The role of working hours, work environment and physical leisure activity on the need for recovery following a day's work among UK white-water raft guides: A within-subjects multilevel approach.

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Abstract

Background: White-water raft guides are a growing workforce of the outdoor sector but little is known about how the working environment, workload and physical leisure activity impacts on the need for occupational recovery (the desire to replenish internal resources and recuperate in the time immediately following work) of those working in this physically demanding occupation.

Methods: Longitudinal data were collected across an eight month working season at three month intervals. Multilevel analyses tested the within-subject associations between work environment, hours worked and physical leisure activity had on the need for recovery.

Results: Working longer across the working season and participating in more physical leisure activity were directly associated with a lower need for occupational recovery. Furthermore, working on natural rivers significantly reduced the need for recovery experienced compared to work on man-made courses. This was regardless of the number of hours of worked in these environments.

Discussion: Physical leisure activity may provide a distraction from work, allowing employees to replenish their physical and psychological energy, thus protecting themselves against work-related fatigue. The findings also expand upon the previous literature identifying that working in a natural environment reduces the risk of experiencing work-related fatigue.

Key Words:

Psychological Well-Being; Need for Recovery; Hours Worked; Physical Leisure Activity; Natural Outdoor Environment; Longitudinal.

Introduction

White-water rafting is a social, commercial and competitive activity that requires great physical skill in using a paddle or oar power to negotiate rivers (natural or man-made) in a soft craft (British Canoe Union, 2015; International Rafting Federation, 2015). The role of the raft guide is to provide an exhilarating experience, whilst maintaining the safety of their clientele. The nature of this occupation is both physically and psychologically demanding (Arnould & Price, 1993). Commercial white-water rafting is growing in popularity, with increasing participation reported in Europe (European Outdoor Group, 2013) and the United States (Outdoor Foundation, 2013). As participation increases, there is a potential for an increase in workload, in terms of the number of hours worked, undertaken by the guides providing these activities. As white-water rafting is a seasonal activity (March to October), the workloads may vary depending on participant demand, with the greatest workload occurring during the peak of the season in Europe (June to August).

Anecdotal evidence suggests that workers in the Outdoor Industry work long hours and take little time for rest and recovery, especially as some engage in physical leisure activities which are similar to their work (Adventure Activities Industry Advisory Committee [AAIAC], 2006). Empirical evidence has supported this indicating that Mountain Leaders work long hours and engage in physical leisure activities on their days off, despite suffering from musculoskeletal conditions and/or being tired from work (McDermott & Munir, 2012). Evidence from other types of demanding occupations have found that high work demands including long working hours and physically demanding work can lead to work-related fatigue (e.g. Van Yperen & Hagedoorn, 2003; Beckers et al., 2004). There is good evidence that work-related fatigue can have further consequences on individuals' health and their abilities to complete everyday activities, such as work (Mallinson, Cella, Cashy, & Holzner,

2006; de Croon, Sluiter, & Frings-Dresen, 2003; Kant et al., 2003; Sluiter et al., 2003). So far, the research has examined workers in predominantly sedentary occupations, therefore little is known about the work-related fatigue of those working in physically active sporting occupations, such as white-water raft guides. This study therefore explores how the working hours, physical leisure activity, and working environment contribute to or protect against white-water raft guides' need for occupational recovery following work across a working season.

Conceptualising the Need for occupational recovery

The need for occupational recovery is a specific state of well-being which refers to the short-term effects of work-related fatigue and has been conceptualised as the desire to replenish internal resources and recuperate in the time immediately following work (Sluiter, 1999; Sluiter, de Croon, Meijman, & Frings-Dresen, 2003). Individuals who chronically recuperate insufficiently following work are more likely to develop a greater need for occupational recovery (Sonnentag & Fritz, 2007). A prolonged need for occupational recovery has been associated with negative effects, such as reduced productivity at an organisational level and poor health, sick leave and disability at an individual level (de Croon et al., 2003; Kant et al., 2003; Sluiter et al., 2003). Furthermore, the need for occupational recovery has been identified as an early indicator of chronic work-related fatigue and psychological distress (Jansen, Kant, van Amelsvoort, Nijhuis, & van den Brandt, 2003). Therefore in the present study, the need for occupational recovery will be utilised as an indicator of fatigue among this working population, as there is no previous literature to suggest whether fatigue is a significant issue among this population.

A lack of psychological detachment from work has been associated with a greater need for occupational recovery on a daily basis (Sonnentag & Bayer, 2005). Individuals with

greater workloads are more focused on their work and therefore are likely to think about their work or complete work tasks during their leisure time, resulting in impaired recovery (Sonnentag & Bayer, 2005). Furthermore, employees with high workloads are more likely to work overtime, consider work and home activities as more effortful and report being more preoccupied with work during home time, when compared to their peers with a lower workload (van Hooff, Geurts, Kompier, & Taris, 2007). It is therefore possible that employees who work longer hours are at risk of negative consequences, such as the development of work-related fatigue.

