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3 Interpersonal mechanisms explaining the transfer of well- and ill-being in coach-athlete dyads.

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Date Submitted: 28<sup>th</sup> June, 2015

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Date Resubmitted: 22<sup>nd</sup> November, 2015

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Date Resubmitted: 10<sup>th</sup> March, 2016

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### **Abstract**

The current study explored coaches' interpersonal behaviors as a mechanism for well- and ill-being contagion from coach to athlete, and vice versa. Eighty-two coach-athlete dyads from individual sports completed self-report measures before and after a training session. Structural equation modeling supported three actor-partner interdependence mediation models, in which coaches' pre-session well- and ill-being were associated with changes in athletes' well- and ill-being over the course of the session. These relationships were mediated by athletes' perceptions of their coaches' interpersonal styles during the session. The reciprocal transfer from athlete to coach was not fully supported. Nonetheless, coaches' perceptions of their own interpersonal behavior were associated with changes in their post-session well- and ill-being. Overall, evidence is provided for the contagion of affect from authority figures to those under their instruction, but not vice versa.

*Keywords:* Self-determination theory, autonomy support, control, laissez-faire, distinguishable dyads, leadership, mediation.

1 Interpersonal mechanisms explaining the transfer of well- and ill-being in coach-athlete dyads  
2 Understanding and attaining optimal states of psychological health and limiting the extent  
3 of ill-health are primary goals for researchers and practitioners in numerous domains. The  
4 concept of psychological well-being refers to optimal experience and functioning, including the  
5 presence of positive affect, such as happiness and pleasure (Diener, 2000; Ryan & Deci 2001). In  
6 contrast, psychological ill-being is acknowledged as a separate, independent dimension of  
7 psychological functioning (Ryff, et al., 2006; Watson, Tellegen, & Clark, 1988). Psychological  
8 ill-being is, therefore, reflected not in the absence of positive affective experiences, but overtly  
9 adverse experiences, negative affectivity (e.g., unhappiness, worry, frustration, anger), and  
10 feelings of burnout (i.e., emotional exhaustion, devaluation, and reduced accomplishment;  
11 Raedeke & Smith, 2001). Daily fluctuations in these experiences are common (e.g., Reis,  
12 Sheldon, Gable, Roscoe, & Ryan, 2000; Sonnentag, Sorbi, van Doornen, Schaufeli, & Maas,  
13 2007), and they are utilized by individuals to construct assessments of overall psychological  
14 health (e.g., Diener, Lucas, Oishi, & Suh, 2002; Shimmack, Diener, & Oishi, 2002).

15 It is also fundamental that researchers identify factors associated with such short-term  
16 changes in a person's experience of well- and ill-being. Daily events arising during work (e.g.,  
17 praise for a job well done) and family (e.g., a visit from a friend) situations, for example, can  
18 have an effect on daily mood (David, Green, Martin, & Suls, 1997). Many of these daily events  
19 are likely to involve relational exchanges, whereby contagion effects can occur in which one  
20 person's well- and ill-being can influence another's (e.g., Bakker & Xanthopoulou, 2009;  
21 Schoebi, 2008; Song, Foo, Uy, & Sun, 2011). Thus, research is required to examine the role that  
22 these relational elements play in the development of well- and ill-being of both individuals.

1           Partly based on the self-determination theory framework (Deci & Ryan, 2000), the present  
2 study seeks to explore various processes that may explain contagion of well- and ill-being across  
3 coach-athlete dyads, and whether the interpersonal behavior of the coach may account for this.  
4 Coaches and athletes are representative of a typical ‘authority figure-subordinate’ relationship  
5 that exists in many other life contexts, such as teachers and students, healthcare workers and  
6 patients, managers and employees, and parents and children. One dyad member (i.e., the coach)  
7 often provides guidelines, advice, and support to the other dyad member (i.e., the athlete)  
8 because it is assumed that he or she has greater experiences, skills or knowledge on relevant  
9 subjects. Exploring the dynamic relationships between well- and ill-being and interpersonal  
10 behaviors in this dyad, therefore, has important implications beyond the sporting arena.  
11 Specifically, this study assesses whether well- (i.e., positive affect) and ill-being (i.e., negative  
12 affect and burnout) transfer from coach to athlete over the course of a training session and  
13 whether this contagion is mediated by the interpersonal behaviors the coaches are perceived to  
14 employ by the athletes (i.e., autonomy support, control, and a laissez-faire style). In addition, a  
15 reverse contagion process will be explored whereby athlete well- and ill-being are associated  
16 with coaches’ perceived interpersonal behavior, which is subsequently associated with changes  
17 in coaches’ own well- and ill-being.

18           Cross-sectional research in the sport domain has indicated that leaders’ psychological  
19 health influences their interpersonal behaviors towards their subordinates. For example, coaches’  
20 experiences of positive and negative affect were associated with their perceived use of autonomy  
21 supportive and controlling behaviors, respectively (Stebbing, Taylor, & Spray, 2011, 2015;  
22 Stebbings, Taylor, Spray, & Ntoumanis, 2012). An autonomy supportive authority figure fosters  
23 a sense of volition, allows subordinates input in decision-making, highlights the purpose and

1 value of tasks, and acknowledges subordinates' feelings and perspectives (Mageau & Vallerand,  
2 2003). In contrast, those in a position of authority can create a controlling environment through  
3 punitive, coercive, and critical behaviors (Bartholomew, Ntoumanis, & Thøgersen-Ntoumani,  
4 2009). Moreover, research in the educational domain demonstrates that teachers' burnout is  
5 related to a lack of enthusiasm, persistence and willingness to invest effort in their work  
6 (Hakanen, Bakker, & Schaufeli, 2006). This implies that when an authority figure experiences  
7 burnout, this may lead them to adopt a laissez-faire interpersonal style, which is recognized as an  
8 example of non-leadership that is inactive in nature. It is characterized by an avoidance of  
9 making decisions and taking action, an abdication of responsibilities, a failure to use authority,  
10 and a resistance to expressing views on important issues. Laissez-faire leaders demonstrate a lack  
11 of involvement and provision of feedback, and make no attempts to satisfy the needs of, or  
12 motivate their subordinates (Bass, 2008; Bass & Avolio, 1990). In contrast to autonomy support,  
13 in which a coach actively gives responsibility to athletes via guided discovery and opportunities  
14 to contribute their ideas, a laissez-faire style is a passive approach where the coach does not fulfil  
15 these responsibilities and demonstrates a lack of behavioral and emotional investment.

