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Daily mindfulness is associated with coaches’ recovery processes

Daily mindfulness is associated with recovery processes among coaches – a 4 week diary study

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Daily mindfulness is associated with coaches’ recovery processes – a 4 week diary study

Sport coaching is a profession which is often demanding, and one in which psychological burnout is problematic. Recovery from work demands is known to important in preventing burnout, but research to date has paid little attention to short term recovery for coaches. The present study therefore focuses on day to day recovery. Specifically, we investigated the role of mindfulness in recovery, given previously established empirical relationships between mindfulness and recovery processes. We used an intensive diary study design to gather daily data from a sample of 46 sport coaches, over a period of 28 consecutive days. Multilevel modelling allowed data analysis at the intra-individual level, providing insights into daily recovery processes for individual coaches. Results showed that increases in daily mindfulness, relative to coaches’ individual mean levels, were predictive of higher levels of recovery related variables (energy, mood) through mechanisms of reduced rumination and improved sleep. The present study highlights mindfulness as a potential path to daily recovery, and prevention of burnout, amongst coaches. The study lays groundwork for the investigation of mindfulness training as a recovery promoting intervention for coaches, potentially through easily accessible means such as app-based training delivery and the incorporation of informal mindfulness practice into daily activities.

Keywords: Stress, burnout, rumination, energy, mood

Introduction

Coaching in competitive sports is a profession which has the potential to be rewarding and stimulating, but also one which is known for its pressures. Coaches typically face a number of varied demands, associated not only with the technical nature of sport performance but also
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to management, administration, and organizational stressors (Norris et al., 2017). Additionally, many coaches work on a part time basis, and must fit the multiple tasks and responsibilities of their coaching work around their primary or other employment (Potts et al., 2019). On top of these demands, many coaches feel pressure to produce results, and often, in high competition. It has been argued that this pressure becomes most obvious and demanding at the highest competitive level (Giges et al., 2004). However, even at levels where competition is less important, such as child and youth sports, coaches must deal with performance expectations, either from external sources or internal sources such as high personal standards (Durand-Bush et al., 2012).

Given these many and varied challenges, it is perhaps unsurprising that stress is a common experience amongst coaches (Fletcher & Scott, 2010; Norris, et al., 2017). Drawing on transactional theory (Folkman & Lazarus, 1984), stress can be explained as the result of an appraisal process; a weighing up of perceived demands or threats against available coping resources. Where demands exceed resources, feelings of stress are the likely outcome. It is important to note that stress is not necessarily harmful, especially when stressful episodes are short lived, and in the coaching context some coaches have even reported a certain amount of stress as being invigorating, boosting energy and motivation (Olusoga et al., 2010; Olusoga et al., 2019). Stress, however, is problematic if it is ongoing and chronic without adequate recovery; in this form stress has been found to act as a precursor to a state of burnout (Fletcher & Scott, 2010).

Burnout has been identified as a serious issue for coaches, from high performance right through to volunteer and community levels (Engelberg-Moston et al., 2009; Olusoga et al., 2019), and therefore presents a cause for concern for the coaching profession (McNeill et al., 2017; O’Connor & Bennie, 2006; Olusoga et al., 2019). Symptoms of coach burnout include depressed mood and low energy levels, sleep disturbances, and ruminative thought patterns
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(Bentzen et al., 2014), as well as feelings of cynicism toward and disengagement from athletes (Lundkvist et al., 2012; Madigan et al., 2019), and a desire to withdraw from coaching (Hassmén et al., 2019). Clearly, burnout has a negative impact on affected coaches, but it also affects the athletes and sports participants they work with. Given the negative impact of burnout on coaches and those around them, understanding how to prevent coach burnout is of importance.

Kallus & Kellmann (2000) conceptualise coach burnout as an end state resulting from an imbalance between stress and recovery over a period of time. Recovery refers to the process that takes place when work demands or stressors cease, and workers have the opportunity to rebuild and restore those resources expended during the working day (Sonnentag, 2001). If stress and recovery are determinants of burnout, it follows that one strategy to reduce the likelihood of coach burnout, in a profession that is inherently demanding and stressful, is to focus on day-to-day recovery (Bentzen et al., 2017; Bentzen et al., 2016; Kellmann et al., 2016).

Consistent with this reasoning, a growing body of research in the general (i.e. non coach specific) work stress literature emphasises the importance of recovery, in terms of maintaining worker wellbeing in the face of high work demands and associated stress (e.g. Rook & Zijlstra, 2006; Sonnentag, 2001; Sonnentag et al., 2008; Zijlstra, & Sonnentag, 2006).

A range of different activities are thought to contribute to recovery, so long as they do not draw on the same resources that are called on at work (Sonnentag et al., 2008). However, in professions such as coaching, where mental effort is involved, recovery can be difficult to achieve. Work-related activity easily extends beyond work hours per se (Querstret et al., 2017), because simply thinking about work challenges or problems can draw on the same mental resources used during the working day thus limiting opportunities for good recovery (Sonnentag, 2001, Rook & Zijlstra, 2006). This challenge is highly relevant to coaching in sports, which is often described as a profession without boundaries that is difficult to mentally
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Disengage from (McNeill et al., 2017). Furthermore, coaches report that they find it hard to stop thinking about work after hours, in addition to a tendency to engage in ruminative thought patterns (e.g. Lundkvist et al., 2012; Tashman et al., 2010; Donahue et al., 2012). Ruminative thoughts, which are intrusive, repetitive, and usually negative, are particularly detrimental to recovery because they can form psychological representations of either past or future stressors at work, prolonging the experience of work demands and the associated stress response (Brosschot et al., 2010). Ruminative thought may be a precursor to, as well as a sign of, coach burnout. In the present research, we therefore examine rumination on day to day basis and how it is associated to the recovery processes, in order to understand more about how coach burnout can be prevented. More specifically, we examine the role of mindfulness, a psychological state that may act as an antidote to rumination and help facilitate better recovery.

