-work time activities on work-related stress and motivational outcomes. We proposed that sleep quality and different types of non-work time activities would have differential effects on levels of work-related fatigue and engagement.

Method: Nine hundred and sixty Australian school teachers (mean age 46 years, 707 females, 237 males) completed a cross-sectional online survey measuring sleep quality, time spent in non-work time activities, and work-related fatigue and engagement.

Results: Teachers spent relatively higher amounts of time on work-related activities outside of formal work hours, and lower amounts of time on health-promoting activities such as exercise. Multiple regression analyses indicated that sleep quality was related to reduced fatigue and increased engagement, while time spent socialising outside of work was related to reduced fatigue. Time spent on work-related tasks outside of working hours was related to both increased fatigue and engagement. Other activities, including passive activity, exercise, and hobbies, were not significantly related to either outcome.

Conclusions: We discuss the implications of our findings in relation to theories and research in work stress, particularly in the context of where priorities should be placed for self-care interventions to facilitate teachers' day-to-day recovery from work demands.

Key words: non-work time activities; sleep quality; teachers; work engagement; work fatigue; work stress.

What is already known on this topic

- 1 Teaching is a high-stress occupation with elevated turnover among staff.
- 2 Workers must recuperate personal resources that are expended at work each day, in order to manage fatigue and promote capacity for work engagement.
- 3 Certain types of activities that workers participate in outside of work can impact work-related stress or motivation levels.

What this paper adds

- 1 Understanding from a large sample the amounts of time that Australian teachers spend in various non-work time activities that are relevant to stress, motivation, and health-related outcomes.
- 2 Comparing how different types of non-work time activities relate to both work-related fatigue and work engagement.
- 3 Identifying areas of need for interventions, with regards to how teachers might improve their work-stress-related self-care and how schools could support this.

The extent to which a worker recovers from job demands is vital to ensure requisite physical, emotional, and psychological resources to manage work-related stress and be motivated to

remain engaged in their job (Sonnentag, 2003). Conservation of resources (COR) theory (Hobfoll, 1989) states that individuals strive to obtain and retain things they value, called resources, which in the context of work-related stress includes personal resources such as vigour or self-esteem. Stress occurs when these resources are expended or threatened. To recover from stress, workers must restore those lost resources or gain new resources, which requires the related job stressors to be absent. Complimentary to COR theory, the effort-recovery model suggests that workers invest resources to meet job demands, which leads to resource depletion (Meijman &

Correspondence: Adam Garrick, Centre for Applied Psychology, University of Canberra, Canberra, ACT 2601, Australia.
Email: adamgarrick@outlook.com

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Mulder, 1998); non-work time activities assist workers to recover lost personal resources (e.g., physical energy, attentive focus) via relaxation and psychological detachment from work. Given that personal resources are required for workers to be engaged and recover from work-related fatigue, it follows that participation in leisure activities can increase work engagement and reduce fatigue. There is a growing literature on the effects of non-work time activities for workers, particularly with regards to the impact on recovery from work stress (e.g., Drach-Zahavy & Marzuq, 2013). However, the authors were only able to find two published studies that examined both stress-related and motivational outcomes of such activities, neither of which included teachers in their samples (Drach-Zahavy & Marzuq, 2013; Ragsdale & Beehr, 2016).

An important avenue for research remains in exploring how non-work time behaviours affect both work-related fatigue and engagement, given that these two variables are consistently linked with worker wellbeing and performance (e.g., Bakker, 2009; McEwen, 2003). This study explored these issues with a sample of school teachers, focusing on the “recovery” aspect of the effort-recovery model. While previous studies have investigated the role of organisational factors in teacher stress, there is a dearth of research exploring how teachers recuperate from such stress outside of the workplace. This approach is important for understanding how teachers’ behaviour outside of work impacts fatigue and engagement levels at work, to inform interventions that leverage non-work time activities to improve teacher wellbeing and performance. Below we present a brief review of work-related fatigue and engagement, and why these outcomes are particularly relevant to the teaching population.

Chronic Occupational Fatigue

Chronic fatigue refers to maladaptive fatigue that is persistent and may not resolve by simple rest (Winwood, Bakker, & Winefield, 2007). For a worker to meet job-related challenges or stressors, a process termed the stress response facilitates available physical and mental resources until the challenge has terminated (McEwen, 1998). A high-pressure occupation such as teaching likely activates the stress response often and for substantial periods in the day. Such prolonged activation without adequate recovery may lead to chronic fatigue (McEwen, 1998). Common characteristics of this include reduced motivation and disengagement from activities, including work participation with accompanying loss of productive capacity (McEwen, 2003).