The relationship between the number of hours worked and health may resemble a bell curve and therefore may not be linear. Individuals who do not work enough may just be at risk of negative health consequences as those who work too much (Sparks, Cooper, Fried, & Shirom, 1997). This may explain why not all studies have found a direct association between the number of hours worked and the need for occupational recovery after a working day (Bos, Donders, Schouteten, & Van der Gulden, 2013; Van der Hulst, Van Veldhoven, & Beckers, 2006). However, it could also be that these studies have only focused on non-physically active work such as university and office based administration employees. It is therefore possible that physically active work, such as white-water raft guiding, may require a greater need for occupational recovery at the end of a working day. The following hypothesis was devised to test whether the number of hours worked was linked with the need for occupational recovery among white-water raft guides:

Hypothesis Ia: A greater number of hours worked per month will be associated with a greater need for occupational recovery across a working season.

Physical activity has been suggested to aid the recovery process and reduce work-related fatigue (Korpela & Kinnunen, 2010; Oerlemans, Bakker, & Demerouti, 2014). This is

particularly the case when individuals fully detach themselves from work and enter the great outdoors (Sonnentag & Zijlstra, 2006; Korpela & Kinnunen, 2010). It is suggested that increased time participating in outdoor activities in a natural setting helps with psychological detachment and thus improves recovery (Korpela & Kinnunen, 2010). The need for recovery may also be influenced by the physical aspect of physically active jobs (Sonnentag & Zijlstra, 2006). However, the relationship with work-related fatigue may be reciprocal, meaning that individuals who are experiencing high levels of work-related fatigue are less likely to engage in physical leisure activity (de Vries et al., 2015). This longitudinal study of Dutch workers only considered physical activity during leisure time. It is unknown whether individuals working in a physically active job will gain the same benefits of physical leisure activity as observed in those working in sedentary occupations. The following hypothesis was therefore tested:

Hypothesis Ib: A greater number of monthly hours of physical leisure activity will be associated with a lower need for occupational recovery across a working season.

It is not known whether the effects of working long hours in a physically active occupation, such as white-water raft guiding, will increase or reduce work-related fatigue. As rafting can occur on a variety of bodies of water, including natural rivers and man-made course it is unknown whether being surrounded in a natural or unnatural environment will affect the need for occupational recovery of white-water raft guides. Exposure to a natural outdoor environment has been associated with positive physical and psychological well-being (e.g. Hug, Hartig, Hansmann, Seeland & Hornung, 2009; Cervinka, Röderer & Hefler, 2011; Nisbet, Zelenski & Murphy, 2011). Specifically, engaging in physical activity and socialising with others in a natural setting is associated with higher levels of physical and mental energy (Ryan, Bernstein, Gagnè & Brown, 2010). This has been demonstrated by the Attention

Restoration Theory which poses that interactions in nature do not require directed attention, thus allowing top-down directed attention abilities to replenish (Berman, Jonides & Kaplan, 2008). It is important to note that all of these studies made comparisons between the benefits of exposure during leisure time in nature and either an urban or indoor setting. The present study will test whether the same benefits of being exposed to a natural setting during working hours will have the same beneficial effects as observed during leisure time. As white-water rafting is an outdoor activity which is generally not located in an urban setting, it is therefore possible that raft guides who work on a natural river may experience different levels of need for occupational recovery following work than those working on a man-made course. We therefore proposed and tested the following hypotheses:

Hypothesis II: Working in a natural outdoor environment (i.e. on a natural river), as opposed to working in an artificial environment (i.e. on a man-made course), will be associated with a lower need for occupational recovery.

Hypothesis IIIa: Working longer hours on a natural river will reduce the need for occupational recovery experienced, whereas working longer hours on a man-made course will increase the need for occupational recovery experienced by white-water raft guides.

Hypothesis IIIb: White-water raft guides who work on a natural river and participate in a greater amount of physical leisure activity will experience a lower need for occupational recovery; furthermore an increased amount of physical leisure activity will reduce the need for occupational recovery experienced by those working on man-made courses.

Methods

Sample and Procedure

A survey was utilised to collect data regarding the levels of work-related fatigue among white-water raft guides working in the UK across a working season at three time points (March, June and October). This study received ethical approval from Loughborough University Ethical Advisory Committee.

The inclusion criteria for survey completion were participants currently employed as a raft guide in the UK and aged over 18 years; and holding or working towards a relevant Raft Guide Qualification e.g. BCU or International Raft Federation (IRF).

An online survey, designed using SurveyMonkey, was used to collect data from a geographically diverse population. Early season measurements commenced in April 2013 and continued until June 2013. Mid-season surveys were distributed three months after Early season data collection. The final set of data collection commenced during late season, 3 months after mid-season collection and ceased in January 2014. A prize draw was advertised as an incentive for participation retention during Mid and Late Season.

