



Antecedents and consequences of perceived autonomy support in elite sport: A diary study linking coaches' off-job recovery and athletes' performance satisfaction

Yannick A. Balk^{a,b,*}, Jan de Jonge^{b,c,d}, Sabine A.E. Geurts^e, Wido G.M. Oerlemans^b

^a University of Amsterdam, Amsterdam, the Netherlands

^b Eindhoven University of Technology, Eindhoven, the Netherlands

^c Utrecht University Utrecht, Utrecht, the Netherlands

^d University of South Australia, Adelaide, Australia

^e Radboud University Nijmegen, Nijmegen, the Netherlands

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ABSTRACT

Objectives: To prevent **poor health and well-being resulting** from the high demands of coaching in elite sport, coaches need to recover during time away from work. This can benefit coaches' own work experiences as well as their interpersonal behaviour towards athletes. Therefore, the first aim of this study was to investigate within-person associations between elite coaches' off-job recovery (i.e., physical, cognitive, and emotional detachment from work), physical fatigue, positive affect, work engagement, and perceived autonomy support. The second aim was to investigate within-person associations between elite athletes' daily perceptions of autonomy support, athlete engagement, and performance satisfaction.

Design: A one-week daily diary study was conducted.

Method: Thirty-one elite coaches (30 males, 1 female) and 96 elite athletes (67 males, 29 females) completed online daily surveys across eight consecutive days.

Results: Multilevel structural equation modelling showed that coaches' daily off-job physical detachment was negatively related to physical fatigue the next morning, whereas daily off-job emotional detachment was positively related to positive affect the next morning. Physical fatigue and positive affect were positively and negatively related to daily work engagement, respectively, which in turn was positively related to athletes' perceptions of autonomy support. For athletes, daily athlete engagement fully mediated the relation between daily perceived autonomy support and daily performance satisfaction.

Conclusions: This study shows that off-job recovery, in terms of physical and emotional detachment from work, is not only important for elite coaches' health, well-being, and work engagement but also benefits elite athletes' daily sport experiences.

Elite coaches face numerous demands in their work, such as having to deal with pressure and expectations, managing the training and competition environment, dealing with conflicts, and keeping the team atmosphere in check (for an overview, see Norris, Didymus, & Kaiseler, 2017). The effort that is required to deal with work-related demands is associated with physical and psychological stress responses (Meijman & Mulder, 1998). This so-called strain may cause coaches to provide less instruction and social support to their athletes (Price & Weiss, 2000). Moreover, a recent qualitative study found that stress experienced by coaches can have a negative influence on athletes in terms of reduced confidence and increased perceived pressure (Thelwell, Wagstaff,

Rayner, Chapman, & Barker, 2017). Likewise, athletes who are coached by exhausted coaches report higher levels of anxiety and burnout (Vealey, Armstrong, Comar, & Greenleaf, 1998). Hence, it is important to identify means to maintain elite coaches' health and well-being, which could ultimately benefit their interpersonal behaviour towards athletes as well.

Both on-the-job experiences, such as job security (Stebbing, Taylor, Spray, & Ntoumanis, 2012), and off-job experiences are related to coaches' health and well-being. Specifically, a lack of recovery and difficulties in 'switching off' from work have been put forward as an important predictor of high stress levels and poor health of coaches

* Corresponding author. Department of Work and Organizational Psychology, P. O. Box 15919, 1001 NK Amsterdam, the Netherlands.

E-mail address: y.a.balk@uva.nl (Y.A. Balk).

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(Bentzen, Lemyre, & Kenttä, 2017; Lundkvist, Gustafsson, Hjälm, & Hassmén, 2012). Therefore, the first aim of this daily diary study was to investigate within-person associations between elite coaches' daily off-job recovery (i.e., detachment from work), physical fatigue, positive affect, work engagement, and perceived autonomy support. To examine how these associations translate into elite athletes' daily training experiences, the second aim of this study was to investigate within-person associations between elite athletes' daily perceived autonomy support, athlete engagement, and performance satisfaction.

1. Detachment from work and coaches' health and well-being

To maintain elite coaches' health and well-being, they need to recover during time away from work (i.e., off-job time; Kellmann, Altfelt, & Mallet, 2016; Lundkvist, Gustafsson, Hjälm, & Hassmén, 2012). Off-job recovery entails that psychophysiological systems that were taxed during demanding work have returned to baseline levels (Geurts & Sonnentag, 2006). Previous research has indicated that detachment from work is an important off-job recovery experience (Sonnentag & Fritz, 2015). Detachment refers to a coach's sense of being away from work-related demands, and usually consists of physical, cognitive, and emotional elements (De Jonge, Spoor, Sonnentag, Dormann, & Van den Tooren, 2012). This implies that a detached coach is able to shake off the physical exertion from work (physical detachment), has stopped thinking about work-related issues (cognitive detachment), and is no longer bothered by work-related negative emotions (emotional detachment). By providing a break from work-related demands, detachment allows physical, cognitive, and emotional systems that were activated during work to return to baseline levels. Several studies have found a positive association between detachment from work during the evening and employee well-being the next morning (e.g., Sonnentag, Binnewies, & Mojza, 2008; Ten Brummelhuis & Bakker, 2012).

2. Coaches' health and well-being, work engagement, and autonomy support

When coaches feel adequately recovered at the beginning of a working day, they may also experience positive states at work. For instance, they may be more likely to enjoy their work and feel engaged. Work engagement is defined as a positive, fulfilling, work-related state of mind that is characterized by vigour, dedication, and absorption (Schaufeli, Bakker, & Salanova, 2006). According to a resource-based view of work engagement and work behaviour (Troughakos & Hideg, 2009), feeling recovered is associated with the availability of energetic and affective resources that, in turn, promote work engagement (Sonnentag, Mojza, Demerouti, & Bakker, 2012). Empirical evidence showed indeed that physical and psychological well-being before the start of the working day is positively related to work engagement during the day (e.g., Sonnentag et al., 2012; Ten Brummelhuis & Bakker, 2012). In contrast, feeling depleted is negatively related to work engagement during the day (Lanaj, Johnson, & Barnes, 2014). In turn, coaches' work engagement can positively impact interpersonal behaviour towards their athletes. Explanations for why higher levels of work engagement translates into better (interpersonal) behaviour are related to the notion that engaged individuals often experience positive emotions, including happiness, joy, and enthusiasm. Consequently, happy people are more sensitive to opportunities at work, more outgoing and helpful to others, and more confident and optimistic (Cropanzano & Wright, 2001). In support of this idea, research has shown that teachers' work engagement is positively associated with their instructional behaviours in the classroom (Klusmann, Kunter, Trautwein, Lüdtke, & Baumert, 2008). Furthermore, Bakker, Gierveld, and Van Rijswijk (2006) showed that engaged school principals were seen as transformational leaders by their teachers (i.e., being able to inspire, stimulate, and instruct).