Work Engagement

In addition to analysing how non-work time activities relate to teacher fatigue, this study also tested whether these activities are related to work engagement. This allowed us to investigate both stress and motivation-related outcomes with respect to how an individual spends his/her non-work time. Work engagement is a work-related cognitive-affective state experienced as positive and fulfilling, characterised by vigour, dedication, and absorption (Schaufeli, Bakker, & Salanova, 2006). Work engagement is related to employee job performance levels, wellbeing, and intentions to stay with one’s current

employer (Bakker, 2009; Schaufeli & Bakker, 2004). Workers need sufficient personal resources in order to be engaged at work, and hence recovery of resources lost during the work day is vital (ten Brummelhuis & Bakker, 2012).

Teacher Stress

The incidence of teacher stress is a cause for concern worldwide (Chan, Chen, & Chong, 2010) and within Australia, with increasing numbers of reports of teacher stress (Hiatt, 2010; Howard & Johnson, 2004). An Australian survey conducted by the Independent Education Union in Victoria and New South Wales (1996) reported that teachers experience stress from a range of areas including difficulties with management, workload pressure, and poor staff–student relationships. Similarly, a recent longitudinal study of Australian school principals found high self-reported levels of job demands, with the largest increasing source of stress over the last 5 years being mental health issues of staff and students (Riley, 2015). Such findings suggest likely organisational consequences such as high staff turnover and reduced quality of education. Teachers’ needs for recovery accumulate daily if they do not adequately recuperate from work strain (e.g., Qi *et al.*, 2015), and so it is important to identify what strategies are available for teachers to help them manage these demands while not becoming overly fatigued or losing engagement. Non-work time is the most significant part of the work–rest cycle available for secondary interventions targeting stress recovery, as this is where individuals have the greatest discretion over their activities.

Following from the effort-recovery approach, our study focuses on the activities that teachers engage in outside of formal working hours as an opportunity to recover from daily work-related stress. We assessed involvement in two different categories of non-work time activities—those that we expected would be potentially detrimental to teacher personal resource recuperation (namely, working at home), and those that we considered likely to assist teacher personal resource recuperation (passive activities, socialising, exercise, hobbies, and sleep).

Non-Work Time Activities—Working at Home

There are high levels of non-paid work-related activity at home that is expected of school teachers, including marking, lesson design, and contact with parents and students (Yong & Yue, 2007). The effort-recovery model suggests that time spent in work-related tasks at home will maintain the stress response experienced during work hours and restrict teachers’ abilities to recover resources, likely resulting in increased fatigue and lowered capacity for engagement. Hence, the amount of time teachers spend performing work-related activity at home is relevant to this research given that it will likely have detrimental effects on stress and motivational outcomes.

Other Types of Non-Work Time Activities

Prior research has highlighted several types of non-work time activities that may promote recuperation of personal resources, including passive activities, socialising, exercise, hobbies, and sleep. Passive forms of non-work time activity include

behaviours such as watching TV, resting, listening to music, etc., where little active effort is required. These activities have shown mixed results regarding value for workers recuperating from work stress; whilst some recent studies have reported passive activities to have little or no effect (Rook & Zijlstra, 2006; Sonnentag & Zijlstra, 2006), the majority of earlier work suggested passive activities to have positive effects on wellbeing before going to sleep (Sonnentag, 2001). Passive activities may encourage recuperation of personal resources simply by virtue of having a low arousal baseline, allowing the stress response time to recede.

Socialising with people whose company is enjoyed is considered beneficial in recuperating from work-related stress (Fritz & Sonnentag, 2005). In addition to providing an opportunity for personal resource recovery, it has been proposed that bursts of the neurotransmitter oxytocin occur in response to positive social interaction, which then acts to regulate the stress response (Detillion, Craft, Gaspard, Prendergast, & DeVries, 2004; Taylor, 2006). In one qualitative study with school teachers, participants often reported that some school colleagues also serve as close friends, and time available to “vent” with colleagues in social settings away from school was very important in coping with work-related stress (Howard & Johnson, 2004).

Physical exercise is consistently linked to recovery from work-related stress both directly and indirectly (Rook & Zijlstra, 2006; Winwood et al., 2007). This can be explained by findings indicating that exercise increases levels of brain-derived neurotropic factor, dopamine and serotonin within the central nervous system, which promote the stress recovery process (Berchtold, Kesslak, Pike, Adlard, & Cotman, 2001; Ernst, Olson, Pinel, Lam, & Christie, 2006).