The survey was distributed to all 577 (357 male) qualified raft guides registered in the UK via the governing body's (Sport England, 2013) internal email. In addition, white-water rafting providers were identified through the Adventure Activities Licensing Authority, and contacted directly regarding the research. Individuals who started but did not complete the online survey were invited by email to complete their response. Participants were requested to provide a name and email to be contacted by for follow up data collection. Of the 577 raft guides contacted, 126 completed the survey at baseline, a response rate of 21.84%. As data regarding the demographics of qualified raft guides are unavailable, other than the number of

qualified males and females, it is therefore not possible to make comparisons of the characteristics between completers and non-completers.

Measures

Need for Recovery. The Need for Recovery Scale (Veldhoven & Broersen, 2003) was utilised to assess whether a participant is recovering substantially. The scale consists of 11 items with dichotomous responses (example items: “I find it hard to relax at the end of a working day” and “I have trouble concentrating in the hours off after my working day”). Unfavourable answers score a value of one, whereas favourable answers score 0. The total score is calculated from the sum of the scores from each item (minimum score = 0, maximum score = 11), and is then recoded into a score out of 100. Higher scores represent a higher the need for occupational recovery which is unfavourable. Internal consistency and stability have been demonstrated for the English version of The Need for Recovery Scale (Veldhoven & Broersen, 2003). The Chronbach’s alphas for the current study were between 0.73 and 0.82 across the working season.

Other Self-Report Questions. Other self-reported measures included sex, age (years), height (metres or feet and inches) and weight (kilograms or stone and pounds) for body mass index (BMI) calculations (kg/m^2), number of years’ experience as a qualified white-water raft guide, type of river worked on (natural river, man-made course or a mixture of the two) and the number of working hours as a white-water raft guide and the number of hours of physical leisure activity (indicated by the hours completed in a month).

Strategies of Analysis

The repeated measures design was considered to be multi-level with the measurements taken from each observation time period (Early, Mid and Late Season) being nested within the individual. This creates a two-level model, with the repeated measures

observations at level one (N = 3 occasions) and the second level being the individual (N = 126 participants). Multilevel analyses were conducted using the MLwiN software (Rasbash, Charlton, Browne, Healy, & Cameron, 2009).

Multilevel analyses were the most appropriate for the data set obtained as there were missing data due to the attrition throughout the longitudinal study. Multilevel modelling is robust against missing data (Quené & Van den Bergh, 2004) therefore all available data could be included which reduces any biases in the analyses (Hill & Goldstein, 1998). Furthermore, as the data were repeated measures in nature, observations at each time point are likely to be interdependent, i.e. not independent of each other, for example, an individual's levels of need for occupational recovery measured during Early Season are likely to influence the same individual's levels of need for occupational recovery during follow up measurements. Independence of the variables is not assumed in multilevel analyses (Dierdorff & Ellington, 2012), making this a more suitable technique than ordinary least squares (Snijders & Bosker, 1994).

With regards to data manipulation, independent variables (monthly hours worked as a raft guide; monthly hours of physical leisure activity) were centred for inclusion in the multilevel analyses as this technique reduces the correlation between the slope and intercept of the regression line thus increasing the robustness of the models assessed (Nezlek, 2001; Enders & Tofighi, 2007). As the hypotheses were concerned with the within subject associations between the need for recovery experienced and hours worked or hours of physical leisure activity (i.e. how the relationships vary over time), predictor variables were centred on the specific mean of each participant, this is group-mean centring (Lüdtke, Robitzsch, Trautwein & Kunter, 2009). Group-mean centring (CWC) allows for the disentanglement of within and between subject effects of predictors can therefore be

disentangled (Lüdtke et al., 2009) thus providing a pure estimation of the within subject relationships between the independent and dependent variables (Enders & Tofighi, 2007). As the hypotheses are concerned with the within subject associations (associations across time) between the need for recovery and various predictor variables, group-mean centring is the most appropriate technique.

Regarding the standardisation of data, standardising level two variables has no implications regarding the coefficients produced as changing the variation in level two variables also changes the standard error which is tested to determine significant results (Nezlek, 2001). This is not the case for level one variables, therefore standardising level one variables can result in the alteration of coefficients and their level of significance (Nezlek, 2001). As the present study is concerned with the within subject (Level 1) differences the need for occupational recovery, data tested using the multilevel analyses were not standardised.

Hypotheses I and II were concerned with a main effect over time. Time was therefore included in the model, alongside independent variables, and was centred to baseline. To assess whether the main association altered over time, an interaction term between time and the independent variable (i.e. time*independent variable$_{CWC}$) was tested to see if model fit improved and whether the interaction was significant.

Hypothesis III was concerned with the testing of moderation effects. Moderation was tested using the technique described by Baron and Kenny (1986). This involves testing a direct effect between the independent variable and the dependent variable (Hypothesis I). Following this, a direct association between the moderator and the dependent variable is tested (Hypothesis II). Finally, the independent variable and moderator are multiplied together to create an interaction term; the moderation effect is tested by the association

between the interaction term and the dependent variable (Hypothesis III). Time was controlled for in these analyses.