In the context of sport, coaches' autonomy-supportive interpersonal

style is considered a key factor in shaping athletes' sport experiences. Autonomy-supportive behaviour is characterized by allowing athletes to participate in decision-making, providing them with a rationale for tasks and rules, taking the athlete's perspective, acknowledging their feelings, and providing them with non-controlling feedback (Mageau & Vallerand, 2003). In contrast, a controlling interpersonal style is characterized by intimidating athletes through verbal abuse and punishment, providing criticism and task-contingent rewards, and pressuring athletes into thinking and behaving in certain ways (Bartholomew, Ntoumanis, & Thøgersen-Ntoumani, 2010). A line of studies by Stebbings and colleagues has provided empirical evidence that coaches' work-related well-being in the context of work, such as subjective vitality and positive affect whilst coaching, is positively related to autonomy-supportive behaviour (e.g., Stebbings, Taylor, & Spray, 2015, 2016; Stebbings et al., 2012). For instance, Stebbings, Taylor, and Spray (2016) examined coach-athlete dyads from pre-training to post-training and found that coaches' pre-training well-being was associated with changes in athletes' well-being over the course of the training session, and this relation was mediated by athletes' perceptions of their coaches' interpersonal style. Interestingly, the authors found no evidence that coaches' behaviour depended on athletes' well-being, indicating that it is important that coaches' experience high levels of health and well-being at work in order to be autonomy-supportive.

3. Perceived autonomy support, athlete engagement, and performance satisfaction

Coaches play a pivotal role in shaping athletes' daily sport experiences, as they spend a significant amount of time with their athletes. Hence, it is worthwhile exploring how coaches' interpersonal behaviour relates to athletes' sport experiences (Reinboth, Duda, & Ntoumanis, 2004). In line with Deci and Ryan's Self-Determination Theory (SDT, 2000), an autonomy-supportive climate has repeatedly been linked to positive cognitive, affective, and behavioural outcomes for athletes (Mageau & Vallerand, 2003; Reinboth et al., 2004; Stebbings et al., 2016). Specifically, coaches' autonomy-supportive behaviour has been linked to increased athlete engagement during practice (Cheon, Reeve, Lee, & Lee, 2015) as well as better performance (Gillet, Vallerand, Amoura, & Baldes, 2010). Analogous to work engagement, athlete engagement is a stable, positive, cognitive-affective experience characterized by enthusiasm, confidence, dedication, and vigour (Lonsdale, Hodge, & Jackson, 2007). According to Lonsdale et al. (2007), athlete engagement may be particularly relevant for elite athletes as they usually must invest tremendous amounts of time and effort in their sport. It has also been linked to positive outcomes in sport such as flow (Hodge, Lonsdale, & Jackson, 2009). Whether athlete engagement is also linked to performance is unclear. In this study, performance is operationalized as performance satisfaction, which reflects the athlete's own athletic performance perception (Nicholls, Polman, & Levy, 2012). This variable offers a reliable and meaningful assessment of athletes' daily training performance across different individuals and different sports (Nicholls et al., 2012).

4. The present study

This daily diary study examines the antecedents (detachment from work, physical fatigue, positive affect, and work engagement) and consequences (athlete engagement and performance satisfaction) of perceived autonomy support in elite sport. Empirical evidence has shown that it is worthwhile to take the multidimensionality of detachment (i.e., physical, cognitive, and emotional) into account in the prediction of health and well-being outcomes. For instance, the Demand-Induced Strain Compensation Recovery (DISC-R) Model (De Jonge et al., 2012) states that the strongest relations are to be found when there is a 'match' or 'fit' between the type of recovery experience (i.e., detachment) and this kind of outcomes. From this statement it

follows that emotional detachment would be the strongest predictor of positive affect, whereas physical detachment would be the strongest predictor of physical fatigue. This general notion of match has been empirically validated in both the work domain (e.g., De Jonge et al., 2012) and the sport domain (e.g., Balk, De Jonge, Oerlemans, & Geurts, 2017). Hence, we hypothesize that coaches' daily physical detachment will be negatively related to physical fatigue the next morning (Hypothesis 1a), and that coaches' daily emotional detachment will be positively related to positive affect the next morning (Hypothesis 1b). In line with the idea of match, we did not expect a statistically significant association between cognitive detachment and either physical fatigue or positive affect.¹

Next, in line with previous studies showing that feeling recovered is positively associated with work engagement (Sonnetag et al., 2012; Ten Brummelhuis & Bakker, 2012), we hypothesize that, in turn, coaches' daily physical fatigue in the morning will be negatively related to their daily work engagement (Hypothesis 2a), and positive affect in the morning will be positively related to their daily work engagement (Hypothesis 2b). Finally, coaches' work engagement likely has a positive impact on their autonomy supportive behaviour towards athletes (Cropanzano & Wright, 2001; Stebbings et al., 2015, 2016). Hence, we hypothesize that coaches' daily work engagement will be positively related to daily autonomy-supportive behaviour as perceived by their athletes (Hypothesis 3). Fig. 1 provides an overview of the hypothesized relations among the coach-related variables.