Hobbies, or creative activity, have received little research attention in the field of work fatigue. However, initial studies suggest that hobbies may be important coping behaviours that provide opportunities for personal fulfilment, skills acquisition, and emotionally rewarding “mastery” experiences that promote recovery from work stress (Sonnentag & Fritz, 2007; Winwood et al., 2007). Teachers choosing to engage in hobby activities may need to expend personal resources in order to meet challenges associated with a particular hobby, however, there is potential for recovery through gaining resources such as skills, competencies, and self-efficacy (Sonnentag & Fritz, 2007).

Sleep is fundamental to the recovery process and conceivably one of the most important non-work time predictors of reduced fatigue and increased engagement for teachers, as this is a behaviour that is amenable to change (e.g., Hulsheger, Feinholdt, & Nubold, 2015) and has robust findings regarding worker wellbeing. For example, sleep quality has been found to predict recovery from work-related stress and fatigue (Rook & Zijlstra, 2006; Sonnentag, 2003), whereas compromised sleep results in diminished resource recovery (McEwen, 2006).

Gender and time spent in housework activity are also relevant background variables for this research. Previous studies have found gender differences in Australian teachers regarding levels of burnout and job stress (Timms, Graham, & Caltabiano, 2006). As an obligated task, housework may be an additional fatiguing factor for teachers after returning home from work, with previous research linking household obligations with

stress-related health outcomes (Thurston, Sherwood, Matthews, & Blumenthal, 2011).

The Present Study

Based on the above review, this study sought to investigate the effects of different types of non-work time activities on teacher work-related fatigue and engagement while controlling for some background factors, using a national survey. This study was designed to address gaps in the literature by surveying the amounts of time spent in these activities among the Australian teacher population to provide insight into the types of activities that may be prioritised in self-care initiatives. It would also address the lack of research exploring how non-work time activities effect both work stress and motivational outcomes, which is important given that these two types of outcomes reflect distinct concepts as opposed to simply being opposites on the same spectrum (e.g., Schaufeli & Bakker, 2004).

For predictor variables, we measured work-related activity performed at home, which may prolong the stress response and so obstruct personal resource recuperation. We also measured non-work time activities that previous research has linked to stress recovery or recuperation of personal resources (passive activities, socialising, exercise, hobbies, and sleep). We included gender and time spent in housework as control variables.

We formulated and tested the following hypotheses regarding teachers’ levels of (a) fatigue and (b) engagement, while controlling for background factors of gender and time spent in housework activity.

Hypothesis 1a. Time spent in work-related activity performed at home would be related to higher levels of work-related fatigue.

Hypothesis 1b. Time spent in passive activities, socialising, exercise, hobbies, and sleep quality would be related to lower levels of work-related fatigue.

Hypothesis 2a. Time spent in work-related activity performed at home would be related to lower levels of work engagement.

Hypothesis 2b. Time spent in passive activities, socialising, exercise, hobbies, and sleep quality would be related to higher levels of work engagement.

Method

Participants

An online survey of teacher stress and wellbeing was accessed 1,136 times and completed 960 times (completion rate = 85%). The sample included 707 (75%) females and 237 (25%) males, with mean age 45.95 years ($SD = 10.94$). A representative national survey ($N = 2,335$) of Australian teachers conducted in 2002 found a mean age of 43.1, with 70% of respondents being female and 30% male (Ministerial Council on Education Employment Training and Youth Affairs (MCEETYA), 2004). Hence, our sample appears representative of the national teaching workforce.

The participants were based in four states and one territory within Australia (Australia includes a total of six states and two territories): 79 from South Australia; 29 from Tasmania; 131 from the Australian Capital Territory; 594 from Western Australia; and 119 from New South Wales. The majority of

participants worked in public schools (96.7%). Regarding job description, 75.7% classified themselves as teachers, 20% as coordinators/executive teachers, 2.9% as principal/assistant principals, and 1.4% as other. We included participants with school leadership positions because their roles often include similar duties as teachers, including face-to-face teaching, staff meetings, student supervision, etc. (Northern Territory Department of Education, 2012). Regarding employment condition, 86.8% were permanent, 11.7% were contract, and 1.3% were relief. Regarding work hours, 80.7% worked full-time, 15.7% worked at least half-time, and 2.7% worked less than half-time.