Results

Description of Participants

A total of 126 (114 male) white-water raft guides completed the survey during Early Season. Participants' age ranged from 18 to 64 years (Mean = 30.13, SD = 9.7). Overall, participants' weight was within the normal range of Body Mass Index (Mean = 24.49, SD = 3.76). White-water rafting experience ranged from less than one year to 28 years (Mean = 5.50, SD = 6.20). Attrition was observed. A total of 98 participants completed the survey during Mid-Season (attrition, 22.2% from baseline) and 79 completed the survey during Late Season (attrition, 37.3% from baseline). The observed attrition has been considered as acceptable in previous longitudinal research (Mauno, Kinnunen, & Ruokolainen, 2007). Analysis of variation tests (for continuous data) and chi square analyses (for categorical data) highlighted no significant differences between the characteristics of the participants who completed the survey at each time point. The only significant difference identified was between the monthly number of hours worked as a raft guide, where a greater number of monthly hours worked was observed during Mid-Season when compared to Early and Late Season. A summary of descriptive and correlations of the nested variables can be seen in Table 1.

[TABLE 1 HERE]

The first of the multilevel analyses conducted was to create an empty model, i.e. a model without any predictors, to estimate the level of variation explained of the need for occupational recovery experienced on an individual level (Level 2 variation) and over time (Level 1 variation). The results show that 37.46% (237.33/[237.33+396.18]) of the variation

in the need for occupational recovery is explained by the differences between individuals (Level 2) and that 62.54% (396.18/[237.33+396.18]) of the variation was explained by the differences between time points (Level 1). Following the empty model, covariates (age, body mass index and years' experience) were included. No significant associations were observed between the need for occupational recovery and age (B = -0.03, SE = 0.25, p = 0.91), BMI (B = 0.19, SE = 0.69, p = 0.79), and years' experience (B = -0.08, SE = 0.38, p = 0.83). The inclusion of covariates did not significantly improve the model fit and (X^2 = 0.17, df = 3, p = 0.98) were therefore excluded from the final analyses conducted during hypotheses testing. The coefficients from the empty model and the coefficients model can be seen in Table 2.

[TABLE 2 HERE]

Results relating to Hypothesis I

Coefficients from the multilevel analyses related to Hypothesis I are presented in Table 3. Hypothesis Ia was concerned with the associations between the need for occupational recovery and the number of hours worked as a raft guide in a month. The results show that the inclusion of 'time' and 'monthly hours worked as a raft guide' explained 0.2% of the within subject variation of the need for occupational recovery and did not improve the model fit (X^2 = 0.90, df = 2, p = 0.64). However, neither time (B = 1.10, SE = 1.16, p = 0.34) nor hours worked as a raft guide (B = 0.00, SE = 0.02, p = 0.86) were directly associated with the need for occupational recovery (See Model 1). When testing the relationship between the number of hours worked and the need for occupational recovery over time (Model 2), an additional 2.7% of the within subject variation of the need for recovery experienced was explained. Specifically, a greater number of hours worked was associated with a lower need for occupational recovery following work (B = -0.12, SE = 0.05, p = 0.02) and this relationship strengthened over time (B = 0.12, SE = 0.04, p = 0.003).

311 With regards to Hypothesis Ib, the inclusion of 'time' and 'monthly hours of physical
312 leisure activity' significantly improved the model fit (X^2 = 288.68, df = 2, p < 0.001) but did
313 not explain any of the within subject variation of the need for occupational recovery (Model
314 3). A greater number of hours of physical leisure activity in a month was significantly
315 associated with a lower need for occupational recovery (B = -0.09, SE = 0.04, p = 0.03).
316 Time was not associated with the need for occupational recovery (B = 1.77, SE = 1.38, p =
317 0.20). The inclusion of the interaction between time and the number of hours of physical
318 leisure activity indicated that the relationship between monthly hours of physical leisure
319 activity and the need for occupational recovery did not alter over time (B = 0.08, SE = 0.07, p
320 = 0.23) and did not significantly improve the model fit (X^2 = 1.40, df = 1, p = 0.24 [Model
321 4]).
322 **Results relating to Hypothesis II**
323 The results from the multilevel analyses assessing whether the working environment
324 (i.e. on a natural river or man-made course) was significantly associated with the need for
325 occupational recovery experienced by raft guides are presented in Table 3. The inclusion of
326 time and river type (mixture of natural rivers and man-made courses was the reference group)
327 significantly improved the model fit (X^2 = 23.33, df = 3, p < 0.001) and explained 0.24% of
328 the within subject variation of the need for occupational recovery (Model 5). Working on a
329 natural river was significantly associated with a lower need for occupational recovery (B = -
330 10.06, SE = 4.32, p = 0.02), whereas working on a man-made course was significantly
331 associated with a greater need for occupational recovery (B = 12.45, SE = 4.72, p = 0.001).
332 These relationships did not significantly alter over time for raft guides who work on either the
333 natural rivers (B = -1.16, SE = 2.71, p = 0.67) or man-made courses (B = -2.03, SE = 2.90, p
334 = 0.48 [Model 6]).