16 In turn, an abundance of evidence exists to substantiate the benefits of perceived autonomy  
17 support from an authority figure on subordinates' psychological well-being (e.g., positive affect,  
18 subjective vitality, self-esteem) in contexts such as management, parenting, education and sport  
19 (e.g., Deci et al., 2001; Grolnick, Ryan, & Deci, 1991; Quested & Duda, 2010; Taylor &  
20 Lonsdale, 2010). On the other hand, a perceived controlling interpersonal style has been linked  
21 with maladaptive outcomes for subordinates, such as negative affect, depression, low self-  
22 esteem, and decreased autonomy (Barber, 2001; Bartholomew, Ntoumanis, Ryan, Bosch, &  
23 Thøgersen-Ntoumani, 2012; Soenens, Sierens, Vansteenkiste, Dochy, & Goossen, 2012).

1 Finally, a laissez-faire interpersonal style has been associated with deleterious effects for  
2 employees such as role ambiguity, conflict with coworkers, poor job satisfaction and  
3 psychological distress (e.g., Judge & Piccolo, 2004; Skogstad, Einarsen, Torsheim, Aasland, &  
4 Hetland, 2007).

5 As well as the transfer of well- and ill-being from coach to athlete, indirect evidence also  
6 alludes to the existence of a reciprocal process. Research has suggested that authority figures'  
7 perceptions of subordinates' characteristics (e.g., emotional and behavioral engagement, self-  
8 determined motivation) can influence their interpersonal behaviors towards those subordinates  
9 (Sarrazin, Tessier, Pelletier, Trouilloud, & Chanal, 2006; Skinner & Belmont, 1993; Taylor,  
10 Ntoumanis, & Standage, 2008). Thus, athletes' well- and ill-being may lead coaches to behave in  
11 particular ways. Subsequently, an individual's interpersonal behavior towards others can affect  
12 his or her own psychological health. For example, Deci, La Guardia, Moller, Scheiner, and Ryan  
13 (2006) demonstrated that when a person provides autonomy support to a close friend, this was  
14 positively related to the individual's (i.e. the provider's) own psychological well-being.  
15 Similarly, Physical Education teachers and Paralympic coaches have also been shown to benefit  
16 psychologically from providing autonomy support to their students and athletes (Cheon, Reeve,  
17 Yu, & Jang, 2014; Cheon, Reeve, Lee, & Lee, 2015). In addition, cross-sectional research  
18 suggests that laissez-faire leadership styles may expose leaders to emotional exhaustion and  
19 depersonalization (Kanste, Kyngäs, & Nikkilä, 2007). Collectively, this evidence suggests that  
20 athletes' well- and ill-being may lead coaches to behave in certain ways that subsequently  
21 influence coaches' own well- and ill-being.

22 Taken together, the reviewed research implies a transfer of well-and ill-being from coach  
23 to athlete (and a reciprocal processes from athlete to coach) occurs during interpersonal

1 exchanges, however, this line of enquiry has yet to be specifically addressed. Additionally,  
2 research is warranted that assesses these variables in a time-lagged design, so as to evaluate  
3 whether this contagion occurs temporally. In other words, are coaches' well- and ill-being  
4 associated with *subsequent* interpersonal behavior, which, in turn leads to *changes* in athlete (or  
5 coach) well- and ill-being over the course of a training session?

6       The investigation of well- and ill-being contagion, in particular the transfer of emotion and  
7 motivation, is not new, however, it has tended to be viewed as an automatic or direct process  
8 (Bakker & Schaufeli, 2000; Chartrand & Lakin, 2013;; Hatfield, Cacioppo, & Rapson, 1994;  
9 Johnson, 2008; Radel, Fournier, de Bressy, d'Arripe-Longueville, 2015; Totterdell, 2000). Recent  
10 evidence, however, exists to suggest interpersonal mechanisms may also be salient. In a peer-to-  
11 peer teaching task, Radel, Sarrazin, Legrain, and Wild (2010) reported that the teachers'  
12 autonomy supportive teaching style mediated the transfer of intrinsic motivation towards a task  
13 from the 'teacher' to the 'student'. It is possible, therefore, that the transfer of well- and ill-being  
14 across two individuals also operates through the interpersonal behaviors displayed by one  
15 person, however, research has yet to directly explore this research question. In addition, the  
16 prevailing emotional contagion studies have typically explored the transference as a  
17 unidirectional process from one person to another. Nonetheless, there is a level of  
18 interdependence between two parties involved in a relationship (e.g., within a leader-follower  
19 dyad), as they have a mutual influence on one another. Individuals in relationships react to each  
20 other's actions and expressions, and often modify their interpersonal behaviors in response (Reis  
21 & Collins, 2004). As such, it is imperative that **researchers consider** contagion as a bidirectional  
22 process. This issue has been examined previously with regards to the role of coaches' and  
23 athletes' efficacy beliefs in predicting both parties' perceptions of coach-athlete relationship

1 quality, commitment, satisfaction, and effort (Jackson & Beauchamp, 2010; Jackson, Grove, &  
2 Beauchamp, 2010). We extend this body of work by assessing the influence coaches and athletes  
3 have on each other's well- and ill-being

#### 4 **Summary and Hypotheses**

5 The extant literature has yet to systematically address whether the transfer of well- and ill-  
6 being between dyad members is mediated by the interpersonal style of the authority figure within  
7 the dyad; a void filled by the present study. Additionally, the current study is the first to consider  
8 that bidirectional contagion processes may occur concurrently within a coach-athlete dyad. The  
9 time-lagged design of the present research allows for the assessment of these processes, rather  
10 than relying on a cross-sectional design.