Procedure

We gained ethical clearance for this study through the relevant university Human Research Ethics Committee procedures. We advertised the survey website with permission through several Australian teacher union newsletters and websites. Participants self-selected and completed an online cross-sectional survey by visiting a website created by the authors. The survey was available to access between August 2009 and January 2010. Inclusion criteria were that participants had current employment as a teacher or member of school leadership in an Australian school. All responses were anonymous. Participants were informed that the study was investigating teacher work fatigue and engagement, as well as methods of stress alleviation during non-work time, and were assured of confidentiality. No incentive was offered to complete the survey. Other variables measured in the survey have previously been analysed in another article, to explore the incidence of psychological injury in teachers (Garrick et al., 2014). All data were entered into an IBM SPSS Statistics version 20 database for analysis (Armonk, NY, USA).

Measures

Predictor and control variables

Predictor variables included hours per day engaged in work-related activity performed at home, passive activities, socialising, exercise, hobbies, and sleep quality. Control variables included gender and hours per day engaged in housework. We initially included participant age and the number of years each participant had worked at his or her current school as control variables, however these showed no significant bivariate correlations with either outcome variable and so were removed from analyses. Time spent on housework also did not have statistically significant bivariate correlations with either outcome variable, although it approached somewhat closer to significance and so was kept in analyses.

Definitions for the non-work time activities were included in the survey. Work-related activity was defined as, "time spent on school-related tasks outside of paid working hours, e.g. lesson preparation, assignment marking, etc." Passive activities were defined as, "activities outside of work which require little or no activity or input from you, such as watching TV, DVDs, reading, listening to music etc." Socialising was defined as "time outside of work that is dedicated to interacting with either friends or family, which may occur in the home, a hotel, a bar/restaurant/club etc. with one or more people, purely for fun and pleasure."

Exercise was defined as "any deliberate physical activity outside of work hours, including sport, sport training, gym, going for a walk, aerobics, etc., which raises your heart level above normal for at least 10 minutes." Hobbies were defined as "any time that is spent engaging in a hobby or other form of creative activity, such as artwork, music (play or practice), model making, restoring, needlework, dressmaking, gardening, etc., where you can 'lose yourself' in an active, personally satisfying way." Participants were asked to estimate on average how many hours they spend in each activity per day.

Time spent on housework and sleep quality were included as control variables. Housework was defined as "time spent doing household chores, e.g. cleaning," and was measured in terms of how many hours participants estimated they spend on housework per day. Sleep quality was measured using six items adapted from the Pittsburgh sleep quality inventory (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989), an example being, "It takes 30 minutes or more for me to get to sleep." Items were measured on a 5-point scale (0 = *not during the past month*; 4 = *everyday*), which were reversed and summed to produce a score out of 24 (actual scores ranged from 0 to 24). Higher scores represented better sleep quality. Present internal consistency reliability was satisfactory (Cronbach's $\alpha = 0.81$).

Outcome variables

Outcome variables were work-related fatigue and engagement. We employed the Chronic Fatigue subscale from the Occupational Fatigue Exhaustion Recovery (OFER) scale, which is a previously validated measure developed based on findings suggesting that chronic fatigue results from insufficient recovery between repeated instances of acute fatigue (Winwood, Lushington, & Winefield, 2006). The chronic fatigue subscale included five items, an example being, "I often wonder how I can keep going at my work." Participants were asked to indicate to what degree each statement has applied to them over the last month. The OFER uses a 5-point scale (0 = *strongly disagree*; 4 = *strongly agree*). The scores from the subscale were summed to a value out of 20 (actual scores ranged from 0 to 20), with higher values representing higher levels of fatigue. Present internal consistency reliability was satisfactory (Cronbach's $\alpha = 0.85$).

Work engagement has been defined as a positive and fulfilling work-related state of mind characterised by vigour, dedication, and absorption, and was measured using an adapted form of the short version of the Utrecht Work Engagement Scale (UWES) (Schaufeli et al., 2006). An example item includes, "At work I feel full of energy." The UWES uses a 5-point scale (1 = *strongly disagree*; 5 = *strongly agree*). The scores from each item were summed to provide an overall measure of engagement, with higher values representing higher levels of engagement (scores ranged from 9 to 45). Present internal consistency reliability was satisfactory (Cronbach's $\alpha = 0.88$).

Results

Descriptive Statistics

We explored the frequencies of time periods participants reported spending in different non-work time activities.

Regarding work-related tasks performed at home, 34% of participants reported spending between 1 and 2 hr/day, 25% reported spending more than 2 hr/day (25%), and 20% reported spending more than 3 hr/day (20%). Over half (56%) reported spending less than 30 min/day in social activities. Almost one quarter (24%) reported not engaging in any exercise, and 45% reported exercising for less than 30 min/day. Over one third (36%) reported typically spending no time on hobby activity.