335 [TABLE 3 HERE]

336 **Results relating to Hypothesis III**

337 With regards to Hypothesis IIIa, 0.25% of the within subject variation of the need for
338 occupational recovery was explained by the number of hours worked as a raft guide per
339 month and the type of river raft guides worked on (see Model 7). As observed with
340 Hypotheses I and II, monthly hours worked as a raft guide was not associated with the need
341 for occupational recovery (B = 0.00, SE = 0.02, p = 0.86), whereas working on a natural river
342 was associated with a lower need for occupational recovery (B = -10.06, SE = 4.32, p = 0.02)
343 and working on a man-made course was associated with a greater need for occupational
344 recovery (B = 12.45, SE = 4.72, p = 0.01). The inclusion of the two moderation terms,
345 monthly hours worked as a raft guide on a natural river and monthly hours worked on a man-
346 made course, significantly improved the model fit (X^2 = 7.41, df = 2, p = 0.02), and explained
347 a further 3.99% of the within subject variation of the need for occupational recovery
348 experienced (see Model 8). A greater number of monthly hours worked as a raft guide on a
349 natural river did not further reduce the need for occupational recovery experienced (B = 0.04,
350 SE = 0.06, p = 0.43) just as a greater number of hours worked on a man-made course did not
351 increase the need for occupational recovery experienced by white-water raft guides (B = -
352 0.16, SE = 0.08, p = 0.06).

353 When testing Hypothesis IIIb, the initial step was to test direct associations between
354 the number of hours of physical leisure activity, the river type worked on and the need for
355 occupational recovery experienced. By including the monthly hours of physical leisure
356 activity and type of river worked on significantly improved the model fit (X^2 = 313.06, df = 4,
357 p < 0.001) but did not explain any of the within subject variation of the need for occupational
358 recovery experienced (see Model 9). Specifically, a greater number of hours of physical

leisure activity participated in per month (B = -0.10, SE = 0.04, p = 0.02) and working on a natural river (B = -9.25, SE = 4.24, p = 0.02) were associated with a lower need for occupational recovery, whereas working on a man-made course was associated with a greater need for occupational recovery (B = 13.92, SE = 4.63, p = 0.002). The inclusion of the interaction terms did not explain any of the within subject variation of the need for occupational recovery and thus did not improve the model fit (X^2 = 1.36, df = 2, p = 0.51 [see Model 10]). Participating in a greater number of hours of physical leisure activity per month combined with working on a natural river was not associated with a lower need for occupational recovery (B = -0.07, SE = 0.13, p = 0.60). Furthermore, a greater number of hours of physical leisure activity combined with working on artificial man-made courses was not associated with the need for occupational recovery experienced either (B = 0.06, SE = 0.10, p = 0.60).

[TABLE 4 HERE]

Discussion

This study aimed to enhance understanding of how raft guides working in the outdoor environment on either a natural river or man-made course, their working hours and their physical activity leisure time impact on their need for occupational recovery (as an indicator of fatigue). The study adopted a longitudinal study design and our results shed light on the need for occupational recovery among white water rate guides and contribute to the wider conceptual literature on fatigue and recovery. Importantly it also contributes new knowledge around natural versus man-made outdoor activity environments on health and well-being (i.e. energy, fatigue and recovery).

The present study found that white-water raft guides required emotional and physical recovery following work, across a working season. The need for occupational recovery in this

population (means 35.4 – 38.4) are higher than that reported in studies examining office workers (mean 32.2) (van der Starre, Robine E, Coffeng, Hendriksen, van Mechelen, & Boot, 2013) but similar to a study on truck drivers over a two year period (means 33.2 – 37.4) (de Croon et al., 2003). This suggests that white-water raft guides, and potentially other workers in other similar physically active outdoor activity occupations, may be at greater risk for the need of occupational recovery than other occupations. This is prior to an increase in workloads as a result of increased participation in the activity. Further research is required in similar outdoor working populations to identify the impact of occupational recovery and fatigue on health and well-being outcomes.

Hypothesis Ia was rejected as working hours was negatively associated with a greater need for occupational recovery across the working. This contradicts previous findings, which identified no direct relationship between working hours and the need for occupational recovery experienced by office workers (Bos et al., 2013; Van der Hulst et al., 2006). Additionally, the negative association was unexpected, as working in the outdoor leisure environment is a physically and psychologically demanding occupation (Arnould & Price, 1993), making it plausible to expect that a greater number of hours worked would be associated with a greater need for occupational recovery. The current study provides evidence that working longer hours in a physically active, sporting occupation may not result in work-related fatigue as observed among some sedentary occupations (e.g. van Hooff et al., 2007). One possible explanation for this difference is the relationship between detachment from work and work-related fatigue (Sonnentag & Bayer, 2005). It may be that white-water raft guides may not be preoccupied with work during their leisure time, however, further investigation is required to unpick what work characteristics contribute to the need for occupational recovery among those working in physically active sporting occupations.