11 In line with the literature discussed above, the present research considers two main  
12 hypothesized processes. First, we propose that the degree of positive affect, negative affect, and  
13 burnout reported by the coach at the beginning of the session will be associated with athletes'  
14 perceptions of their coaches' autonomy supportive, controlling, and laissez-faire interpersonal  
15 style during the training session, respectively. In turn, athletes' perceptions of each of the coach  
16 interpersonal styles will be associated with changes in athletes' positive affect, negative affect,  
17 and burnout from pre- to post-session. Our second hypothesized process proposes the reciprocal  
18 contagion of positive affect, negative affect, and burnout from athletes at the beginning of the  
19 session to changes in coaches at the end of the session, via the coaches' perceptions of their own  
20 autonomy supportive, controlling, and laissez-faire behaviors, respectively. We hypothesized  
21 that for both reciprocal processes, perceptions of coaches' interpersonal styles will mediate the  
22 contagion of well- and ill-being.



1 Evidence exists for the independence of well- and ill-being constructs (e.g., Ryff, et al.,  
2 2006; Watson, et al., 1988), and for the interpersonal behaviors of authority figures' autonomy  
3 support and control (Bartholomew, Ntoumanis, & Thøgersen-Ntoumani, 2010; Pelletier, Fortier,  
4 Vallerand, & Brière, 2001; Silk, Morris, Kanaya, & Steinberg, 2003). Moreover, these diverse  
5 interpersonal styles have distinct antecedents and consequences (Bartholomew et al., 2012;  
6 Stebbings et al., 2012; 2015). For example, Stebbings et al. (2015) demonstrated that a) coaches'  
7 well-being was associated with autonomy supportive but not controlling coaching, b) negative  
8 affect was associated with control but not autonomy support, and c) burnout **was not** associated  
9 with either style of coaching. These authors suggested that burnout might better predict a laissez-  
10 faire coaching style, a speculation that we wanted to explicitly test in the present research. As  
11 such, we assume three independent processes and, therefore, test three separate models: a) the  
12 contagion of positive affect through autonomy support, b) the contagion of negative affect  
13 through control, and c) the contagion of burnout through a laissez faire style.

## 14 **Method**

### 15 **Participants and Procedures**

16 Participants comprised 82 coach-athlete dyads who had been working together for an  
17 average of 2.70 ( $SD = 3.06$ ; range 1-17) years, and who spent on average 9.09 ( $SD = 7.40$ ; range  
18 1-35) hours per week training together on a one-to-one basis. Coaches (60 male, 22 female;  $M$   
19 age = 46.00 years,  $SD = 12.17$ , range = 23–72 years) and their athletes (42 male, 40 female;  $M$   
20 age = 28.36 years,  $SD = 11.97$ , range = 15–58 years) were currently engaged in one of nine  
21 individual sports such as athletics, badminton, fencing and tennis, at the recreational ( $n = 18$ ),  
22 club ( $n = 26$ ), regional ( $n = 12$ ), national ( $n = 11$ ), and international/professional ( $n = 15$ )

1 competitive levels. Coaches had, on average, 16.78 ( $SD = 12.99$ ) years of coaching experience,  
2 and athletes had, on average, 7.43 ( $SD = 7.17$ ) years of experience in their sport.

3 Ethical approval was obtained from a university ethics committee, and was conducted  
4 according to APA guidelines. Prospective coach-athlete dyads were recruited through national  
5 governing body databases and sports club websites, and provided with information outlining the  
6 purpose and procedures of the research. Participants were informed that their involvement was  
7 anonymous and voluntary. In addition, parents of athletes under the age of 18 were provided  
8 with an information letter and a consent form. Coaches and athletes were asked to complete  
9 measures of affect and burnout immediately before a training session together, and measures of  
10 affect, burnout, and perceived coach autonomy supportive, controlling, and laissez-faire  
11 behaviors immediately after the session. All participants answered exactly the same items, but  
12 two different versions were produced to reflect coaches' and athletes' perspectives. Questions  
13 took approximately five minutes to complete each time.

#### 14 **Measures**

15 **Positive and negative affect.** Positive and negative affect were assessed using the nine  
16 adjectives selected by Diener and Emmons (1984). Coaches and athletes indicated the degree to  
17 which they were currently experiencing positive ("Happy", "Enjoyment/Fun", "Pleased", and  
18 "Joyful") and negative ("Unhappy", "Frustrated", "Angry/Hostile", "Worried/Anxious, and  
19 "Depressed/Blue") affect on a seven-point scale ranging from 1 (*not at all*) to 7 (*extremely*).

20 **Scores from these items** demonstrated acceptable internal consistency and predictive validity in  
21 previous diary research (Bartholomew et al., 2012).

22 **Burnout.** Coaches' and athletes' levels of burnout were assessed using the 15-item Athlete  
23 Burnout Questionnaire (Raedeke & Smith, 2001). The scale comprises three elements of

1 burnout, including emotional and physical exhaustion (e.g., “I am exhausted by the mental and  
2 physical demands of coaching/my sport”), devaluation (e.g., “The effort I spend coaching/my  
3 sport would be better spent doing other things”), and reduced sense of accomplishment (e.g.,  
4 “I’m not achieving much in coaching/my sport”). Coaches and athletes were asked to indicate  
5 the degree to which they were currently experiencing the items on a five-point scale anchored by  
6 1 (*almost never*) to 5 (*most of the time*). Raedeke and Smith reported good internal consistency,  
7 factorial structure and test-retest reliability of item scores.