Table 1 displays the variable means and standard deviations. Mean levels of teachers' fatigue and engagement were above the respective scale mid-points. This indicated that teachers tended to agree to experiencing work-related fatigue as well as engagement. Visual inspections of the histograms of work-related activity performed at home, sleep quality, fatigue, and engagement indicated that the distributions of these variables were approximately normal. The remaining predictor variables (passive activity, socialising, exercise, and hobby activity) had positive skewness, which reflected the nature of participation levels in these activities, that is, many participants self-reported not spending any time in these activities.

Correlations

When conducting correlations and regressions, we used listwise deletion to handle missing values. This was appropriate given that Little's missing completely at random test was not significant ($\chi^2 = 199.02$, $df = 185$, $p = .23$), indicating that data were missing completely at random (Little & Rubin, 1987). As the assumption of normality was not met for all predictor variables, when measuring significance of relationships we used a lower alpha level of $p < .01$ to compensate. As can be seen from the inter-correlations in Table 1, fatigue had a significant positive relationship with working at home, and significant negative relationships with sleep quality, socialising, exercise, and hobbies. Engagement had significant positive relationships with sleep quality, working at home, socialising, exercise, and hobbies. There was a moderate inverse relationship between

fatigue and engagement, indicating that they were measuring sufficiently distinct constructs.

Regression Analyses of Chronic Fatigue and Work Engagement

We conducted two sets of hierarchical multiple regression analyses to determine if non-work time activities predicted levels of fatigue and work engagement, respectively. Control variables were entered as predictor variables in Step 1, work-related activity performed at home was entered in Step 2, and the remaining four non-work time activities and sleep quality were added in Step 3. We tested assumptions for multiple regression for both analyses following guidelines from Field (2009). Analyses of standard residuals were carried out on the data to identify outliers, which indicated that four participants needed to be removed, after which results showed that the data contained no outliers (std. residual min greater than -3.29 , std. residual max smaller than 3.29). Multi-collinearity was not a problem, since no variables displayed variance inflation factors higher than 10, or tolerance values lower than 0.20 (O'Brien, 2007; Schroeder, 1990). The data met the assumption of independent errors (Durbin-Watson values for the two regressions ranged between 1.93 and 1.99). The histograms of standardised residuals indicated that the data contained approximately normally distributed errors, as did the normal P-P plots of standardised residuals. The scatter plots of standardised residuals showed that the data met the assumptions of linearity and homogeneity of variance. The data also met the assumption of non-zero variances.

Table 2 displays the results of hierarchical multiple regression analyses of non-work time behaviours predicting levels of teacher fatigue. Step 1 included the control variables, and found that neither gender nor time spent performing housework was significantly related to fatigue. Step 2 added the predictor variable of time spent working at home, which was significantly positively related to fatigue. Step 3 introduced the remaining predictor variables (passive activity, socialising,

Table 1 Means, Standard Deviations (SD) and Bivariate Correlations of Study Variables ($N = 814$)

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	
<i>Control variables</i>												
1	Gender ^a	—	—	—	—	—	—	—	—	—	—	
2	Housework ^b	1.52	1.06	.10*	—	—	—	—	—	—	—	
<i>Predictor variables</i>												
3	Work at home ^b	2.25	1.08	.13*	.20*	—	—	—	—	—	—	
4	Passive ^b	1.86	1.09	-.03	.41*	.09*	—	—	—	—	—	
5	Socialising ^b	0.97	1.01	-.03	.52*	.17*	.46*	—	—	—	—	
6	Exercise ^b	0.72	0.83	-.04	.37*	.14*	.29*	.42*	—	—	—	
7	Hobbies ^b	0.60	0.79	-.10*	.32*	.04	.31*	.41*	.34*	—	—	
8	Sleep quality	11.86	5.74	-.01	-.05	-.11*	-.02	.06	.05	.04	—	
<i>Outcome variables</i>												
9	Fatigue	12.34	4.53	.01	-.02	.12*	-.04	-.13*	-.09*	.09	.49*	—
10	Engagement	31.47	6.65	.13*	.04	.16*	-.01	.08	.06	-.06	-.37*	-.48*

^a 0 = male, 1 = female.

^b Hours per day.

* $p < .01$.

exercise, hobbies, and sleep quality). Time spent socialising and sleep quality were significantly related to lower levels of fatigue. The other predictors indicated negative relationships with fatigue, but the results were not statistically significant.