The negative relationship strengthened over time, which was particularly interesting as there was a significant increase in hours worked during the middle of the season when compared to early and late. It is possible that workers who work longer hours may be physically and psychologically fitter throughout the year when compared to the employees who work shorter hours. Raft guides starting the season with lower baseline fitness levels, may mean that they were more prone to experiencing a greater need for occupational recovery throughout the working season. Poor baseline levels of fitness can impact on the levels of fatigue experienced throughout a season, regardless of how much fitness levels improve; this seasonal pattern of fatigue has been observed among footballers (Lango-Penas, Rey, Lango-Ballesteros, Dominguez & Casais, 2013). In contrast, it is possible that raft guides who work longer hours may improve their physical and psychological fitness, thus protecting themselves against a greater need for occupational recovery across the season. Further investigation into the physical and psychological fitness levels of the workers is required to build upon the current findings.

As hypothesised, a greater amount of physical leisure activity was associated with a lower need for occupational recovery. This supports previous literature which identified that workers in sedentary occupations who participated in a greater amount of physical leisure activity had a lower need for occupational recovery (Korpela & Kinnunen, 2010; Oerlemans, Bakker, & Demerouti, 2014). The findings of the current study build upon this literature and identifiy that those working in physically active occupations also benefit from engaging in physical activity during their leisure time. Physical leisure activity can provide a distraction from occupational demands which can reduce the amont of work-related fatigue experienced by employees (Sonnentag & Zijlstra, 2006; Korpela & Kinnunen, 2010). This can be further demonstrated by the Attention Restoration Theory (Berman, Jonides & Kaplan, 2008).

Specifically, although aspects of a physically active occupation may overlap with physical leisure activity, the different tasks may require different cognitive resources, therefore allowing for the replenishment of resources utilised during the working day.

However, this relationship did not significantly change across the working season. This suggests that engaging in physical leisure activities can have a positive effect by reducing work-related fatigue. This is contrary to previous evidence which suggests that physical leisure activity in addition to the physical demands of working in the outdoor industry can have negative consequences on employee well-being (AAIAC, 2006; McDermott & Munir, 2012). It is possible that workers, such as Mountain Leaders, engage in physical activities which are very similar in nature to their work, thus utilising the same physical and psychological resources. As there are no details on the physical activity completed by raft guides, it is possible that these activities are sufficiently different from their work allowing them to recover and experience less work-related fatigue. As the Need for Recovery Scale measures both physical and psychological fatigue, it is not possible to unpick specifically whether physical activity improves physiological, psychological and cognitive health and thus reduces the level of effort required to complete daily tasks such as work (Colombe & Kramer, 2003) or whether it provides a distraction from work aiding the psychological recovery from work (Sonnentag & Bayer, 2005). Delineating whether physical or psychological fatigue is more predominant may provide more insight into how physically active work and physical leisure activity affect fatigue is appropriate. As there were no significant differences between the amount of physical activity completed at the different times of the season, it was unsurprising that there the relationship between physical leisure activity and the need for occupational recovery did not alter across the working season.

The multilevel models related to Hypothesis II identified that the type of river worked on had a direct effect on the need for occupational recovery following a day's work. It showed that working in a natural environment could reduce the levels of need for occupational recovery, whereas, working on a man-made course increased the amount of need for occupational recovery. This builds on previous literature, showing that being immersed in a natural, outdoor environment may aid with the recovery process (Korpela & Kinnunen, 2010). Previous research has demonstrated this with regard to physical leisure activities, however, the current study extends this to the working environment. This could be related to the positive effects of being in the outdoors (De Vries, Verheij, Groenewegen, & Spreeuwenberg, 2003). However, this is not the case for man-made courses which are also situated in outdoor areas, such as country parks. Having concrete surroundings may reduce the stimulating environment in which a river in a natural outdoor setting provides (Korpela & Kinnunen, 2010). Empirical evidence has highlighted that exercise in a natural environment, as opposed to an urban setting is more likely to result in higher levels of physical and psychological energy (Ryan et al., 2010). Such benefits are attributed to the social experience, physical activity associated with outdoor activities, as well as the exposure to the natural environment (Ryan et al., 2010). As both white-water rafting on natural rivers and man-made courses involve both social interactions and physical activity, it is most likely the surrounding settings which may influence the need for occupational recovery experienced by white-water raft guides. The Attention Restoration Theory poses that interactions in nature require fewer directed attention resources (Berman, et al., 2008), however, in both the natural and man-made settings directed attention is required to negotiate the rivers, therefore this explanation alone is not enough to explain the difference in the need for occupational recovery observed between those working on a natural river as opposed to an artificial river.