8 **Coach autonomy supportive behaviors.** The six-item version of the Healthcare Climate  
9 Questionnaire (HCQ; Williams, Grow, Freedman, Ryan, & Deci, 1996) adapted to the sport  
10 context, was used to assess coaches’ and athletes’ perceptions of the coaches’ autonomy  
11 supportive behavior. Previous research has adapted the HCQ items to explore both coaches’ and  
12 athletes’ perceptions of coach autonomy support, and found responses to have acceptable  
13 predictive validity and internal consistency (e.g., Reinboth, Duda, & Ntoumanis, 2004;  
14 Stebbings, et al., 2012). Participants were asked to reflect on the coaching practices in the current  
15 session and rate the extent to which they agreed with each of the items (e.g., “I provided my  
16 athlete with choices and options/My coach provided me with choices and options”) on a seven-  
17 point scale anchored by 1 (*strongly disagree*) and 7 (*strongly agree*).

18 **Coach controlling behaviors.** Coaches’ and athletes’ perceptions of coaches’ use of  
19 controlling behaviors were assessed using the 15-item Controlling Coach Behaviors Scale  
20 (CCBS; Bartholomew, et al., 2010). The scale measures four types of controlling behaviors,  
21 including coaches’ controlling use of rewards (e.g., “I only rewarded/praised my athlete to make  
22 them train harder/My coach only rewarded/praised me to make me train harder”), negative  
23 conditional regard (e.g., “I was less friendly with my athlete because they didn’t make an effort

1 to see things my way/My coach was less friendly with me because I didn't make an effort to see  
2 things their way"), intimidation (e.g., "I intimidated my athlete into doing things I wanted/My  
3 coach intimidated me into doing things they wanted"), and excessive personal control (e.g., "I  
4 tried to interfere in aspects of my athlete's life outside sport/My coach tried to interfere in my  
5 life outside of sport"). Participants were asked to consider the coaching in the current session,  
6 and rate the degree to which they agreed with each of the items on a seven-point scale anchored  
7 by 1 (*strongly disagree*) and 7 (*strongly agree*). Previous research using CCBS items to assess  
8 coaches' and athletes' perceptions of coach control have reported acceptable internal consistency  
9 and predictive validity of item scores (e.g., Bartholomew et al., 2010; Stebbings, et al., 2012).

10 **Coach laissez-faire behaviors.** Due to the non-existence of a measure assessing coach  
11 laissez-faire behavior, a scale was created for the purpose of the current study, using theoretically  
12 guided item development. In a preliminary validation study for this measure, 138 athletes who  
13 were not included in the main analysis completed seven items that were based on a review of the  
14 conceptual definitions of laissez-faire leadership. For example, a laissez-faire style is  
15 characterized by hesitating to take action, (Bass, 2008; Bass & Avolio, 1990), therefore, the item  
16 "My coach hesitated to take action" was created. These items were scored on a seven-point scale  
17 ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). In this validation sample, the scale  
18 scores showed acceptable internal consistency  $\alpha = .86$ ) and factor structure:  $S-B\chi^2(14) = 16.74, p$   
19  $< .001$ ; SRMR = .04; CFI = .98. Table 1 outlines the factor loadings and standard errors for each  
20 of the seven items. In addition, athletes' perceptions of coach laissez faire behavior measured  
21 using this scale were found to negatively predict athletes' perceptions of coach-athlete  
22 relationship quality ( $b = -.64; p < .001$ ), which is in line with theoretical proposals.

23

## Results

## 1 **Preliminary Analyses**

2       No missing data were recorded in the present study. The means, standard deviations, and  
3 Cronbach's alpha coefficients were calculated for variables at pre- and post-session (perceptions  
4 of coach behaviors at post-session only) and are presented in **Table 2**. Correlations between all  
5 study variables are shown in **Table 3**. All subscales demonstrated acceptable **internal consistency**  
6 ( $\alpha > .70$ ), with the exception of athlete perceptions of coach laissez-faire behavior, which was  
7 marginally acceptable ( $\alpha = .67$ ).

8       Confirmatory factor analysis (CFA) using the robust maximum likelihood method with  
9 EQS software (version 6.1; Bentler, 2003) was employed to determine the factor structure of the  
10 scales used. Owing to the dyadic nature of the current data, all CFA models included two latent  
11 factors (one for coaches, one for athletes) comprising the corresponding indicators. These latent  
12 factors were allowed to correlate, as were the errors across the equivalent indicators. In addition,  
13 the item loadings were constrained to be equal across dyad members (constraints were released  
14 when the probability value of the incremental univariate  $\chi^2$  was below .05; Byrne, 2006). These  
15 model specifications ensure that each construct comprises the same combination of indicators,  
16 and that the construct has the same meaning for both dyad members (Kenny, Kashy, & Cook,  
17 2006). Aligned with Hu and Bentler's (1999) two-presentation index strategy, the standardized  
18 root mean square residual (SRMR) fit index was examined, and was supplemented with the  
19 comparative fit index (CFI). Hu and Bentler (1999) proposed that acceptable fit of a  
20 hypothesized model to the data is indicated when the SRMR is close to .08 and the CFI is close  
21 to .95. The Satorra-Bentler Chi Square Statistic (S-B $\chi^2$ ) was also examined. CFAs were  
22 conducted on the pre-session measurement scales (and the post-session scales measuring coach  
23 behaviors), all of which demonstrated satisfactory fit.