In the final model predicting occupational fatigue, $R^2 = 0.29$, adjusted $R^2 = 0.28$. Hypothesis 1a on the detrimental effect of working at home on teachers' fatigue was supported. Hypothesis 1b was supported only in relation to the effects of socialising and sleep quality on fatigue. In decreasing order of importance of the significant predictors of teachers' fatigue, sleep quality exerted a large effect, while socialising and work at home exerted small effects.

Table 3 displays the results of hierarchical multiple regression analyses of non-work time behaviours predicting levels of teacher engagement. Step 1 included the control variables, and found that gender was related to work engagement indicating that females were more engaged than males, while time spent performing housework was not significantly related to engagement. Step 2 added the predictor variable of time spent working at home, which was significantly positively related to engagement. This was the opposite direction hypothesised, and so Hypothesis 2a was not supported. Step 3 introduced the other non-work time behaviours (passive activity, socialising, exercise, hobbies, and sleep quality). Sleep quality was significantly related to higher levels of engagement. Passive activity was negatively related to work engagement (the opposite direction predicted), although this result was not statistically significant. The other predictors indicated positive relationships with engagement, but the results were not statistically significant.

In the final model predicting engagement, $R^2 = 0.19$, adjusted $R^2 = 0.18$. Hypothesis 2a on the detrimental effect of working at home on teachers' work engagement was not

supported. Hypothesis 2b was supported only in relation to the effect of sleep quality on engagement. In decreasing order of importance of the significant predictors of teachers' engagement, sleep quality exerted a moderate effect, whereas working at home and being female exerted small effects.

Discussion

Our research drew upon the effort-recovery approach to examine the impact of various non-work time activities on teacher occupational fatigue and work engagement. We found that females were more engaged than males; this is consistent with other research such as that of Klassen et al. (2012), who measured a sample of teachers from five different countries and found that females were more engaged in their work than males (although this result did not reach statistical significance). It is unclear why our other control variable, time spent in housework activities, did not show any significant relationships to the outcome variables. One possible explanation is that housework activities did not draw from the same set of personal resources that teachers used during work, and so did not inhibit resource recuperation.

Working at Home

Time spent in work-related activity was significantly related to higher levels of fatigue, indicating that the high levels of non-paid work that teachers are required to complete outside of work hours is detrimental to staff wellbeing. In Australia, full-time teacher contracts typically include approximately 37 paid work hours per week, which includes time to perform duties such as lesson preparation, marking, etc. (e.g., Northern Territory Department of Education, 2012). Despite this, our sample reported spending on average 2¼ hr/day engaged in work-related activity outside of formal working hours. It is possible that teachers are being deprived of opportunities to recuperate from daily stress as a result of the hours spent performing work duties at home, which may have a significant impact on fatigue levels. This highlights an area for schools and education departments to try and address in terms of teacher workload.

Notably, contrary to expectation, higher amounts of non-paid work were positively related to work engagement. A possible explanation is that teachers who are more engaged with their job may feel more obligated to spend extra time outside of work in order to ensure the highest quality of teaching. Future research should investigate teachers' perceptions around performing non-paid work, as it is possible that our unexpected finding may be related to how participants appraised non-paid work, for example, some may perceive this work as overloading one's capacity and hence threatening personal resources, while others might view the work as a manageable challenge. Despite this positive relationship between working at home and engagement, we also found that time spent working at home is correlated to higher fatigue, suggesting that non-paid work may have negative consequences for teacher wellbeing that could build over time if not adequately recovered. Further research is needed, particularly longitudinal investigations around the impacts of extended engagement in work outside of school hours for teachers.

Table 2 Multiple Regression Analysis Predicting Occupational Fatigue ($N = 810$)

	<i>B</i>	<i>SE B</i>	β
<i>Step 1</i>			
Gender ^a	0.09	0.36	0.01
Housework ^b	-0.08	0.15	-0.02
<i>Step 2</i>			
Gender ^a	-0.06	0.36	-0.01
Housework ^b	-0.19	0.15	-0.04
Work at home ^b	0.57	0.15	0.14*
<i>Step 3</i>			
Gender ^a	-0.20	0.31	-0.02
Housework ^b	0.08	0.16	0.02
Work at home ^b	0.41	0.13	0.10*
Passive activity ^b	-0.03	0.14	-0.01
Socialising ^b	-0.50	0.17	-0.11*
Exercise ^b	-0.18	0.19	-0.03
Hobbies ^b	-0.14	0.19	-0.03
Sleep quality	-0.39	0.02	-0.50*

Note. $R^2 = 0.01$ for Step 1; $R^2 = 0.02$ for Step 2 ($\Delta R^2 = 0.01$, $p < .01$); $R^2 = 0.29$ for Step 3 ($\Delta R^2 = 0.26$, $p < .01$).