It is therefore possible that white-water raft guides working on a natural river may experience a higher connectedness with nature, as their exposure is more direct, which has been associated with higher levels of self-reported well-being and physical and psychological energy (Cervinka et al., 2011; Nisbet et al., 2011). Alternatively, the effects may stem from an organisational level as different white-water rafting providers tend to operate on either natural rivers or man-made courses.

Interestingly, a greater number of hours worked did not increase the strength of the observed relationships between river type and the need for occupational recovery as expected in Hypothesis IIIa. It is therefore possible that the environment worked in is more important than the amount of time spent working in that environment. Further investigation is required to unpick the specific occupational characteristics, whether it may be the working environment or the operational structure and job demands of the providers on natural rivers, as to why working on a natural river, as opposed to man-made courses, can reduce the levels of need for occupational recovery among raft guides.

Similarly, a greater number of hours of physical leisure activity did not influence the relationship between the type of river worked on and the need for occupational recovery as hypothesised. This suggests that the benefits of physical leisure activity are separate to the working environment. As it was not recorded where physical leisure activity was undertaken, it is possible that the physical leisure activity undertaken may have occurred in an artificial environment (e.g. a gym) or in a natural outdoor setting. As the number of hours worked in the different environments did not influence the need for occupational recovery, it is possible that the location of the physical activity may also be insignificant. Further investigation into the effects of working location (i.e. in a natural outdoor setting or an artificial outdoor

setting) and the choice of location for physical leisure activity has on the need for occupational recovery is required.

Limitations

One limitation of the present study is that the sample was self-selecting. This relates to the initial data collection during Early Season, as well as follow-up data collections during Mid and Late Season. Those who believe they require a higher need for occupational recovery may have been more likely to participate in this study as opposed to their peers. This may mean that levels of the need for occupational recovery may be slightly inflated. However, with regards to self-selecting bias and attrition, tests of difference highlighted no significant differences between those who completed the follow-up surveys when compared to those that did not. This suggests that the sample has maintained its level of representation of the general population despite attrition.

Another limitation related to the sample regards the small sample of female guides who participated. Although there are 220 female raft guides registered under the British Canoe Union (Sport England, 2013), less than 5% of them participated in the study. The number of registered raft guides is only an estimated figure. This is because the qualification of a raft guide is maintained for the duration of a valid first aid certificate, therefore, raft guides who are no longer operating in Great Britain, either because they are operating abroad or no longer operating as a raft guide, will remain registered. It should also be noted that due to the work being seasonal, qualified raft guides who did not start work until later in the season may not have been captured. Despite this, there is a strong representation of qualified male raft guides.

Another limitation relates to the method of data collection. Self-report data relies on participants providing accurate information. However, self-reported hours worked and hours

of physical leisure activity have been shown to be inaccurate in some cases (Shephard, 2003). Additionally, it has not been possible to determine the extent to which individuals are physically active during their working day. A more sensitive measure, such as employee data or daily diary data, combined with the use of physical activity devices, such as accelerometers, may be more appropriate than the recall of monthly hours worked for future studies. This would allow for the unpicking of the amount and intensity of physical activity conducted during a working day as well as some duties undertaken by white-water raft guides may not be physical in nature. However, the self-report survey design was the most appropriate design for the current study which aimed to collect data from a large sample from a geographically diverse population. Furthermore, the present research is the first study to examine the need for occupational recovery among those working in a physically active, sporting occupation. It was therefore important to note the number of hours worked in a physically active occupation as opposed to measuring the specific number of hours of physical activity during the working day.

Conclusions

It has been identified in the present study that a greater amount of physical leisure activity and working in a natural outdoor setting were associated with a lower need for occupational recovery. However, working in an artificial outdoor setting was associated with a greater need for occupational recovery. Interestingly, the number of hours worked was not directly nor indirectly associated with the need for occupational recovery experienced by white-water raft guides. Future research should focus on strategies to protect against work-related fatigue. This could include creating working environments which reflect a more natural setting, for example, planting shrubbery to reduce the amount of visible concrete. The

findings of the current study are not limited to white-water raft guides but may also be applicable to workers in other similar physically active outdoor activity occupations.

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687 **Table 1**

688 *Summary of Descriptives of Reported Variables and Correlations of the Nested Variables*

Variable	Mean + Standard Deviation			Correlations	
	Early Season (N=126)	Mid-Season (N=98)	Late Season (N=79)	1	2
Age	30.13 ± 9.70	30.05 ± 10.05	31.10 ± 10.65		
Body Mass Index	24.68 ± 3.05	24.45 ± 2.75	24.69 ± 2.86		
Years' Experience	5.56 ± 6.21	5.52 ± 6.10	5.42 ± 6.16		
1. Need for Recovery	34.13 ± 24.22	34.88 ± 25.97	37.86 ± 26.06	-	
2. Monthly hours worked as a raft guide	34.60 ± 47.59	57.71 ± 66.53**	16.11 ± 35.26	0.06	-
3. Monthly hours of physical leisure activity	27.92 ± 25.54	29.63 ± 31.74	34.65 ± 41.66	- 0.09	0.02
	Frequencies (%)				
Sex					
Male	114 (90.48)	90 (91.84)	71 (89.87)		
Female	12 (9.52)	8 (8.16)	8 (10.13)		
Highest Qualification					
Trainee Raft Guide	13 (10.32)	9 (9.18)	7 (8.86)		
Level 1 Site Specific Raft Guide	58 (46.03)	46 (46.94)	38 (48.10)		
Level 2 Unrestricted Raft Guide	29 (23.02)	23 (23.47)	20 (25.32)		
Level 3 Trip Leader	15 (11.90)	12 (12.24)	7 (8.86)		
Level 4 Raft Coach	5 (3.97)	4 (4.08)	4 (5.06)		
Level 5 Senior Raft Coach	6 (4.76)	4 (4.08)	3 (3.80)		