1           Next, tests of nonindependence across dyad members were conducted in line with  
2 recommendations of Cook and Kenny (2005). As coach-athlete partnerships represent  
3 distinguishable dyads, Pearson correlations between the coach and athlete scores on the study's  
4 post-session dependent variables were calculated to test for nonindependence in the data, which  
5 is indicated by a statistically significant correlation. Correlations between coach and athlete post-  
6 session scores for positive affect ( $r = .41, p = .001$ ), negative affect ( $r = .42, p = .001$ ), burnout ( $r$   
7  $= .40, p = .002$ ), autonomy support ( $r = .46, p < .001$ ), control ( $r = .37, p = .004$ ), and laissez-  
8 faire ( $r = .05, p = .727$ ) indicated that coach and athlete reports for most of the variables in the  
9 data set were nonindependent. As a result of these significant levels of nonindependence, a series  
10 of time-lagged actor-partner interdependence mediation models (APIMeM; Ledermann, Macho,  
11 & Kenny, 2011) were employed using a structural equation modeling (SEM) approach.

### 12 **APIMeM Models of Well- and Ill-Being Contagion**

13           Three APIMeM models were constructed to examine the hypothesized processes of the  
14 present research (see Figure 1). The models contain three pairs of variables; pre-session well- or  
15 ill-being (predictor variables, labeled  $X$ ), post-session well- or ill-being (outcome variables,  
16 labeled  $Y$ ), and perceptions of coach interpersonal behavior (mediators, labeled  $M$ ) for the two  
17 dyad members. This allows researchers to assess the associations between a person's predictor  
18 variable and his or her own outcome variable (actor effect) and the outcome variable of the other  
19 dyad member (partner effect). Within a traditional APIMeM model there are six actor effects and  
20 six partner effects (indexed by  $A$  and  $P$ , respectively), however, in the present study we have  
21 utilized a parsimonious, theoretically-driven adaptation of Ledermann et al.'s (2011) APIMeM  
22 model. Specifically, we have omitted two partner effects between the mediator and the  
23 dependent variables ( $M_1 \rightarrow Y_2$  and  $M_2 \rightarrow Y_1$ ) because there are no theoretical reasons to justify

1 the pathways between coach (athlete) perceptions of coach interpersonal behavior and athlete  
2 (coach) post-session well-/ill-being.

3 The primary pathways of interest for the study hypotheses are shown by dashed lines in  
4 Figure 1. For hypothesis one this is the indirect effect of coach pre-session well-ill-being to  
5 athlete post-session well-/ill-being via athlete perceptions of coach behavior ( $\alpha_{P2}$  and  $b_{A2}$ ). In  
6 addition, the direct effect of coach pre-session well-/ill-being to athlete post-session well-/ill-  
7 being ( $c'_{P2}$ ) is of substantive interest. For hypothesis two this is the indirect effect of athlete pre-  
8 session well-/ill-being to coach post-session well-/ill-being via coach perceptions of coach  
9 behavior ( $\alpha_{P1}$  and  $b_{A1}$ ), as well as the direct pathway between athlete pre-session well-/ill-being  
10 to coach post-session well-/ill-being ( $c'_{P1}$ ).

11 Within the models we also controlled for lagged effects to discount the possibility that  
12 well- and ill-being at the end of the session were merely a result of well- and ill-being at the  
13 beginning of the session ( $c'_{A1}$ , and  $c'_{A2}$ ). By doing so, we can establish whether contagion  
14 processes are associated with *changes* in the outcome variables over the course of the session.  
15 We also accounted for the possibility that each dyad member's well- or ill-being would be  
16 associated with their own perceptions of the coach's interpersonal style ( $\alpha_{A1}$ , and  $\alpha_{A2}$ ). In  
17 accordance with the recommendations of Kenny et al. (2006), we also controlled for the  
18 interdependence between the two dyad members by modeling associations between each  
19 member's well- and ill-being, as well as their perceptions of the coach's interpersonal style  
20 (covariance terms between the predictor variables, the mediator variables' error terms, and the  
21 outcomes variables' error terms).

22 In order to maintain an acceptable ratio of participants per estimated parameter (Bentler &  
23 Chou, 1987), the mean of each variable was included as an observed variable (rather than the

1 latent factor approach to determine the factor structure of the scales). Two out of three APIMeM  
2 models demonstrated significant multivariate non-normality (Mardia's multivariate kurtosis >  
3 3.0; Bentler & Wu, 2002), therefore, all structural equation models were estimated using the  
4 robust maximum likelihood method. Mediation effects were also calculated for the relevant  
5 pathways within the three APIMeM models. As indirect effects often show non-normal  
6 distribution even if the direct effects are normally distributed, authors have recommended the use  
7 of the bootstrap method when assessing mediation (e.g., Ledermann, et al., 2011; Preacher &  
8 Hayes, 2008). Bootstrapping is a statistical re-sampling technique that treats the sample as a  
9 pseudo-population (Kline, 2010). Parameter estimates derived from 1000 bootstrap samples were  
10 examined. In line with the recommendations of Kenny et al. (2006) and Ledermann et al. (2011),  
11 to determine if an effect is statistically significant, the bootstrap 95% CI for the unstandardized  
12 coefficients are presented. When the 95% CI does not contain zero, the indirect effect is  
13 considered to be significant. Total mediation occurs when the direct effect is zero and the  
14 indirect effect is non zero. Partial mediation occurs when both the direct and indirect effects are  
15 significant and of the same sign (Ledermann, et al., 2011; Shrout & Bolger, 2002). Results of the  
16 APIMeM models are presented in **Table 4**.