To elucidate the consequences of perceived autonomy support for elite athletes' daily sport experiences, we also investigated the day-level associations between perceived autonomy support, athlete engagement, and performance satisfaction among elite athletes. Perceived autonomy support is positively related to performance (Gillet et al., 2010) and athlete engagement (Cheon et al., 2015), which in turn has been linked to positive outcomes in sport (Hodge et al., 2009). Hence, we hypothesize that athlete engagement will mediate the positive relation between athletes' perceptions of autonomy-supportive coach behaviour and performance satisfaction (Hypothesis 4). Fig. 2 provides an overview of the hypothesized relations among the athlete-related variables.

To summarize, the present study investigates four different associations: (1) whether coaches' detachment from work is associated with lower physical fatigue and higher positive affect the next morning; (2) whether coaches' physical fatigue is negatively associated and positive affect is positively associated with coaches' subsequent work engagement; (3) whether coaches' work engagement is positively associated with athletes' perceptions of autonomy support; and (4) whether perceived coach autonomy support is positively associated with athletes' performance satisfaction, via athlete engagement.

There are several ways in which this study advances previous research. First, this study investigates the non-work antecedent of off-job detachment to get a more complete picture of factors outside the sport context that are related to elite coaches' well-being. Some work-related antecedents of coaches' well-being have been identified, such as basic needs satisfaction at work and job security (e.g., Stebbings et al., 2012). However, coaches also spend time away from work, which can have a profound effect on their health and well-being (Bentzen et al., 2017). Although previous research has shown that detachment is an important off-job recovery experience (Sonnetag & Fritz, 2015), the role of daily detachment from work as a recovery experience has received limited attention among elite coaches. This is particularly interesting as elite coaches seem to experience difficulties in distancing themselves from their work (Bentzen et al., 2017). Second, as coach well-being and interpersonal behaviour is not static and fluctuates from day to day, we extend previous work on coaches' interpersonal behaviour (e.g.,

Stebbing et al., 2016) and athlete's sport experiences by looking at dynamics over the course of one week using a daily diary design. A diary study is well-suited to investigate dynamics in off-job recovery and work experiences, as well as factors that influence these dynamics (Bolger, Davis, & Rafaeli, 2003). Moreover, daily measurement of behaviour reduces recall bias which is often a shortcoming of cross-sectional designs (Ohly, Sonnetag, Niessen, & Zapf, 2010). For athletes, it is valuable to investigate how perceived autonomy support is related to daily athlete engagement and, subsequently, satisfaction with performance. Finally, this study investigates daily experiences of both coaches and athletes at the elite level. Studies on antecedents and consequences of autonomy support involving both elite coaches and elite athletes are scarce (cf. Cheon et al., 2015). Investigating these associations at the elite level is particularly important given the notion that elite sport does not necessarily promote an autonomy-supportive climate due to its rigid nature (e.g., performance-contingent rewards, inflexible schedules for training and competition) as well as elite coaches' responsibility for training programs and competitive strategies (Conroy & Coatsworth, 2007). At times, this might make coaches inclined to engage in controlling rather than autonomy-supportive behaviours (Conroy & Coatsworth, 2007).

5. Method

5.1. Design

This study employed a within-person daily diary design over the course of eight consecutive days. Elite coaches completed a daily survey at two time points per day (after waking up, T1; at bedtime, T2), whereas elite athletes completed a daily survey only once (after training). Data was collected during a typical training week (i.e., not a recovery or a competition week).

5.2. Participants

Prior to recruitment, the study received institutional ethical approval. Thirty-two coaches agreed to participate. All coaches interacted at least three times per week with their athletes. We chose to only include participants in our final sample who had filled out the daily diary on at least five occasions, as this is the recommended minimum number of observations at the lowest level (Maas & Hox, 2005). This led to the exclusion of one coach. The final sample consisted of 31 elite coaches ($M_{\text{age}} = 38.7$; $SD = 7.7$; range = 22–52 years) from The Netherlands ($n = 27$) and Australia ($n = 4$). All but one were male, with an average of 11.9 years of coaching experience ($SD = 9.5$). On average, coaches worked 46.1 h per week ($SD = 19.0$) and were active at either the national or international level. They were involved in football ($n = 16$), swimming, ($n = 4$), Australian football ($n = 3$), handball ($n = 3$), beach volleyball ($n = 2$), short track speed skating ($n = 1$), water polo ($n = 1$), and archery ($n = 1$).

Ninety-six elite athletes ($M_{\text{age}} = 21.0$; $SD = 3.8$; range = 15–33 years) from The Netherlands ($n = 84$) and Australia ($n = 12$) also participated. Sixty-seven participants were male (70%), and 29 were female (30%). On average, athletes spent 18.3 h per week training and competing ($SD = 9.5$). The majority of the coaches worked with their athletes well over 3 times per week as they usually interacted on a daily basis. Participants competed at either the national or international level in football ($n = 34$), swimming ($n = 24$), Australian football ($n = 9$), water polo ($n = 8$), handball ($n = 9$), beach volleyball ($n = 5$), short track speed skating ($n = 4$), and archery ($n = 3$).

5.3. Measures

The following measures were used for elite coaches' off-job detachment, physical fatigue, positive affect, and work engagement.

Off-job detachment. Coaches' physical detachment, cognitive

¹ We could not hypothesize an association between cognitive detachment and a cognitive outcome, as we did not have a cognitive outcome in our data that would have matched with cognitive detachment.

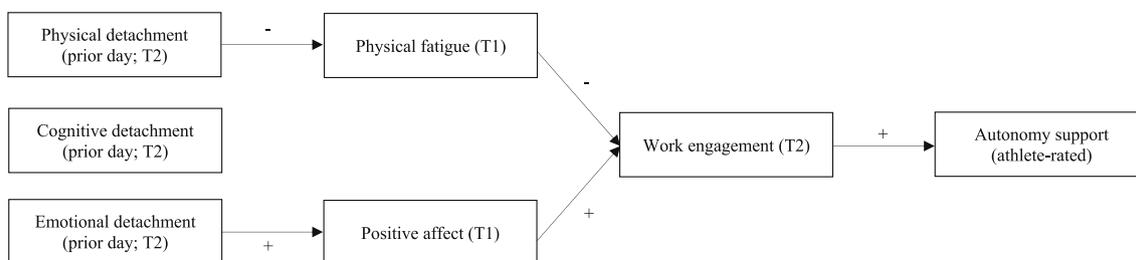


Fig. 1. Model of assumed relations between elite coaches' off-job experiences of physical and emotional detachment from work, physical fatigue and positive affect the next morning, work engagement, and athlete-ratings of autonomy support. T1 = after waking up; T2 = at bedtime.