Mindfulness and Recovery

Mindfulness is a state of consciousness involving a ‘receptive attention to and awareness of present events and experience’ (Brown et al., 2007; p122), which has been related to a range of positive outcomes including positive emotional states, and declines in mood disturbance and stress (Brown & Ryan, 2003 Chiesa & Serrett; 2009; Sharma & Rush, 2014). Everyone has the capacity to experience mindfulness (Tuckey et al., 2018), but some people tend to do so more frequently and consistently than others. Mindfulness, therefore, varies between people, but can also fluctuate within individuals. For example, someone who has a naturally high level of mindfulness will still have moments or days when they are less aware of the present moment, and when they end up completing tasks on autopilot (Siegel, 2009). Mindfulness can therefore be considered trait-like (i.e., dispositional mindfulness) but also as a state of consciousness which can vary somewhat from day-to-day within individuals (i.e., state mindfulness).

Over the last two decades mindfulness based interventions have been increasingly used in sports settings, and have been found effective in enhancing performance as well as overall
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wellbeing of athletes (Gardner & Moore, 2017). More recently, coach specific interventions have been developed and tested. Longshore and Sachs (2015) found that coaches who participated in mindfulness training reported less anxiety and greater emotional stability following the intervention, while participants in an applied mindfulness intervention (Lundqvist et al., 2018) experienced greater psychological flexibility and lower perceived stress after completing mindfulness training. Importantly, those coaches also reported improved sleep quality and reduced rumination.

We build on the findings of Lundqvist et al., (2018) in the present research, further investigating the relationship between mindfulness and rumination amongst coaches, to understand more about determinants of coach recovery. Previous research has demonstrated that individuals who are higher in mindfulness are less likely to engage in ruminative patterns of thinking (Josefsson et al., 2017; Jury & Jose, 2019; Querstret et al., 2017). There are several possible explanations for this relationship. Firstly, mindfulness implies acceptance of events and experiences, whereas rumination has been described as a maladaptive cognitive strategy employed by individuals to avoid, rather than face up to, unwanted emotional states (Liverant et al., 2011). Rumination, therefore, indicates a lack of acceptance (Ciesla et al., 2012; Liverant et al., 2011), a mental or emotional state which seems incompatible with a state of mindfulness.

Additionally, as a cognitive response to events or experiences, rumination is automatic rather than intentional. Mindfulness, on the other hand, is associated with decreased automaticity of thoughts and emotions. Mindfulness is described as involving a shift in perspective, referred to as decentering (Brown et al., 2007; Piet & Hougaard, 2011) or re-perceiving (Shapiro et al., 2006), in which thoughts and emotions are acknowledged simply as temporary mental events rather than reflections of reality (Bishop et al., 2004; Wolkin, 2015). Decentering therefore involves a separation of self from emotion, and this appears to reduce automatic response patterns such as rumination.
In addition, mindfulness may also be associated with recovery because it appears to promote sleep quality (Howell et al., 2010; Hülsheger et al., 2015). Sleep is fundamental to recovery (Berset et al., 2011; Zijlstra & Sonnentag, 2006), bringing total disengagement from work related activity, thought and effort (Hulsheger et al., 2015). On the other hand, lack of sleep, or impaired sleep quality, can result in accumulated fatigue, and there are well established links between impaired sleep and burnout in non-clinical populations (Grossi et al., 2015). When people are more mindful they may experience better quality sleep, and therefore have greater opportunity for recovery.

The present research

The arguments presented so far suggest that individuals who are higher in dispositional mindfulness are less likely to engage in ruminative thought, and more likely to experience better quality sleep, in contrast to their counterparts who might be lower in mindfulness. Less rumination, and better sleep quality, are thought to predict recovery from work demands. In the present research we examined these relationships on a day to day basis, for individual coaches. We proposed a an investigative model where daily mindfulness is indirectly related to recovery indicators (mood and energy) through two potential explanatory variables; namely, evening rumination and evening sleep quality. Mood and energy were chosen as outcomes because they strongly associated to recovery: sufficient recovery is experienced by way of feeling mentally and physically refreshed with an associated improvement in mood (Binnewies et al., 2009; Sonnentag & Kruel, 2006). We expected that where participants were more mindful than usual, they would report lower rumination and better sleep that evening, and higher mood and energy levels the following day.

Research hypotheses follow:
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Hypothesis 1: At the within person level, daytime mindfulness is: a) negatively related to evening work-related rumination, and b) positively related to evening sleep quality.

Hypothesis 2: At the within person level, daytime mindfulness is positively related to mood and energy ratings the following day, via the mechanisms of a) reduced evening rumination, and b) improved sleep quality.