17 Model A explored the contagion of positive affect via autonomy support and demonstrated  
18 acceptable fit to the data:  $S-B\chi^2(2) = 6.293, p < .05$ ; SRMR = .03; CFI = .99. With regards to the  
19 transfer from coach to athlete, coaches' positive affect at the beginning of the session was  
20 associated with athletes' perceptions of coach autonomy support during the session ( $a_{P2}$ ) which,  
21 in turn, was positively associated with changes in athletes' positive affect ( $b_{A2}$ ). The direct  
22 pathway ( $c'_{P2}$ ) from coaches' pre-session positive affect to changes in athletes' positive affect  
23 was also significant and positive, as was the indirect pathway ( $a_{P2}b_{A2}$ ;  $b = .05, 95\% CI = .001$  to



1 .133) indicating partial mediation. The reciprocal process demonstrated that athletes' pre-session  
2 positive affect was not associated with coaches' perceptions of their in-session autonomy support  
3 ( $\alpha_{P1}$ ), but coaches' perceptions of their autonomy support was positively associated with changes  
4 in their positive affect over the course of the session ( $b_{A1}$ ). The direct pathway from athletes' pre-  
5 session positive affect to changes in coaches' positive affect ( $c'_{P1}$ ) was not significant, and nor  
6 was the indirect pathway ( $\alpha_{P1} b_{A1}$ ;  $b = .01$ , 95% CI =  $-.049$  to  $.072$ ).

7 Model B assessed the contagion of negative affect via control and showed acceptable fit to  
8 the data:  $S-B\chi^2(2) = 7.53$ ,  $p < .05$ ; SRMR =  $.05$ ; CFI =  $.96$ . Coaches' pre-session negative affect  
9 was positively associated with athletes' perceptions of coach in-session control ( $a_{P2}$ ) which, in  
10 turn, was positively associated with changes in athletes' negative affect ( $b_{A2}$ ). The direct pathway  
11 ( $c'_{P2}$ ) from coaches' pre-session negative affect to changes in athletes' negative affect was not  
12 significant, yet the indirect pathway was significant ( $a_{P2} b_{A2}$ ;  $b = .02$ , 95% CI =  $.001$  to  $.037$ )  
13 indicating full mediation. Athletes' pre-session negative affect was not associated with coaches'  
14 perceptions of their in-session control ( $\alpha_{P1}$ ), but coaches' perceptions of their control was  
15 positively associated with changes in their negative affect ( $b_{A1}$ ). Neither the direct ( $c'_{P1}$ ) nor  
16 indirect ( $\alpha_{P1} b_{A1}$ ;  $b = .03$ , 95% CI =  $-.018$  to  $.101$ ) pathways from athletes' pre- to coaches' post-  
17 session negative affect were significant.

18 Model C explored the contagion of burnout via laissez-faire behaviors and also  
19 demonstrated acceptable fit to the data:  $S-B\chi^2(2) = 6.27$ ,  $p < .05$ ; SRMR =  $.02$ ; CFI =  $.98$ .  
20 Coaches' pre-session burnout was positively related to athletes' perceptions of coach in-session  
21 laissez-faire behavior ( $a_{P2}$ ) but this, in turn, was not associated with changes in athletes' burnout  
22 ( $b_{A2}$ ). There were no significant direct ( $c'_{P2}$ ) or indirect ( $a_{P2} b_{A2}$ ;  $b = .01$ , 95% CI =  $-.027$  to  $.052$ )  
23 relationships between coaches' pre-session burnout and changes in athletes' burnout. In terms of

1 the reciprocal contagion process, athlete pre-session burnout was not associated with coaches'  
2 perceptions of their in-session laissez-faire behavior ( $\alpha_{P1}$ ), yet coaches' perceptions of this style  
3 were positively associated with changes in post-session burnout ( $b_{A1}$ ). The direct pathway from  
4 athletes' pre-session burnout to changes in coaches' burnout ( $c'_{P1}$ ) was also significant and  
5 positive, yet the indirect pathway was not ( $\alpha_{P1} b_{A1}$ ;  $b = -.04$ , 95% CI =  $-.119$  to  $.010$ ).

### 6 **Discussion**

7 The aim of the current study was to examine potential processes of bidirectional well- and  
8 ill-being contagion between coach-athlete dyad members, and whether interpersonal behaviors of  
9 the coach functioned as a mediator to facilitate this contagion. These processes were partially  
10 supported and, consequently, the present study advances the extant literature in a number of  
11 ways.

12 Consistent with our hypothesis based on the existing literature (e.g., Bartholomew et al.,  
13 2012; Gagné et al., 2003; Hakanen et al., 2006; Radel, et al., 2010; Stebbings, et al., 2011, 2012,  
14 2015), coaches' pre-session experiences of positive and negative affect were associated with  
15 changes in athletes' experiences over the course of the training session via athletes' perceptions  
16 of their coaches' in-session autonomy support and control, respectively. This builds upon the  
17 earlier work of Stebbings et al. (2011, 2012, 2015) and Hakanen et al. (2006), who relied on  
18 coaches' and teachers' self-reported behaviors. In turn, the present results suggest that these in-  
19 session behaviors served to foster an increased (or decreased) sense of positive (or negative  
20 affect) in the athletes from pre- to post-session. These findings and the observed mediation  
21 effects extend the previous contagion literature (Bakker & Schaufeli, 2000; Hatfield, et al., 1994;  
22 Johnson, 2008; Totterdell, 2000) and the work of Radel et al. (2010), by highlighting that  
23 authority figure interpersonal behavior mediates the affect contagion relationship.