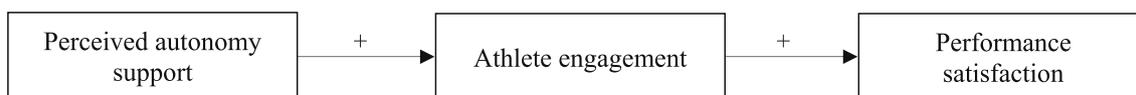


Fig. 2. Model of assumed relations between elite athletes' perceived autonomy support, athlete engagement, and performance satisfaction.

detachment, and emotional detachment were measured at bedtime (T2) with three items per dimension that were developed by De Jonge et al. (2012). An example item measuring physical detachment is “Today, after work, I got a break from the physical demands of coaching” (Cronbach’s $\alpha = 0.86$). An example item measuring cognitive detachment is “Today, after work, I mentally distanced myself from work” (Cronbach’s $\alpha = 0.88$), and an example item measuring emotional detachment is “Today, after work, I put all negative emotions from work aside” (Cronbach’s $\alpha = 0.89$). Items were scored on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). To test the factorial validity of the three factors in the present study, a confirmatory factor analysis (CFA) was conducted. To evaluate the fit of the factor model we used the following model fit indices and cut-off values as recommended in the literature (Hair, Black, Babin, & Anderson, 2014): the comparative fit index (CFI; ≥ 0.90), the Tucker-Lewis index (TLI; ≥ 0.90), the standardized root mean square residual (SRMR; ≤ 0.08), and the root mean square error of approximation (RMSEA; ≤ 0.06). Fit indices revealed that the proposed three-factor model provided a good fit to the data ($\chi^2 = 90.63$, $df = 57$, $p = .003$, RMSEA = 0.05, CFI = 0.97, TLI = 0.96, SRMR = 0.05). The three-factor model also showed a significantly and substantially better fit to the data compared to a one-factor solution (i.e., general detachment; $\Delta\chi^2 = 286.98$, $\Delta df = 6$, $p < .001$), and a two-factor solution (i.e., physical and psychological detachment; $\Delta\chi^2 = 80.91$, $\Delta df = 2$, $p < .001$).

Physical fatigue. Physical fatigue was measured after waking up (T1) with the corresponding 6-item subscale of the Multidimensional Fatigue Symptom Inventory Short-form (Stein, Jacobsen, Blanchard, & Thors, 2004). An example item measuring physical fatigue is “My body feels heavy all over” (Cronbach’s $\alpha = 0.91$). Items were scored on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Positive affect. Positive affect was measured after waking up (T1) using the 5 items of the positive affect subscale of the International Positive and Negative Affect Schedule Short-form (I-PANAS-SF; Thompson, 2007). Coaches indicated to what extent they experienced positive affect (e.g., “inspired”; Cronbach’s $\alpha = 0.94$) on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Work engagement. Work engagement was measured at bedtime (T2) using the Utrecht Work Engagement Scale (UWES; Schaufeli et al., 2006). The 9-item UWES is a shorter version of the original 17-item UWES that measures work engagement based on three subscales: vigour, dedication, and absorption. Coaches indicated to what extent they had felt engaged during work (e.g., “Today at work, I felt happy when I was working intensely”) on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The overall average score from the three subscales was used as an indicator of work engagement as recommended by Schaufeli et al. (2006; Cronbach’s $\alpha = 0.92$).

Autonomy support. Athletes’ perceptions of their coaches’ daily autonomy-supportive behaviour (see below) were used as an indicator of autonomy support. Coaches’ daily autonomy-supportive behaviour was based on an aggregated score from a minimum of three of their athletes.

Control variables. To rule out alternative interpretations of the study results, we included a number of control variables. Including these covariates ought to give a more complete picture of the relations between predictor and outcome variables as well as facilitate comparisons with other research. First, age (continuous variable) was included as a control variable. Second, it is widely recognized that sleep plays an important role in the recovery process (e.g., Sonnentag et al., 2008). Therefore, to rule out alternative interpretations of the study results, we included sleep quality and sleep duration as additional predictors of well-being in the morning. Sleep quality was measured at T1 using one item (“How do you rate the quality of your sleep last night?”) on 10-point Likert scale, ranging from 1 (*very bad*) to 10 (*very good*), and sleep duration was measured at T1 with an open question (“How many hours did you sleep last night?”).

The following measures were used for perceived autonomy support, athlete engagement, and performance satisfaction among elite athletes.

Perceived autonomy support. Athletes’ perceptions of daily autonomy-supportive behaviour were measured following training. In line with previous studies (e.g., Reinboth et al., 2004; Stebbings et al., 2015, 2016), seven items from the Health Care Climate Questionnaire (HCCQ; Williams, Grow, Freedman, Ryan, & Deci, 1996) were adapted to the sport setting and used to measure the degree to which athletes perceived their coach to be autonomy-supportive (e.g., “Today, my coach listened to how I would like to do things”; Cronbach’s $\alpha = 0.93$). The psychometric properties of this instrument have been empirically supported elsewhere (e.g., Reinboth et al., 2004). Responses were given on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Since a majority of athletes and coaches from team sports participated in our study, we instructed athletes to report the name of the coach who they interacted with mostly that day, and then answer the items related to perceived autonomy support accordingly. For instance, some athletes who participated in this study worked with three coaches on a rotating basis. Consequently, some athletes rated autonomy-supportive behaviour of coach A on day 1, of coach B on day 2, and again of coach A on day 3.