The purpose of the current research was to test the two hypotheses, and we did this by using a diary design, with participants providing repeated daily measures of the same variables over a period of 28 consecutive days. Each day, the data collection gathered information on recovery related outcomes that day, as well as on recovery processes, which unfolded the previous evening. This repeated measure design gave the ability to examine varying states within individual participants (Gunthert & Wenze, 2012; Hamaker, 2012), and therefore to understand more about individual participant’s recovery processes.

Methods

Participants

Participants were recruited through convenience sampling, via two different methods. Some study participants were recruited through their participation in a previous coaching study carried out by the lead author (while responses in that cross-sectional survey were anonymous, some respondents provide an email address so that they might be contacted regarding future research). Others responded to emails sent to their sporting organisations or governing bodies, providing information on the present study and calling for participants. Eligibility was limited to people over 18 years of age, actively working as a sport coach (either on a full time or part time basis) and based in New Zealand. As an incentive, participants were offered the opportunity to go in a draw for a $250 shopping voucher, provided they remained in the study for the 28-day duration.
A total of 50 sport coaches began the study. Four were excluded from the analyses because they had completed less than 50% of the daily surveys, leaving a remaining sample of $n = 46$ (30 males, 65%). This sample size was deemed appropriate for the planned multilevel analysis, where a sample of size of 30 or more is sufficiently large to not bias results (Ohly et al., 2010). Participants ranged in age; the youngest participant identified as being in the 18-20 age bracket, while 15 participants (32%) were aged 50 years and over. Ten participants (21%) were aged between 21 and 30 years, 7 (15%) were aged between 31 and 40 years, and 13 (28%) were aged between 41 and 50 years. The majority of participants (29) had more than 10 years coaching experience; only 7 participants had less than 5 years coaching experience. The other 10 coaches had between 5 and 10 years of experience. Approximately one third of participants ($n = 16, 36\%$) were full-time coaches, and the remainder coached part-time as well as being employed elsewhere. Hours per week spent coaching ranged from 7 hours per week for a part-time coach who worked in other full-time employment, to 60 hours per week for a professional rugby coach. Coaches came from a wide range of sports, including mainstream codes such as rugby, netball, athletics and rowing, as well as lesser known sports such including archery, equestrian, and multisport. The diversity in terms of age, experience, and sports means that it is likely that participants had a range of pathways into their coaching positions; some may have had formal training while others are likely to have learned ‘on the job.’

**Daily survey procedures**

Data collection took place over a four-month period, and coaches were given the option of participating in one of four separate rounds. Each round began on the first Tuesday of the month and continued for 28 consecutive days. Coaches were asked to self-select the month in which they would complete surveys, based on availability and their sporting season (coaches were asked to only participate if they were in their competitive season, and therefore to choose a month where this was the case). Data collection ran from August to November 2017, a time
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period which captured the competitive season for winter and summer sports in New Zealand. Prior to the beginning of data collection, the survey was piloted for seven days amongst a post-graduate research lab group and a small group of volunteers from a range of backgrounds and occupations. Additionally, human ethics approval was obtained from the University of Canterbury.

In the study itself, daily surveys were emailed to participants each evening for 28 consecutive days. Basic demographic information was captured in the initial survey. The remaining 27 surveys contained the same questions each day, although the order of questions was randomized to minimise habitual responding. Daily surveys were brief and took around two minutes to complete. The text introducing and concluding the survey was consistent across participants but different every day, both to keep participants interested and engaged and to show interest and commitment on the part of the researchers. Participants were also given the option to request weekly summaries of their survey scores, to further boost engagement. All surveys and accompanying emails were friendly, informal and encouraging in tone, offering opportunities for participants to provide feedback or to contact the researchers with any questions or concerns. Every survey ended with an expression of thanks and appreciation to the participants for their time and effort.

Participants were asked to provide an email address for an account they could access either from home, or on their mobile device, and surveys were emailed via the Qualtrics survey platform (Qualtrics, Provo, Utah, USA) at 7pm each evening. Participants were asked and encouraged to complete each survey on the night it was sent. After 15 hours the survey was made inaccessible, thus preventing late responses. Participants were strongly encouraged to complete all 28 surveys but given the feasibility of an intensive daily diary study, missing a survey on occasion would not impact their inclusion in the study. Of the 1288 possible surveys over the course of the study, 1131 were completed with a mean of 24.64 (SD 3.34) of diary
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entries per participant and a range of 17 – 28 entries. 41 participants completed 20 or more surveys, with 8 participants completing all 28 entries. The highest number of missing surveys for a single participant was 11. Friday and Saturday were the days on which surveys were least likely to be completed. Missing data analysis showed that, at a within-person level, lagged study variables were not significantly associated with the missed days of entry the next day.

Measures

Mindfulness

Daily mindfulness was measured using the state version of the Mindful Attention and Awareness Scale (MAAS). This version of the MAAS has been used in similar diary research (Hülsheger et al., 2014) and is a five-item scale which is designed to measure mindfulness as a naturally occurring state, even in those without any prior mindfulness meditation training or experience. Participants were asked to think back on the day they had just had and indicate the extent to which they agreed with the scale items, an example of which is “I rushed through activities without being really attentive to them.” Responses were given on a seven-point Likert-type scale, where 1 = strongly disagree and 7 = strongly agree. Scores were reverse coded prior to analyses, so that a high score would indicate higher levels of mindfulness.