^a 0 = male, 1 = female.

^b Hours per day.

* $p < .01$.

Table 3 Multiple Regression Analysis Predicting Work Engagement (N = 814)

	B	SE B	β
<i>Step 1</i>			
Gender ^a	1.90	0.53	0.13*
Housework ^b	0.17	0.22	0.03
<i>Step 2</i>			
Gender ^a	1.66	0.53	0.11*
Housework ^b	-0.01	0.22	0.00
Work at home ^b	0.91	0.22	0.15*
<i>Step 3</i>			
Gender ^a	1.73	0.49	0.11*
Housework ^b	-0.04	0.25	-0.01
Work at home ^b	1.14	0.20	0.19*
Passive activity ^b	-0.25	0.23	-0.04
Socialising ^b	0.16	0.27	0.03
Exercise ^b	0.02	0.29	0.00
Hobbies ^b	0.45	0.30	0.05
Sleep quality	0.45	0.04	0.39*

Note. $R^2 = 0.02$ for Step 1; $R^2 = 0.04$ for Step 2 ($\Delta R^2 = 0.02$, $p < .01$); $R^2 = 0.19$ for Step 3 ($\Delta R^2 = 0.15$, $p < .01$).

^a 0 = male, 1 = female.

^b Hours per day.

* $p < .01$.

Other Non-Work Time Activities

Sleep quality was identified as the most important predictor of reduced fatigue and greater engagement, exerting large to moderate effect sizes. This is consistent with previous literature regarding the importance of sleep quality in managing work-related stress (Rook & Zijlstra, 2006), and highlights this as a priority for interventions aimed at improving teacher wellbeing.

We found that teachers who socialised more outside of work reported lower levels of work-related fatigue, highlighting the importance of teachers having time to spend with friends and family to maximise recovery from work-related stress. If schools place excessive workload on staff, it may restrict opportunities for staff to engage in such socialising activity. Table 1 shows that on average teachers reported spending just under 1 hr/day socialising with friends/family etc., and so any steps that individual teachers or school management can take (e.g., organising social gatherings outside of school) might be beneficial for alleviating staff fatigue levels.

Our findings suggested that time spent in hobby activity may have a negative relationship with fatigue, although it did not quite achieve statistical significance. We might have discovered a significant effect if we had used more detailed measurement tools to accurately identify types of hobby activity participants engaged in, as our current definition was somewhat broad. There is a lack of research investigating the effects of hobby activities on work-related stress and motivational outcomes, although findings that mastery opportunities may encourage recovery (Sonnentag & Fritz, 2007) suggest that hobbies can be an effective tool for worker self-care. This may be particularly important for school teachers, who commonly report low

feelings of accomplishment from their occupation (Yong & Yue, 2007).

Exercise was not related to fatigue or engagement, which was surprising. One confounding factor may be that school teachers have physical exertion as a key job demand (e.g., continually being on one's feet while conducting lessons); performing further exercise in non-work time and hence expending similar personal resources may not promote further engagement. Despite this, there are consistent findings of the importance of exercise for both physical and mental health for workers (Ernst et al., 2006; Rook & Zijlstra, 2006). A concerning finding was that almost half of participants reported spending no dedicated time to exercise on an average day. Guidelines around exercise for health benefits are relatively consistent, for example, approximately 30 min of moderate exercise daily (Hansen, Stevens, & Coast, 2001). While we did not find a significant relationship between daily exercise and teacher fatigue or engagement levels, our results indicate that teachers are not getting enough daily exercise and this may be something that schools can take initiative to address with their staff.

Passive activity was not related to either stress-related (fatigue) or motivational (engagement) outcomes, which is in agreement with the findings of Sonnentag and Zijlstra (2006). For a teacher who has finished a stressful day at school, passive activities have the virtue of a low arousal baseline, although such activities may not activate the reward system to the same extent as other, more effortful activities, and so not significantly reduce feelings of fatigue. This indicates that other forms of stimulating non-work time activity are also necessary in order for teachers to avoid experiencing consistently elevated levels of fatigue. Our finding requires further investigation with longer timeframes of observation as well as further examination of the content of passive activities that people engage in.