Athlete engagement. Athletes’ engagement was measured following training using the Athlete Engagement Questionnaire (AEQ; Lonsdale et al., 2007). The AEQ consists of 16 items and is comprised of four subscales: confidence, dedication, enthusiasm, and vigour. Participants responded to all AEQ items (e.g., “Today, I was determined to achieve my goals”) on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Correlations among the four dimensions

were relatively strong (0.59–0.76). Therefore, in line with previous studies (e.g., Hodge et al., 2009), the average score across the four subscales was used as an indicator of athlete engagement (Cronbach's $\alpha = 0.96$).

Performance satisfaction. Athletes were active in a variety of sports, so objective performance measures were difficult to compare. For that very reason, athletes rated satisfaction with their performance following training (“How satisfied are you with your performance today?”) on a 10-point Likert scale, ranging from 1 (*totally dissatisfied*) to 10 (*totally satisfied*), as recommended by Biddle and colleagues (Biddle, Hanrahan, & Sellars, 2001).

Control variables. To reduce the risk of finding spurious associations between the study variables, age (continuous variable) and gender (dummy coded: 1 = male and 2 = female) were included as control variables.

5.4. Procedure

Before the start of the daily diary study, coaches and their athletes gave their informed consent and completed an intake questionnaire consisting of questions related to demographic characteristics. Coaches were instructed to complete two daily surveys over the course of eight consecutive days. To enhance compliance with the study they received a reminder including a hyperlink to the online survey by means of a text message in the early morning (around 7:30 a.m.; T1) and before bedtime (around 10 p.m.; T2). Athletes received a reminder shortly after their final training session (between 6 p.m. and 9 p.m.).

5.5. Analytical strategy

The data had a hierarchical structure with days (Level 1) nested within persons (Level 2), and not athletes within coaches, as the latter could vary from day-to-day. Moreover, the number of 31 elite coaches is conform the minimum of 30 cases at the highest level of analysis, which is needed for reliable coefficients in multilevel modelling (Maas & Hox, 2005). We centred all our variables around the group (i.e., person) mean, because we are interested in how daily fluctuations in the predictor variables are related to daily fluctuations in the outcome variable. We used the Mplus software (Muthén & Muthén, 2010) to test the hypothesized model with multilevel structural equation modelling (MSEM). The following variables were allowed to correlate with one another: physical fatigue and positive affect; the three types of detachment; and both sleep measures. The fit of the factor models to the data was evaluated according to the criteria formulated by Hair et al. (2014).

6. Results

6.1. Preliminary analysis

Table 1 (for coaches) and Table 2 (for athletes) display day-level means, standard deviations, and Pearson zero-order correlations between the study variables. To determine the degree of within-person and between-person variation of our day-level variables, we examined the intra-class correlations (ICC) of the outcome variables. The ICCs of coaches' physical detachment, cognitive detachment, emotional detachment, physical fatigue, positive affect, and work engagement showed that for these variables a substantial proportion of the variance could be explained at the within-person level (ranging from 50% to 81%). Additionally, sleep quality (82%) and sleep duration (63%) varied considerably at the within-person level. For athletes, a substantial proportion of the variance in perceived autonomy support, athlete engagement, and performance satisfaction could be explained at the within-person level (ranging from 51% to 74%). These numbers legitimize our choice for multilevel analysis.

6.2. Coaches' findings

Fig. 3 depicts the final MSEM model including unstandardized estimates for the analyses among elite coaches. The fit of the hypothesized MSEM model to the data was good: $\chi^2 = 32.11$, $df = 37$, $p = .70$, RMSEA = 0.00, CFI = 0.1.00, TLI = 1.03, SRMR = 0.04 (within level). The model explained 6% of the variance in physical fatigue, 17% of the variance in positive affect, 10% of the variance in work engagement, and 18% of the variance in perceived autonomy support. Furthermore, results showed that daily physical detachment was negatively related to coaches' physical fatigue ($B = -0.14$ ($SE = 0.07$), $p = .050$ (95% CI [-0.29, 0.00]) the next morning, but not to positive affect ($B = 0.11$ ($SE = 0.09$), $p = .185$ (95% CI [-0.06, 0.28])), supporting Hypothesis 1a. In other words, on days that coaches were better able to physically detach from work-related efforts during off-job time, they reported lower levels of physical fatigue the next morning. Daily cognitive detachment was not related to physical fatigue ($B = 0.10$ ($SE = 0.08$), $p = .228$ (95% CI [-0.06, 0.26]) and positive affect ($B = -0.07$ ($SE = 0.10$), $p = .448$ (95% CI [-0.26, 0.12]) the next morning. Emotional detachment was not related to physical fatigue the next morning ($B = -0.09$ ($SE = 0.09$), $p = .312$ (95% CI > [-0.27, 0.09])), but the relation between daily emotional detachment from work and coaches' positive affect the next morning was significant ($B = 0.22$ ($SE = 0.11$), $p = .039$ (95% CI [0.01, 0.43])), thereby providing support for Hypothesis 1b. Thus, on days that coaches were better able to emotionally distance themselves from work-related emotions after work, they also reported higher levels of positive affect the next morning.

In support of Hypotheses 2a and 2b, physical fatigue was negatively related to coaches' work engagement ($B = -0.17$ ($SE = 0.08$), $p = .039$ (95% CI [-0.33, -0.01])), whereas positive affect was positively related to work engagement ($B = 0.16$ ($SE = 0.07$), $p = .021$ (95% CI [0.02, 0.30])). In other words, on days that coaches reported less physical fatigue and more positive affect in the morning, they felt more engaged during their coaching work. In turn, coaches' work engagement positively predicted autonomy support as perceived by athletes ($B = 0.27$ ($SE = 0.11$), $p = .013$ (95% CI [0.06, 0.47])), providing support for Hypothesis 3. Thus, coaches reporting higher levels of work engagement were perceived as being more autonomy-supportive by their athletes. With regard to the control variables, sleep quality was negatively related to physical fatigue ($B = -0.12$ ($SE = 0.05$), $p = .016$ (95% CI [-0.22, -0.02]) and positively related to positive affect ($B = 0.29$ ($SE = 0.55$), $p < .001$ (95% CI [0.18, 0.40])). Sleep duration was negatively related to positive affect ($B = -0.14$ ($SE = 0.07$), $p = .050$ (95% CI [-0.28, 0.00])). Age was positively related to sleep duration ($B = -0.06$ ($SE = 0.18$), $p = .002$ (95% CI [0.02, 0.09])). The interpretation of our findings did not change when excluding the control variables age, sleep quality, and sleep duration from the MSEM model.