Rumination

A five-item scale was adapted from the ‘affective rumination’ component of the Work-Related Rumination Questionnaire (Querstret & Cropley, 2012). Items were slightly adjusted to refer specifically to coaching work. The five adjusted items included in the scale were as follows:

1. I became tense when I thought about coaching related issues during my free time; 2. I got annoyed by thinking about coaching related issues when not at work; 3. I became irritated by coaching issues when not at work; 4. I felt fatigued by thinking about coaching-related issues during my free time; 5. I was troubled by coaching-related issues when not at work”.
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Participants were asked to think back on the previous evening when responding, and responses were provided on a 7-point Likert-type scale where 1 = strongly disagree and 7 = strongly agree.

Sleep quality

Participants were asked to ‘please rate, out of ten, the overall quality of your sleep last night’, using a visual analogue scale with anchor points at each end (0 = extremely poor and 10 = extremely good). This single-item measure has been used in previous diary studies and correlates highly with total scores on the Pittsburgh Sleep Quality Index (Pow et al., 2017), while the visual analogue format was used by Arnetz et al. (2008) in their Brief Fatigue Syndrome Scale.

Energy

Energy was measured using a single-item measure; participants were asked ‘please rate your energy levels today,’ again using a visual analogue scale with anchor points at each of 0 = extremely poor and 10 = extremely good (Fisher et al., 2016). This question was taken from the Brief Fatigue Syndrome Scale (Arnetz et al., 2008), a validated scale containing three single-item measures to measure three aspects of fatigue. The wording was adjusted slightly to reflect the daily nature of the present study and different anchor points were used to ensure consistency with the other single-item measures.

Mood

A single item measure was used for mood: participants were asked participants to ‘please rate your overall mood today,’ using a visual analogue scale with anchor points at each end of 0 = extremely poor and 10 = extremely good. Mood has been measured in previous recovery-related diary research using a similar single item (Fuller et al., 2003).
Reliability analysis

Reliability for the multi-item scales, in terms of measuring within person change, was assessed following recommendations from Bolger and Laurenceau (2013). Coefficient omegas for each scale were calculated based on the estimated factor loadings and variances from the within person component of a multilevel confirmatory factor analysis (Bolger & Laurenceau, 2013). The resulting coefficient omegas of .85 for the mindfulness scale and .87 for rumination indicated good reliability.

Statistical analyses

As the daily measures were nested within participants, multilevel modelling was appropriate. All analyses were carried out using MPlus Version 8 (Muthén & Muthén, 2019). The analyses utilised a lower level or 1-1-1 mediation model (Kenny et al., 2003) reflecting the fact that all the study variables were measured at the lower (day) level. Following recommendations from Preacher and colleagues (Preacher et al., 2011; Preacher et al., 2010) an unconflated approach was taken, meaning that the variance of the day-level variables was separated into within- and between-level components. This approach allows for the possibility that relationships between study variables will differ at the within- and between-levels. Additionally, each day-level predictor variable was centered on the person mean. Centering in this way makes it possible to investigate how individuals’ daily deviations from their own mean on a predictor variable relate to the outcome variable (Hülsheger et al., 2018), and enables the study of intra-individual processes.

Although measures were collected at the same time each day, they related to different points in time. On any given day, the survey measured mindfulness on that day, energy and mood on that same day, and rumination and sleep the previous evening. The area of focus, and research interest, was the temporal relationship between mindfulness on any day, rumination
and sleep that same evening, and energy and mood the following day. Therefore, prior to analysis the mindfulness variable was lagged by one day in the dataset to allow this temporal relationship to be assessed (Bolger & Laurenceau, 2013). For example, data collected on a Tuesday evening related to mindfulness, energy, and mood on Tuesday, and rumination and sleep on Monday evening. Lagging the mindfulness variable by one day meant that the Monday mindfulness score could be used to predict Monday evening rumination and sleep, and Tuesday daytime energy and mood.

Before testing the study hypotheses, several different elements of the data were inspected. First, the intra-class correlation (ICC) was checked. This indicates the proportion of variation that exists between people, compared with the total variation in the model (Finch & Bolin, 2017). ICCs ranged from 0.32 to 0.48, indicating that a large amount of variation in the model was at the within person level, and therefore that multilevel modelling was an appropriate approach. Next, the data was visually inspected via the creation of individual panel plots for each participant. This allowed for observation of variables across time, to check for any evidence of systematic change. While none was apparent, recommendations from Bolger and Laurenceau (2013) were nonetheless followed and time was included in the final model as a predictor of the mediator and outcome variables.