Implications for Theory

Broadly, in partial support of the effort-recovery approach to work stress, our results showed that time spent engaging in work-related activity at home and sleep quality were important predictors of work-related fatigue and engagement. Performing work-related activities at home (extended taxing on the same types of personal resources used at work) indicated resource depletion reflected in our results by higher levels of fatigue. Conversely, recovery-promoting behaviour in the form of quality sleep indicated replenishment of resources, reflected by lower levels of fatigue and higher levels of engagement. Apart from these variables however, we found relatively little evidence for non-work time activities as beneficial for regulating work-related fatigue and engagement, with most activities failing to demonstrate statistically significant relationships to the outcome variables. Our findings suggest that the types of leisure-time activities one engages in are of less importance to stress and motivational outcomes than achieving high quality sleep. This is consistent with the effort-recovery model's condition that resource recovery requires work-related stressors to be absent, as one would assume that during sleep no work-related demands are experienced, thus allowing for greatest recuperation. During other periods of leisure time however, it

may be that a worker might continue to experience some forms of work-related demands such as thinking about work or engaging in activities that require expenditure of similar types of personal resources. This study's primary focus was on the "recovery" aspect of the effort-recovery model; additional measures of the "effort" aspect (e.g., work demands) would have allowed for a more holistic interpretation of our findings as they relate to the effort-recovery model.

Strengths and Limitations

A strength of this study is that it included a large sample of teachers from across Australia and measured a range of non-work time activities. However, the cross-sectional design precluded demonstrating causation between variables that had significant correlations. Owing to the method of advertisement used for the online survey, the vast majority of participants were drawn from public schools, and hence no meaningful comparisons could be drawn between the working environments of public versus private schools in Australia. Not all Australian states/territories were represented in our sample and there were uneven numbers of participants from the various states/territories, hence we could not make comparisons of our findings based on location. There may also have been a survey response bias (e.g., participants experiencing higher levels of work-related stress may have been more likely to self-select), as well as potential measurement error due to asking participants to estimate average time spent in non-work time activities. Further research with more detailed, longitudinal measures is needed to overcome some of these limitations.

Our data relied on self-report measures and so there is potential for common method bias, although we believe that self-reports were the most appropriate form for measuring these variables with a large sample of teachers. We did not measure the health status of participants and hence could not capture the potential impact of medical variables on our measures such as exercise, fatigue, and sleep quality. It is also noted that the percentages of variance explained in both regression analyses were relatively small (R^2 values indicated that our models accounted for 29% of the variance of fatigue, and 19% of the variance of engagement), which is reflected in the low number of significant relationships identified. Future research should include additional occupational stress predictors, as our study only measured predictors based on individuals' perspectives. This might include workplace stressors or job demands as conceptualised in Karasek's (1979) job demands-control model, as well as organisation factors such as psychosocial safety climate (Dollard & Bakker, 2010). Variables measured in this study could also be assessed with greater fidelity in future investigations. There may have been deficiencies in our present measurement of non-work time activities, such as lack of specificity in our definitions, as well as the varying subjective experiences individuals might have. Additionally, recent research has demonstrated that the recovery potential of non-work time activities may depend on conditional factors such as whether or not an individual wants to engage in a certain activity on that day (Volman, Bakker, & Xanthopoulou, 2013). Future research examining the effects of such conditional factors on a variety of non-work time behaviours, alongside the

use of prospective research designs, will further clarify effective ways to promote recovery in teachers.

Conclusion

This research, guided by the effort-recovery approach to understanding work stress, collected data from a large sample of school teachers across Australia, and provides new information on the types and frequencies of activities teachers are engaged in outside of working hours. This allowed us to analyse how these different activities are related to both stress-related and motivational psychological outcomes, which is a gap in the existing literature around non-work time activities. Our results suggest that having high quality sleep is the most important resource for aiding teachers' recuperation from work demands, resulting in reduced fatigue and increased engagement. Time dedicated to socialising and potentially hobbies are important in managing fatigue levels, but many teachers are spending little to no time in such activities and so missing out on the potential benefits. We found that almost half of teachers reported less than 30 min of daily exercise, and approximately one quarter get no daily exercise. Another key result was quantifying the amount of work required of teachers outside of formal working hours, which is significantly related to increased fatigue and would impose further time restrictions from engaging in other activities that contribute to recuperation. These findings can be used in conjunction with the extant psychological and physical health research regarding self-care to inform education for teachers around coping with work stress, and be integrated into practical stress reduction interventions.

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