6.3. Athletes' findings

Fig. 4 depicts the final MSEM model including unstandardized estimates for the analyses among elite athletes. The fit of the hypothesized MSEM model to the data was good: $\chi^2 = 4.18$, $df = 2$, $p = .12$, RMSEA = 0.05, CFI = 0.99, TLI = 0.94, SRMR = 0.00 (within level). The model explained 15% of the variance in athlete engagement and 25% of the variance in performance satisfaction. Findings showed that perceived autonomy support by athletes was positively related to athlete engagement during training ($B = 0.47$ ($SE = 0.039$), $p < .001$ (95% CI [0.39, 0.55])), which in turn was positively related to their performance satisfaction ($B = 0.82$ ($SE = 0.11$), $p < .001$ (95% CI [0.61, 1.03])). In addition, results revealed a significant indirect effect between perceived autonomy support and performance satisfaction ($B = 0.39$ ($SE = 0.06$), $p < .001$ (95% CI [0.27–0.50])), thereby supporting Hypothesis 4. In other words, athletes who perceived more autonomy-supportive behaviour from their coach felt more engaged

Table 1
Means, standard deviations, alpha coefficients, and correlations between the study variables (coach sample).

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Age	38.71	7.66	–										
2. Gender	1.03	0.18	-.24	–									
3. Sleep quality (1–10)	6.89	1.50	-.14	.12	–								
4. Sleep duration (hours)	6.99	1.31	-.03	.12	.62	–							
5. Physical detachment (prior day; 1–7)	4.85	1.18	-.17	-.01	.05	.02	–						
6. Cognitive detachment (prior day; 1–7)	4.05	1.43	.08	-.03	.23	.16	.66	–					
7. Emotional detachment (prior day; 1–7)	4.55	1.33	.13	-.03	.12	-.07	.55	.73	–				
8. Physical fatigue (1–7)	2.31	1.18	.02	.04	-.11	-.13	-.19	-.15	-.47	–			
9. Positive affect (1–7)	5.24	1.06	.24	-.07	.07	-.04	.42	.23	.19	-.31	–		
10. Work engagement (1–7)	5.09	0.92	-.12	.05	-.06	-.05	.42	.22	.23	-.09	.64	–	
11. Perceived autonomy support (athlete data; 1–7) ^a	5.44	0.78	-.32	.06	.07	-.23	.15	.08	-.01	.28	.56	.57	–

Notes: Correlations below the diagonal are person-level correlations (N = 31). All correlations ≥ 0.42 are significant at $p < .05$; all correlations ≥ 0.48 are significant at $p < .01$. Correlations above the diagonal are day-level correlations (N = 243). All correlations ≥ 0.16 are significant at $p < .05$; all correlations ≥ 0.33 are significant at $p < .01$. ^aRatings provided by a minimum of 3 athletes (per coach).

Table 2
Means, standard deviations, alpha coefficients, and correlations between the study variables (athlete sample).

	Mean	SD	1	2	3	4	5
1. Age	21.01	3.84	–				
2. Gender	1.30	0.46	.11	–			
3. Coach autonomy support (1–7)	5.48	1.01	-.18	-.01	–	.51	.19
4. Athlete engagement (1–7)	5.63	0.85	-.20	-.15	.50	–	.40
5. Performance satisfaction (1–10)	6.74	1.59	.03	.06	.22	.28	–

Notes: Correlations below the diagonal are person-level correlations (N = 96). All correlations ≥ 0.11 are significant at $p < .01$; all correlations ≥ 0.18 are significant at $p < .001$. Correlations above the diagonal are day-level correlations (N = 780). All correlations ≥ 0.19 are significant at $p < .001$.

during training, and in turn were more satisfied with their performance in training. As the direct association between perceived autonomy support and performance satisfaction was not significant, athlete engagement fully mediated the relation between perceived autonomy support and performance satisfaction.

With regard to the control variables, both age ($B = -0.03$ ($SE = 0.02$), $p = .026$ (95% CI [-0.06, -0.01])) and gender ($B = -0.24$ ($SE = 0.11$), $p = .039$ (95% CI [-0.46, -0.01] >)) were negatively related to daily athlete engagement. The interpretation of our findings did not change when excluding these control variables from the MSEM model.

7. Discussion

A lack of recovery has been identified as an important predictor of poor health and well-being of elite coaches. This can, in turn, negatively impact coaches' own work experiences as well as their interpersonal behaviour. Therefore, the present study investigated within-person associations between elite coaches' detachment from work, physical fatigue, positive affect, work engagement, and autonomy-supportive behaviour towards elite athletes. Subsequently, associations between elite athletes' daily perceptions of autonomy support, athlete engagement, and performance satisfaction were tested. Findings showed that coaches' daily off-job physical detachment was negatively related to physical fatigue the next morning, whereas daily off-job emotional detachment was positively related to positive affect the next morning, over and above sleep. Physical fatigue was positively related to daily work engagement, and positive affect was negatively related to daily work engagement, which in turn was positively related to athletes' perceptions of autonomy support in training. For athletes, daily perceived autonomy support was positively related to daily performance satisfaction, via increased daily athlete engagement.