**Results**

Tables 1 shows means, standard deviations, and intercorrelations for all study variables. Tables 2 and 3 display results of the multilevel mediation analysis, for the outcome variables energy and mood respectively. It should be noted at this point that mediation analysis was used not to explain any direct relationship between the predictor and outcome variables, but rather to investigate the hypothesized *indirect* relationships between those variables, via the hypothesized explanatory mechanisms (Agler & De Boeck, 2017).
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Table 1: Descriptive statistics and correlations for study variables at within and between person level

<table>
<thead>
<tr>
<th>Variable (within person)</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Mindfulness</td>
<td>5.19</td>
<td>1.34</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Rumination</td>
<td>2.53</td>
<td>1.40</td>
<td>-14*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Sleep</td>
<td>6.66</td>
<td>2.25</td>
<td>0.10*</td>
<td>-13*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Mood</td>
<td>7.57</td>
<td>1.60</td>
<td>0.08</td>
<td>-23*</td>
<td>0.34*</td>
<td></td>
</tr>
<tr>
<td>5 Energy</td>
<td>6.91</td>
<td>1.98</td>
<td>0.06</td>
<td>-15*</td>
<td>0.40*</td>
<td>0.53*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable (between person)</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Mindfulness</td>
<td>5.19</td>
<td>1.28</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Rumination</td>
<td>2.53</td>
<td>0.94</td>
<td>-82*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Sleep</td>
<td>6.70</td>
<td>1.28</td>
<td>0.43*</td>
<td>-28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Mood</td>
<td>7.62</td>
<td>1.16</td>
<td>0.73*</td>
<td>-69*</td>
<td>0.56*</td>
<td></td>
</tr>
<tr>
<td>5 Energy</td>
<td>6.97</td>
<td>1.31</td>
<td>0.62*</td>
<td>-55*</td>
<td>0.75*</td>
<td>0.73*</td>
</tr>
</tbody>
</table>

*significant at 0.05 level

At the within-subject level mindfulness was negatively related to rumination, meaning that on days where individuals reported higher mindfulness during the day, they were less likely to experience coaching-related ruminative thoughts that evening. Similarly, mindfulness during the day was positively related to sleep quality that evening. Thus, Hypotheses 1a and 1b were supported. Regarding Hypothesis 2a, results showed a significant indirect relationship between mindfulness and energy, via both rumination and sleep, supporting our predictions (Figure 1). Similarly, Hypothesis 2b was supported, with mindfulness and mood indirectly related, via both rumination and sleep. (Refer to Figure 1 for a conceptual model, including results).

In terms of the relative effect of different variables in the model, standardized regression coefficients showed that at the individual level mindfulness had a stronger effect on rumination (-0.14, p = 0.000) than on sleep (0.09, p = 0.000). The effect of sleep on mood (0.29, p = 0.00) was stronger than the effect of rumination on mood (-0.18, p = 0.00). Similarly, the effect of sleep on energy (0.38, p=0.000) was stronger than the effect of rumination on energy (-0.10, p = 0.003). Contrast tests, however, showed that neither rumination nor sleep was more important than the other, in terms of their explanatory roles in the model.
### Table 2: Results of mediation analysis for outcome variable Energy

<table>
<thead>
<tr>
<th>Mediation Pathway</th>
<th>Estimate</th>
<th>SE</th>
<th>P value</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Within Level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mindfulness → Ruminatio</td>
<td>-0.16*</td>
<td>0.06</td>
<td>0.006</td>
<td>-0.25</td>
<td>-0.06</td>
</tr>
<tr>
<td>Mindfulness → Sleep</td>
<td>0.17*</td>
<td>0.07</td>
<td>0.011</td>
<td>0.06</td>
<td>0.27</td>
</tr>
<tr>
<td>Ruminatio → Energy</td>
<td>-0.15*</td>
<td>0.04</td>
<td>0.001</td>
<td>-0.22</td>
<td>-0.08</td>
</tr>
<tr>
<td>Sleep → Energy</td>
<td>0.30*</td>
<td>0.07</td>
<td>0.000</td>
<td>0.19</td>
<td>0.41</td>
</tr>
<tr>
<td>Mindfulness → Energy</td>
<td>-0.02</td>
<td>0.04</td>
<td>0.698</td>
<td>-0.08</td>
<td>0.05</td>
</tr>
<tr>
<td><strong>Indirect Effects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mindfulness → Ruminatio → Energy</td>
<td>0.02*</td>
<td>0.01</td>
<td>0.030</td>
<td>0.00</td>
<td>0.04</td>
</tr>
<tr>
<td>Mindfulness → Sleep → Energy</td>
<td>0.05*</td>
<td>0.02</td>
<td>0.044</td>
<td>0.01</td>
<td>0.09</td>
</tr>
<tr>
<td>Residual variance outcome</td>
<td>1.82*</td>
<td>0.39</td>
<td>0.000</td>
<td>1.17</td>
<td>2.46</td>
</tr>
<tr>
<td>Residual variance rumination</td>
<td>1.15*</td>
<td>0.13</td>
<td>0.000</td>
<td>0.94</td>
<td>1.36</td>
</tr>
<tr>
<td>Residual variance sleep</td>
<td>3.38*</td>
<td>0.39</td>
<td>0.000</td>
<td>2.33</td>
<td>4.43</td>
</tr>
<tr>
<td><strong>Between Level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mindfulness → Ruminatio</td>
<td>-0.76*</td>
<td>0.11</td>
<td>0.000</td>
<td>-0.94</td>
<td>-0.59</td>
</tr>
<tr>
<td>Mindfulness → Sleep</td>
<td>0.49*</td>
<td>0.19</td>
<td>0.009</td>
<td>0.18</td>
<td>0.79</td>
</tr>
<tr>
<td>Ruminatio → Energy</td>
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<td>0.075</td>
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</tr>
<tr>
<td>Sleep → Energy</td>
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<td>0.000</td>
<td>0.38</td>
<td>0.85</td>
</tr>
<tr>
<td>Mindfulness → Energy</td>
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<td>0.17</td>
<td>0.056</td>
<td>-0.08</td>
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</tr>
<tr>
<td><strong>Indirect Effects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mindfulness → Ruminatio → Energy</td>
<td>0.26</td>
<td>0.15</td>
<td>0.070</td>
<td>0.02</td>
<td>0.50</td>
</tr>
<tr>
<td>Mindfulness → Sleep → Energy</td>
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<td>0.14</td>
<td>0.030</td>
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</tr>
<tr>
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<td>0.003</td>
<td>0.26</td>
<td>0.90</td>
</tr>
<tr>
<td>Residual variance rumination</td>
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<td>0.000</td>
<td>0.24</td>
<td>0.45</td>
</tr>
<tr>
<td>Residual variance sleep</td>
<td>1.41*</td>
<td>0.24</td>
<td>0.000</td>
<td>1.02</td>
<td>1.81</td>
</tr>
</tbody>
</table>