1           Conversely, although coaches' pre-session levels of burnout were significantly related to  
2 athletes' perceptions of their coaches' laissez-faire behavior, these perceptions of laissez faire  
3 behavior were not significantly associated with changes in athletes' burnout. This finding is  
4 contrary to our hypothesis. One might reasonably expect a coach's passive, indifferent or  
5 avoidant attitude to lead athletes to also adopt an uncaring, unconcerned attitude towards their  
6 sport (i.e., devaluation), or to believe that they are not achieving their potential or performing up  
7 to their ability in sport (i.e., reduced sense of accomplishment). Nonetheless, it is possible that as  
8 a laissez-faire coach may not drive and encourage athletes, nor instil a dedicated work ethic,  
9 athletes with this type of coach may be less likely to experience mental and physical exhaustion,  
10 but rather feelings of unhappiness and frustration. Future research is warranted to assess the  
11 effects of laissez-faire interpersonal styles on the distinct elements of athlete burnout. As such,  
12 the current findings indicate that the burnout contagion process reported by Bakker and Schaufeli  
13 (2000) may not operate through laissez-faire interpersonal behavior. Further exploration into the  
14 mechanisms responsible for burnout contagion is required.

15           In contrast to the existing literature, the current results do not fully support a reciprocal  
16 well- and ill-being contagion process from athlete to coach over the course of the training  
17 session. Researchers have previously suggested that authority figures' interpersonal behaviors  
18 (e.g., autonomy support, control) towards subordinates may be influenced by their perceptions of  
19 subordinate characteristics (e.g., Sarrazin, et al., 2006; Skinner & Belmont, 1993; Taylor, et al.,  
20 2008). **In the present study, however,** athletes' pre-session positive affect, negative affect, and  
21 burnout were not associated with coaches' subsequent autonomy supportive, controlling, and  
22 laissez-faire behaviors, respectively. That is, coaches may not have 'picked up' on athletes' well-  
23 and ill-being to a sufficient extent to influence their interpersonal behavior. Indeed, although we

1 attempted to conduct the study at training sessions where coaches and athletes were working  
2 together on a one-to-one basis, in a small number of sessions, other athletes were present in the  
3 training environment. This may have created a 'noisy' emotional environment (Van Kleef,  
4 2009), thereby limiting the extent to which the coach may have detected the target athlete's  
5 expressions of well- and ill-being. Due to being in a position of authority, coaches' interpersonal  
6 styles may also be less likely to be influenced by athletes' psychological state, or perhaps some  
7 people's emotions are simply more contagious than others. Alternatively, perceptions of one's  
8 own interpersonal style are potentially very stable, and so while affected by one's own  
9 psychological state, they are less likely to be influenced by the psychological state of others.  
10 These speculations represent interesting avenues for further research.

11         Although the contagion of psychological health from athlete to coach was not supported,  
12 the current findings considerably advance the existing literature (Cheon et al., 2014; 2015; Deci  
13 et al., 2006; Kanste et al., 2007) by demonstrating significant associations between coaches'  
14 perceptions of their in-session interpersonal behaviors and their respective post-session indices  
15 of well-and ill-being (whilst controlling for initial levels of well- and ill-being). That is, a coach  
16 who displays confidence in their athletes, provides athletes with choices and options, and openly  
17 discusses athletes' perspectives and ideas, may subsequently feel pleased with their actions and  
18 fulfilled from their coaching duties (i.e. a sense of positive affect). In contrast, a coach who  
19 engages in punitive and directive strategies to control their athletes' behavior during the training  
20 session, may then feel frustrated and unhappy. Last, if a coach abdicates their responsibilities and  
21 adopts a non-committal attitude when coaching, they may subsequently reflect on what was (or  
22 was not) achieved in the session, thereby enhancing perceptions of reduced accomplishment and  
23 leaving them feeling less concerned about their involvement in coaching.

## 1 **Implications and Future Directions**

2       The current research offers a number of practical implications. First, it is important that  
3 those employing coaches (e.g. club managers, head coaches, performance directors) recognize  
4 the need to support coaches' well-being in their roles, due to the implications for both the  
5 coaches' and their athletes' future well-being. In addition, individuals in leadership positions  
6 need to have an awareness of how their affectivity may be associated with subsequent  
7 interpersonal exchanges with their subordinates, and the psychological health of both themselves  
8 and their subordinates. Mindfulness techniques (see Baer, 2003, for a review) are commonly  
9 used in clinical settings to enhance individuals' awareness of experiences and feelings occurring  
10 in the present moment. Similar interventions aimed at improving leaders' attentiveness to their  
11 own emotions could be implemented to minimize the adverse impact of negative affect and  
12 burnout on leaders' subsequent interpersonal behaviors.

13       Research has also demonstrated that autonomy supportive interpersonal styles are  
14 teachable (Reeve, 1998). Interventions aimed at educating authority figures in the benefits of  
15 providing autonomy support (for their own well-being and that of their subordinates) and  
16 teaching them the techniques associated with this style are essential. Concurrently, interventions  
17 should also aim to inform authority figures of the detriments of adopting controlling and laissez-  
18 faire styles and target ways to reduce such practices.

19       The results also highlight the importance of measuring both dyad members' prior levels of  
20 well- and ill-being when assessing the effects of the authority figures' interpersonal behaviors on  
21 both members' well- and ill-being. This methodology provides researchers with greater temporal  
22 insight into the proposed mechanisms than cross-sectional investigations allow. Nonetheless, in  
23 the present study, the coaches' and athletes' perceptions of coaches' interpersonal behaviors

1 were assessed immediately following the training session. Future research could ideally include  
2 in-session observational measures of coach behavior to ensure strict temporal ordering of all the  
3 study variables. Longitudinal research assessing multiple training sessions or interpersonal  
4 encounters would also be beneficial to further endorse the present findings.