7.1. Theoretical and practical implications

The present study has important theoretical and practical implications. Whereas several work-related antecedents of coaches' health and well-being have been identified (e.g., Stebbings et al., 2012), our

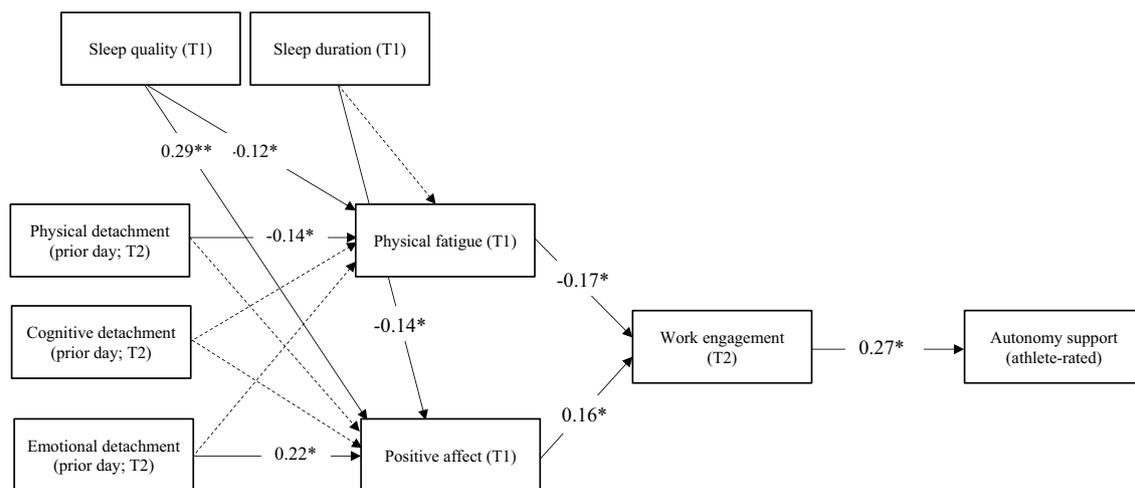


Fig. 3. Multilevel structural equation model of detachment, physical fatigue, positive affect, work engagement, and athlete-rated autonomy support. Note: * $p < .05$, ** $p < .01$. Dotted lines represent nonsignificant paths. Autonomy support was based on an aggregated score from a minimum of three athletes. T1 = after waking up; T2 = at bedtime.

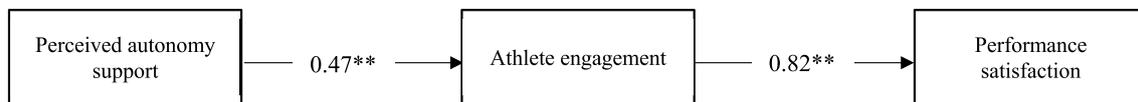


Fig. 4. Multilevel structural equation model of perceived autonomy support, athlete engagement, and performance satisfaction. Note: * $p < .05$, ** $p < .01$.

findings show that physical and emotional detachment are important off-job (i.e., non-work) antecedents of coaches' well-being. These findings are in agreement with previous studies showing a positive association between detachment from work during the evening and well-being the next morning (cf. [Sonnentag & Fritz, 2015](#)). Cognitive detachment was not related to physical fatigue or positive affect. Generally, these findings are in line with the DISC-R Model's matching principle and highlight the importance of taking different dimensions of recovery strategies into account ([De Jonge et al., 2012](#); [Kenttä & Hassmén, 1998](#)). However, this finding should be considered in light of the absence of a cognitive well-being indicator (e.g., cognitive liveliness; [Shirom, 2003](#)) in this study, which does not permit us to draw strong conclusions regarding the role of cognitive detachment for elite coaches' well-being.

As elite coaches are often faced with high emotional demands compared to non-elite coaches ([Kallus & Kellmann, 2000](#)), emotional recovery seems to be particularly important to maintain elite coaches' health and well-being. The matching principle also entails that the type of recovery experience should match the source of demands ([De Jonge et al., 2012](#)). Therefore, it is recommended that coaches consider ways to physically detach (e.g., watching TV, reading), especially on physically demanding days. Likewise, coaches need to conceive ways to emotionally unwind from work, particularly on emotionally demanding days. Exercising and spending time with people who do not belong to one's work context could be effective in promoting emotional detachment from work ([Kellmann, Altfeld, & Mallett, 2016](#); [Ten Brummelhuis & Bakker, 2012](#)). However, it is important to note that recovery is idiosyncratic by nature, as it is not just the time spent on off-work activities but the subjective experience of such activities (i.e., whether they are enjoyed) that plays a critical role in the way they are linked to recovery. For instance, a diary study by [Oerlemans, Bakker, and Demerouti \(2014\)](#) found that social and physical activities were associated positively with recovery at bedtime when happiness during such activities was high, but negatively when happiness was low. Additionally, coaches should be assisted by sport organizations in finding an appropriate work-life balance ([Bentzen et al., 2017](#)).

The present findings also underscore the role of good sleep in relation to coaches' well-being as sleep quality was negatively related to physical fatigue and positively related to positive affect. Sleep is crucial for the restoration of physical and psychological capacities and self-regulatory strength ([Hagger, 2010](#)). However, working late can impede coaches from unwinding from work and can reduce sleep quality ([Querretre & Cropley, 2012](#)). In contrast, engaging in physical exercise might enhance sleep quality ([Feuerhahn, Sonnentag, & Woll, 2014](#)). A somewhat surprising finding from the current study is that sleep duration was negatively related to positive affect. A potential explanation could be the existence of a curvilinear relation between sleep duration and well-being found in previous studies (cf. [Åkerstedt et al., 2017](#)). However, additional analyses did not reveal a curvilinear relation between sleep duration and positive affect in our study. Another explanation is that this association resulted from a collinearity effect, as the zero-order correlation between sleep duration and positive affect was not significant. For instance, correlations between sleep quality and sleep duration (range $r = .52-.62$) might have resulted in collinearity effects. Indeed, reanalysing our data without sleep quality as a covariate revealed a non-significant relation between sleep duration and positive affect.

In line with our hypotheses, coaches' physical fatigue in the morning was negatively related to daily work engagement and positive

affect in the morning was positively related to daily work engagement. In turn, coaches' work engagement was positively related to athlete-ratings of autonomy support. These findings support earlier studies in the work domain showing that feeling recovered before the start of the working day is positively related to work engagement during the day ([Sonnentag et al., 2012](#); [Ten Brummelhuis & Bakker, 2012](#)). Moreover, these findings substantiate previous empirical evidence showing that physically and psychologically healthy coaches interact more positively with their athletes (e.g., [Price & Weiss, 2000](#); [Stebbins et al., 2012, 2015](#); [Thelwell et al., 2017](#)). The present findings also extend the findings by [Stebbins et al. \(2016\)](#), who found that coaches' positive affect at the start of a training session was positively related to autonomy support during the session, to a full training week of elite athletes. This supports the general view that well-being, for instance in terms of positive affect, is positively related to positive interpersonal behaviours ([Cropanzano & Wright, 2001](#)). Accordingly, coaches should be aware that their recovery state before work may spill over and positively impact their own work experiences as well as the interaction with their athletes.