*Significant at 0.05 level
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Table 3: Results of mediation analysis for outcome variable Mood

<table>
<thead>
<tr>
<th>Mediation Pathway</th>
<th>Estimate</th>
<th>SE</th>
<th>P Value</th>
<th>LLCI</th>
<th>ULCI</th>
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<tr>
<td><strong>Within Level</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>0.006</td>
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<td>0.011</td>
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<td>0.27</td>
</tr>
<tr>
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<td>0.000</td>
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<td>-0.14</td>
</tr>
<tr>
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<td>0.000</td>
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<td>0.05</td>
<td>0.747</td>
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<td>0.09</td>
</tr>
<tr>
<td><strong>Indirect Effects</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>0.01</td>
<td>0.013</td>
<td>0.01</td>
<td>0.05</td>
</tr>
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<td>0.02</td>
<td>0.030</td>
<td>0.01</td>
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</tr>
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<td>0.000</td>
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</tr>
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<td>0.000</td>
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</tr>
<tr>
<td><strong>Between Level</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
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<td>0.000</td>
<td>-0.94</td>
<td>-0.59</td>
</tr>
<tr>
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<td>0.19</td>
<td>0.000</td>
<td>0.18</td>
<td>0.79</td>
</tr>
<tr>
<td>Rumination → Mood</td>
<td>-0.43*</td>
<td>0.21</td>
<td>0.035</td>
<td>-0.77</td>
<td>-0.09</td>
</tr>
<tr>
<td>Sleep → Mood</td>
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<td>Mindfulness → Mood</td>
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<td>0.18</td>
<td>0.058</td>
<td>0.05</td>
<td>0.65</td>
</tr>
<tr>
<td><strong>Indirect Effects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mindfulness → Rumination → Mood</td>
<td>0.33</td>
<td>0.17</td>
<td>0.055</td>
<td>0.05</td>
<td>0.61</td>
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<tr>
<td>Mindfulness → Sleep → Mood</td>
<td>0.14</td>
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<td>0.096</td>
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<td>0.05</td>
</tr>
<tr>
<td>Residual variance outcome</td>
<td>0.44*</td>
<td>0.11</td>
<td>0.000</td>
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<td>0.61</td>
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<tr>
<td>Residual variance rumination</td>
<td>0.35*</td>
<td>0.06</td>
<td>0.000</td>
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<tr>
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<td>0.24</td>
<td>0.000</td>
<td>1.02</td>
<td>1.81</td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

Relationships at the between-person level were not hypothesized, because the focus of the study was the within-person process of recovery. Tests for those relationships were, however, included in the analysis. Results, displayed in Tables 2-3, show a similar pattern to results at the within-subject level. Mindfulness was related to rumination and sleep, indicating that those coaches who across the course of the study reported higher mindfulness levels also reported less rumination and better-quality sleep. Consistent with the within-
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Within-person analyses, there were significant indirect effects between mindfulness and both outcome variables through rumination and sleep.

Figure 1: Results model showing relationships between study variables

Discussion

The 28-day diary study provided a rich body of data and with it the ability to investigate within-person fluctuations in mindfulness, consequent changes in evening recovery processes, and recovery-related outcomes the day after, for participating coaches. Examining daily processes over an extended time period, at the individual level, is relatively unique in the literature and therefore the present research contributes to a more in-depth understanding of daily recovery processes. Results provided support for both of the study hypotheses. Firstly, and consistent with existing research (e.g., Josefsson et al., 2017; Querstret et al., 2017), a negative relationship was found between mindfulness and subsequent rumination. Secondly, results supported the hypothesis that there would be a positive relationship between daily mindfulness and sleep that same evening, providing further evidence that a mindful attitude promotes sleep quality (Howell et al., 2010). Finally, support was found for the hypothesized model. Results showed an indirect relationship between coach mindfulness on a given day and mood and energy the following day, through rumination and sleep quality on the given evening. Specifically, on days where coaches reported higher mindfulness (relative to their own mean),
they also reported less coaching-related rumination and better sleep quality that evening, and
higher mood and energy ratings the following day. Altogether, this represents a recovery
process facilitated by state mindfulness. The use of within person lagged analysis in the present
study gives an indication of the temporal order of the variables. Intuitively it seems possible
that mindfulness, and consequent effects on rumination and sleep, might be outcomes rather
than predictors of positive mood. Previous research has suggested that when people are
experiencing better psychological wellbeing, they may be more likely to be mindful (Bishop,
2002), or that mindfulness levels and mood have a mutual influence on one another (Baer et
al., 2012). Past study designs, however, have not adequately allowed for examination of the
causal order of variables (Snippe et al., 2015). In the present study there was no significant
correlation between mindfulness and mood, but rather an indirect relationship via the
explanatory mechanisms of rumination and sleep, suggesting that increased mindfulness is
indeed a precursor to better mood. This is consistent with the findings of Snippe et al., (2015)
who examined within-person changes in mindfulness and mood following a Mindfulness
Based Stress Reduction intervention. Their findings indicated that changes in mindfulness
predicted changes in positive affect the following day, but changes in affect did not predict
next-day mindfulness. Mindfulness, they argued, was not simply a 'side-effect' of a good mood
(Snippe et al., 2015). While not yet conclusive, evidence, including that in the present study,
does suggest that mindfulness promotes positive affect rather than the other way around.