Employment Status			
Full-Time	54	42	32
	(42.86)	(42.86)	(40.51)
Part-Time	17	16	12
	(13.49)	(16.33)	(15.19)
Freelance	47	37	30
	(37.30)	(37.76)	(37.97)
Other	8 (6.34)	3 (3.06)	5 (6.33)
River Type Worked On			
Natural River	51	36	28
	(40.48)	(36.73)	(35.44)
Natural River and Man-	41	33	29
Made Courses	(32.54)	(33.67)	(36.71)
Man-Made Courses	34	29	22
	(26.98)	(29.59)	(27.85)

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

692 **Table 2**

693 *Coefficients from the empty model and the model including covariates*

Variables	Empty Model		Model Including Covariates	
	Estimation	SE	Estimation	SE
Intercept	34.63	2.01	34.62	2.01
Age_{CGM}			-0.03	0.25
Body Mass $Index_{CGM}$			0.19	0.69
Years' $Experience_{CGM}$			-0.08	0.38
2 x log		2715.11		2714.94
X^2				0.17
Df				3
Level 1 Variation	237.33	25.14	237.26	25.14
Level 2 Variation	396.18	64.55	395.74	64.50

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

Table 3

Results from Multilevel Analyses relating to Hypotheses Ia, Ib and II

Variable	Hypothesis Ia: Hours worked as a Raft Guide$_{CWC}$ as IV1				Hypothesis Ib: Hours of Physical Leisure$_{CWC}$ Activity as IV1				Hypothesis II: Natural River as IV1 and Man-Made Course as IV2			
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Estimation	SE	Estimation	SE	Estimation	SE	Estimation	SE	Estimation	SE	Estimation	SE
Intercept	33.80	2.19	33.17	2.17	33.49	2.16	33.36	2.17	34.49	3.32	33.68	3.55
Time	1.10	1.16	2.36	1.22	1.77	1.38	1.78	1.36	0.96	1.15	1.96	1.93
IV1	0.00	0.02	-0.12*	0.05	-0.09*	0.04	-0.16*	0.07	-10.06*	4.32	-9.13	4.78
IV2									12.45**	4.72	14.10**	5.28
Time*IV1			0.12**	0.04			-0.08	0.07			-1.16	2.71
Time*IV2											-2.03	2.90
2 x log		2714.21		2705.92		2426.43		2425.03		2691.78		2691.28
X^2		0.90		8.29*		288.68**		1.40		23.33**		0.50
Df		2		1		2		1		2		2
Level 1 Variation	236.82	25.09	230.22	24.39	240.43	28.22	236.03	27.76	236.75	25.05	235.98	24.97
Level 2 Variation	394.33	64.29	384.42	62.63	372.45	63.74	378.33	64.21	312.31	53.95	312.91	53.98

*p<0.05 **p<0.01

Table 4

Results from Multilevel Analyses relating to Hypothesis III

Variables	Monthly hours worked as a raft guide$_{CWC}$ as the IV				Monthly hours worked of physical leisure activity$_{CWC}$ as the IV			
	Model 7		Model 8		Model 9		Model 10	
	Estimation	SE	Estimation	SE	Estimation	SE	Estimation	SE
Intercept	34.47	3.33	34.23	3.32	33.44	3.26	33.39	3.26
Time	0.98	1.16	1.28	1.14	1.64	1.37	1.73	1.37
IV	0.00	0.02	-0.00	0.05	-0.10**	0.04	-0.12	0.09
Natural River	-10.06*	4.32	-10.03*	4.32	-9.25*	4.24	-9.52*	4.25
Man-Made Courses	12.45**	4.72	12.45**	4.72	13.92**	4.63	13.86*	4.63
IV*Natural River			0.04	0.06			-0.07	0.13
IV*Man-Made Course			-0.16	0.08			0.06	0.10
2 x log		2691.75		2684.34		2402.05		2400.69
X^2		23.36**		7.41*		313.06**		1.36
df		4		2		4		2
Level 1 Variation	236.72	25.05	227.22	24.05	241.57	28.31	239.43	28.30
Level 2 Variation	312.29	53.95	316.15	53.856	282.46	52.58	283.29	52.60

*p<0.05 **p<0.01