Studies investigating the consequences of autonomy support in the elite sport domain have been limited (but see [Cheon et al., 2015](#)). In line with SDT ([Deci & Ryan, 2000](#)), elite coaches' daily autonomy-supportive behaviour appears to be important for elite athletes' daily well-being and performance-related outcomes. Specifically, the relation between daily perceived autonomy support and daily performance satisfaction was fully mediated by daily athlete engagement. This corroborates findings by [Gillet et al. \(2010\)](#) which linked perceived autonomy support to better objective performance (i.e., event ranking) of French judokas. Likewise, previous research outside the sport domain has shown that leader autonomy support is associated with optimal functioning in work settings as well ([Slemp, Kern, Patrick, & Ryan, 2018](#)). Taken together, this study extends previous studies by showing that daily autonomy-supportive behaviour towards athletes is a key determinant of elite athletes' well-being and satisfaction with performance ([Mageau & Vallerand, 2003](#)).

The findings of this study further substantiate the need for interventions aimed at promoting elite coaches' autonomy-supportive interpersonal style. [Cheon et al. \(2015\)](#) reported positive effects of an intervention to help coaches adopt a more autonomy-supportive style, which were maintained during an actual high-stakes event. Previous research has also shown that physical education teachers and exercise instructors can learn how to become more autonomy-supportive (e.g., [Edmunds, Ntoumanis, & Duda, 2008](#)). Moreover, research on the effectiveness of autonomy-supportive intervention programs for physical education teachers has shown that teachers' beliefs about the ease of implementation is an important aspect ([Reeve & Cheon, 2016](#)). The findings of the present study suggest that interventions aimed at improving coaches' autonomy-supportive behaviour could also seek to improve their well-being (e.g., through promoting physical and emotional detachment) with attainable and efficient approaches, such as taking time for self-care, planning sufficient breaks, and finding an appropriate work-life balance.

7.2. Limitations and future directions

The findings of the current study advance knowledge on the role of off-job recovery for elite coaches' health, well-being, work engagement, and ultimately, interpersonal style. However, several limitations of the present study should be noted. First, the study is limited to experiences

of elite coaches and athletes during training sessions. This forced us to use performance satisfaction as an outcome. The advantage of performance satisfaction is that it allows for comparisons across different sports (Nicholls et al., 2012). It was, therefore, the best available measure for this study in which elite athletes from a variety of sports participated. However, such subjective measures of performance are prone to bias (e.g., social desirability). In addition, satisfaction with performance in training does not necessarily generalize to performance satisfaction in competition. Therefore, future studies could also investigate experiences of coaches and athletes during competitions (e.g., Gillet et al., 2010), as this would also allow researchers to replicate the present findings using more objective performance measures. In addition, future studies could employ longer time intervals between measurements to capture processes over the course of a competitive season.

Second, the study mainly relied on self-report data which increases the risk of common-method bias. However, by centring the day-level variables (Level 1) around the person-mean, we eliminated the potential influence of response tendencies stemming from individual differences, thereby reducing the regular problems associated with self-report data. Nonetheless, future research could include other kinds of measures to further reduce common-method bias, such as physiological measures (e.g., neuroendocrine and cardiovascular indicators) as additional well-being indicators (cf. Geurts & Sonnentag, 2006).

Third, we employed athlete-ratings of coaches' interpersonal behaviour as there is limited agreement between autonomy-supportive behaviour reported by coaches and athletes (Smith et al., 2016). This can be considered a strength as this approach reduces common-method bias. Moreover, it seems important to investigate autonomy support from the perspective of athletes, as this is in line with the belief that resources, such as autonomy support, represent individual perceptions that are best rated by athletes themselves (Horn, 2002). However, athletes' perceptions can be affected by other factors (e.g., one's physical or psychological state). Therefore, future studies could include both coach- and athlete-ratings of autonomy support. Likewise, coaches' reported levels of engagement after work might have been influenced by, among other things, the quality of their relationship with their athletes during training. Hence, future studies could also investigate if and when a reciprocal process between coaches and athletes in elite sport occurs, as it is believed that there is generally a high interdependence between elite coaches and elite athletes (Duda & Balaguer, 2007). Research in education found evidence for the existence of a reciprocal process between teachers and students (Sarrazin, Tessier, Pelletier, Trouilloud, & Chanal, 2006). In contrast, however, Stebbings et al. (2016) found no support for a reciprocal process from athlete to coach over the course of a training session.

Fourth, the convenience sample used in this study resulted in the majority of the sample being comprised of Dutch coaches and including just one female coach. Analysing our data with coaches' nationality as a covariate or without the female coach did not change the interpretation of our results. However, studies including more female coaches are warranted.

Finally, the scope of this study was limited to the role of coaches' off-job recovery experiences and sleep in relation to daily health and well-being at work. Hence, a potential direction for future research is to investigate specific, quantitative work-related variables, such as work hours and workload, as well as the role of specific off-job recovery activities (e.g., Oerlemans et al., 2014; Ten Brummelhuis & Bakker, 2012) that could be related to elite coaches' health and well-being.

7.3. Conclusion

The present diary study has linked elite coaches' daily recovery, in terms of physical and emotional detachment, to increased daily work engagement and autonomy-supportive behaviour as perceived by elite athletes. For elite athletes, daily perceived autonomy support was associated with daily performance satisfaction in training, via increased

daily athlete engagement. Taken together, these findings highlight the importance of off-job recovery for elite coaches' physical and psychological state as well as their athletes' sport experiences. Coaches should be aware of means to adequately recover and find a healthy balance between work and life.

Conflicts of interest

The authors declare no potential conflict of interest.

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