Sleep is an important part of any overnight recovery process, because of the opportunity
it provides for total disengagement from work related demands, as well as the replenishment
of resources. The present study expected, and found, mindfulness to be positively related to
sleep quality. This hypothesis was based on prior research suggesting that mindfulness
promotes better awareness and regulation of sleep behaviour (Howell et al., 2008; Hülsheger
et al., 2015). It is possible, however, that improved sleep is a result of decreased rumination
Daily mindfulness is associated with coaches’ recovery processes (Berset et al., 2011; Demsky et al., 2018), and that the two recovery processes proposed in the present study (lower rumination, higher sleep quality) are interdependent. Future research, with survey questions more targeted on different aspects of sleep quality, as well as a design that would better support serial mediation and causal inferences (e.g. collection of data about post-work rumination with a brief survey in the evening, and collecting data on sleep quality the following morning), could investigate this potential relationship more fully.

The present study contributes to the coach burnout literature by identifying the state of mindfulness as a factor which might facilitate recovery and help coaches restore personal resources so that they may continue to meet the demands of their work. Work-related thought outside of work time can act as a continuation of work demands, therefore impeding recovery. Negative rumination is considered particularly detrimental, because dwelling on work problems and stressors may prolong the physiological stress response, and prevent restoration of resources (e.g., energy, and positive affect). Contemplation of work challenges which is positive in tone, however, appears to be less detrimental to recovery (Querstret & Cropley, 2012). The experience of positive events is known to build personal resources (Fredrickson, 2001) so it is possible that reflections on good things that have taken place at work add to rather than deplete work-related resources. Taken together, these findings signal a need to identify factors which affect the content and valence of work-related thought and may therefore facilitate recovery. Results from the present study, particularly the negative relationship between mindfulness and rumination, suggest that mindfulness is one such factor.

Many coaches are motivated to work because of a genuine interest in their chosen sport, and in the development of sportspeople. They find a sense of purpose, meaning, and identity in their work (McNeill et al., 2017). This motivation, amongst workers in an occupation known for unusual work hours and high integration between work and non-work lives, means that work-related thought often extends beyond work hours. Persistent and negative thoughts about
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work issues are known to impede recovery from work demands. However, results of the present study indicate that negative ruminative thought is less likely to occur when one is in a mindful state. Given that the consistency and frequency with which individuals experience state mindfulness (Creswell, 2017) can be increased through education and training, the study highlights a potential direction for recovery promoting interventions for coaches. Given the prevalence of burnout in coaching (e.g. Engelberg-Moston et al., 2009; Olusoga et al., 2019), and the role of recovery in preventing burnout, results of the present study make a significant contribution to the coach burnout literature.

Methodological considerations

A strength of the present study is the longitudinal design and daily data collection, as there is limited research on actual day to day recovery processes amongst coaches. In addition, little is known how mindfulness varies across workdays and how this might affect wellbeing related outcomes. Almost all investigations of mindfulness in the work context look at trait mindfulness, or the impact of mindfulness interventions (Tuckey et al., 2018). Results of the present study, which show that varying levels of mindfulness predict variation in rumination and sleep and are indirectly related to recovery, add to the literature on how, rather than whether, mindfulness is related to a recovery process that facilitates coach wellbeing.

Mindfulness appears to help coaches regulate the content of work-related thought outside of work time, reducing work-related rumination and thus allowing for more effective recovery from the mental demands of work. Through this process, mindfulness may help to protect against the risk of under-recovery and eventual burnout amongst coaches, ultimately enhancing sustainability.

While the longitudinal design is one of the strongest features of the study, it also presented challenges. Data collection took place over a relatively long timeframe, in order to
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gain meaningful information on the overnight recovery process within individuals. Administering daily surveys over 28 consecutive days, however, carried the risk of participant boredom and disengagement. The survey was therefore deliberately brief, capturing only the variables which were considered fundamental to the study. Future research into the relationship between daily mindfulness and overnight recovery from work could include other variables which potentially influence recovery. For example, daily measures of objective work demands might influence the amount of recovery required each evening. Daily measures of perceived work-related stress could provide some indication of the extent to which mindfulness predict more benign stress appraisals and more adaptive coping strategies, reducing the likelihood of ruminative thought.

In an effort to keep the daily surveys brief, single-item measures rather than multi-item scales were used to measure some of the study variables. Multi-item scales are usually considered more appropriate in survey research, as they allow for assessment of psychometric properties, but single items are suitable in some circumstances (Van Hooff et al., 2007). In daily diary studies where constructs are measured frequently and repeatedly, use of single-item measures can help minimise the risk of participant boredom, disengagement, and dropout (Fuchs & Diamantopoulos, 2009). Additionally, when a construct is familiar and unambiguous to a participant, the use of a single item may be appropriate and even have higher face validity than repetitive multiple items (Van Hooff et al., 2007). This was considered to be the case with the constructs of mood, energy, and sleep, which were likely to be clear and familiar to participants. Further, because the data of interest was within person fluctuations in mood and energy, rather than absolute values, it was more important to measure according to each individual’s understanding of the construct, rather than considering every possible aspect (Gilbert & Kelloway, 2014). In the case of mindfulness and rumination, brief scales were
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considered more appropriate than single items, as the constructs are very abstract in nature and may not have been familiar to or easily conceptualised by participants.

Study variables were all measured using self-report, which does bring the risk of common method variance. However, as part of the analysis the independent and mediator variables were centered on the person mean, effectively eliminating any between-person variance attributable to the response tendencies of individual participants (Niks et al., 2017). In addition, the lagging of the data meant that there was a time delay between completion of the mindfulness and rumination scales for each day. From a practical perspective, self-report is the only way to measure constructs which are attitudinal or perceptual, such as rumination, energy, and mood (Fisher et al., 2016; Schmitt, 1994). However, future research on the daily within-person recovery process could explore the use of objective and physiological measures. Steps have been taken toward development of an objective measure of mindfulness (e.g., Wong et al., 2018), and sleep quality and quantity can feasibly be measured using heart rate monitoring technology, as can physiological recovery from work demands. These measures would require considerably more time, effort and commitment from participants, and were not feasible for 28-day daily diary design of the present study where data was easily accessible via self-report measures.

Practical implications

Mindfulness training is gradually receiving attention in sport coaching literature; a limited number of studies have demonstrated the promise of formal mindfulness based interventions in assisting coaches to maintain wellbeing (e.g. Longshore & Sachs, 2015; Lundqvist et al., 2018). However, in considering the impact of day to day fluctuations in mindfulness, the present study makes a novel contribution with important practical implications. In addition, it responds to the recent call by Cropley et al. (2020) for more research into self-care strategies
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that may be taken by coaches. Specifically, results from the present study suggest that even small shifts in mindfulness, relative to one’s daily norm, can have an effect on both rumination and sleep, and therefore may impact the degree to people can recovery from work demands. These findings suggest it could be worthwhile for coaches to take even very small steps that help them to be more mindful, more often. As Creswell (2017) suggests, mindfulness training could viewed in a similar vein to physical training that strives to improve aerobic or muscular capacity; while it might be true that there are optimum training levels in terms of volume and intensity, where this levels are not realistic consistently doing some training is certainly better than none. This should be encouraging for coaches, many of whom may consider the time and commitment requirements of formal mindfulness training programmes a major deterrent. Today, there are practical and accessible ways in which coaches might bring more mindfulness into their daily lives.

One option which could feasibly be explored by coaches, and the coaching profession, is digital mindfulness training. Over the last decade mindfulness apps have provided mindfulness instruction to millions of people in different settings (Mrazek et al, 2019). This form of delivery makes mindfulness instruction highly accessible, and even very brief interventions (for example, 10 sessions of 10 minutes each, taking at time and setting of participants’ choice) have been found to have a positive impact on aspects of participants’ wellbeing (Campillo et al., 2018). Critics point out that the plethora of available apps do vary in their content, quality and effectiveness, and the extent to which they teach mindfulness or simply offer guided meditation (Mani et al., 2015). Indeed, to continue with the physical training analogy, any coach will agree that a program well designed, evidence based and specific to the population is preferable. The same is true for mindfulness training (Baltzell et al., 2014). So perhaps while a readily available ‘off the shelf’ app may be a good start, there is potential and need for the
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development for online, app based mindfulness resources specifically targeted toward sport coaches.

Additionally, mindfulness can be built and maintained through informal as well as formal practice (Hindman et al., 2015). Informal practice simply means incorporating mindfulness into everyday tasks and existing routines, such as eating mindfully, completing household chores mindfully, or simply engaging in mindful moments. Using such activities as an opportunity to be mindful can increase state mindfulness (Hanley et al., 2015), and as shown in the present study even small increases in state mindfulness may have an impact on wellbeing. Coaches, therefore, could benefit from being taught and encouraged to cultivate moments of mindfulness in their day to day activities; a practice that could be in addition to or instead of formal mindfulness practice. It is suggested that coach education programs could include and promote both formal and informal mindfulness practices, with an emphasis that it will enhance well-being and sustainability in the coaching profession.

Conclusions

Many sport coaches are faced with high demands, making regular and sufficient recovery important for sustained wellbeing and performance. In showing that variations in daily mindfulness are predictive of changes in rumination levels and sleep quality, which in turn predict changes in recovery related outcomes, the present study highlights a potential path to daily recovery. Groundwork is laid for the investigation of mindfulness training as a recovery promoting intervention, potentially through easily accessible means such as app based training delivery and the incorporation of informal mindfulness practice into day to day activities.

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