5 **In addition, the current study assessed three independent models based on previous**  
6 **literature; however, there may be some interrelations between variables included in different**  
7 **models. For example, negative affect may be associated with a laissez-faire coaching style, and**  
8 **burnout and negative affect may be correlated. We tested three distinct models in the hope of**  
9 **maintaining clarity when describing relatively complex interpersonal processes, but these**  
10 **interrelations would be interesting to test in forthcoming work.**

11 Last, it is conceivable that such well- and ill-being contagion processes may be influenced  
12 by the length of the relationship between dyad members, the regularity and intensity of their  
13 interpersonal interactions, and other demographic variables such as gender (same versus different  
14 within the dyad) and age (similar versus discrepant within the dyad). The contagion literature  
15 would benefit from some further insights into these issues, so examining moderating variables or  
16 conducting multigroup SEM analyses with larger sample sizes are warranted to explore potential  
17 contrasts.

## 18 **Conclusions**

19 The present study is the first to systematically explore and provide insight into the dynamic  
20 relationships between dyad members' well- and ill-being, and the interpersonal styles of the  
21 authority figure dyad member. Overall, the current research demonstrates that contagion  
22 processes of positive and negative affect from coaches to athletes are salient during interpersonal  
23 exchanges, but not vice versa. The key implication of the present research is to ensure that

- 1 authority figures are supported so that they can experience positive affect (and limited negative
- 2 affect and burnout), in order to facilitate the creation of adaptive autonomy supportive climates,
- 3 and therefore, the subsequent well-being of themselves and their subordinates.

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Table 1

*Standardized Factor Loadings and Standard Errors for each item of the Laissez-Faire Scale in the Preliminary Validation Study*

<b>Item</b>	<b>Factor Loading</b>	<b>Standard Error</b>
My coach avoided making decisions in training	.52	.86
My coach did not fulfil the responsibilities he/she was supposed to fulfil	.59	.81
My coach hesitated to take action	.71	.71
My coach did not make decisions when he/she needed to	.88	.48
My coach was slow to take action when something needed to be done	.75	.66
My coach did not use his/her authority when he/she needed to	.61	.79
My coach avoided getting involved when an important issue arose	.78	.63

Table 2

*Means, Standard Deviations, and Cronbach's Alpha Coefficients, for all Variables at Pre- and Post-Session*

	Pre-Session			Post-Session		
	Mean	SD	$\alpha$	Mean	SD	$\alpha$
Coach Positive Affect	4.69	1.13	.91	5.48	.95	.83
Coach Negative Affect	2.09	1.45	.96	1.56	.85	.89
Coach Burnout	1.63	.52	.89	1.64	.65	.93
Coach Perceptions of Coach Autonomy Support	-	-	-	5.76	.87	.83
Coach Perceptions of Coach Control	-	-	-	1.70	.72	.86
Coach Perceptions of Coach Laissez-Faire	-	-	-	1.95	1.00	.79
Athlete Positive Affect	5.51	1.09	.88	4.78	1.10	.90
Athlete Negative Affect	1.53	.70	.76	1.61	.76	.77
Athlete Burnout	1.74	.53	.88	1.75	.54	.88
Athlete Perceptions of Coach Autonomy Support	-	-	-	5.66	.95	.83
Athlete Perceptions of Coach Control	-	-	-	1.74	.69	.83
Athlete Perceptions of Coach Laissez-Faire	-	-	-	1.68	.62	.67

Table 3

*Correlations Between all Study Variables*

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.
1.Coach Pre PA	–																	
2. Coach Pre NA	-.67**	–																
3. Coach Pre BO	-.56**	.66**	–															
4. Coach AS	.44**	-.19	-.38**	–														
5. Coach C	-.30*	.54**	.57**	.00	–													
6. Coach LF	-.13	.33*	.43**	-.09	.50**	–												
7. Coach Post PA	.62**	-.57**	-.69**	.41**	-.50**	-.42**	–											
8. Coach Post NA	-.59**	.70**	.71**	-.16	.47**	.42**	-.65**	–										
9. Coach Post BO	-.44**	.57**	.90**	-.31*	.64**	.55**	-.76**	.69**	–									
10. Athlete Pre PA	.10	-.14	-.31*	.12	-.13	-.05	.23	-.18	-.28*	–								
11. Athlete Pre NA	-.15	.16	.20	-.02	.28*	.36**	-.26	.22	.31*	-.35**	–							
12. Athlete Pre BO	-.27*	.13	.40*	.00	.24	.04	-.35**	.37**	.42**	-.37**	.41**	–						
13. Athlete AS	.32*	-.15	-.39**	.46**	-.01	-.04	.29*	-.25	-.38**	.32*	-.18	-.28*	–					
14. Athlete C	-.34**	.29*	.39**	.02	.37**	.02	-.43*	.45**	.52**	-.06	.16	.45**	-.16	–				
15. Athlete LF	-.34**	.04	.35**	-.18	.02	.05	-.39**	.33*	.36**	-.15	.23	.49**	-.46**	.46**	–			
16. Athlete Post PA	.38**	-.27*	-.52**	.24	-.14	-.13	.41**	-.44**	-.43**	.56**	-.22	-.34**	.45**	-.18	-.34**	–		
17. Athlete Post NA	-.25	.29*	.29*	-.07	.28*	.26	-.44**	.42**	.32*	-.27*	.68**	.47**	-.10	.20	.26*	-.37**	–	
18. Athlete Post BO	-.28*	.18	.43**	-.06	.23	.11	-.40**	.41**	.40**	-.34**	.27*	.88**	-.25*	.33**	.47**	-.36**	.43**	–

Note. \*  $p < .05$ , \*\*  $p < .01$

*Note.* Acronyms in Table 3 are as follows: Pre (pre-session), Post (post-session), PA (positive affect), NA (negative affect), BO (burnout), AS (autonomy support), C (control), LF (laissez-faire). The prefixes 'Coach' and 'Athlete' represent coaches' and athletes' perceptions of the variables, respectively.

Table 4

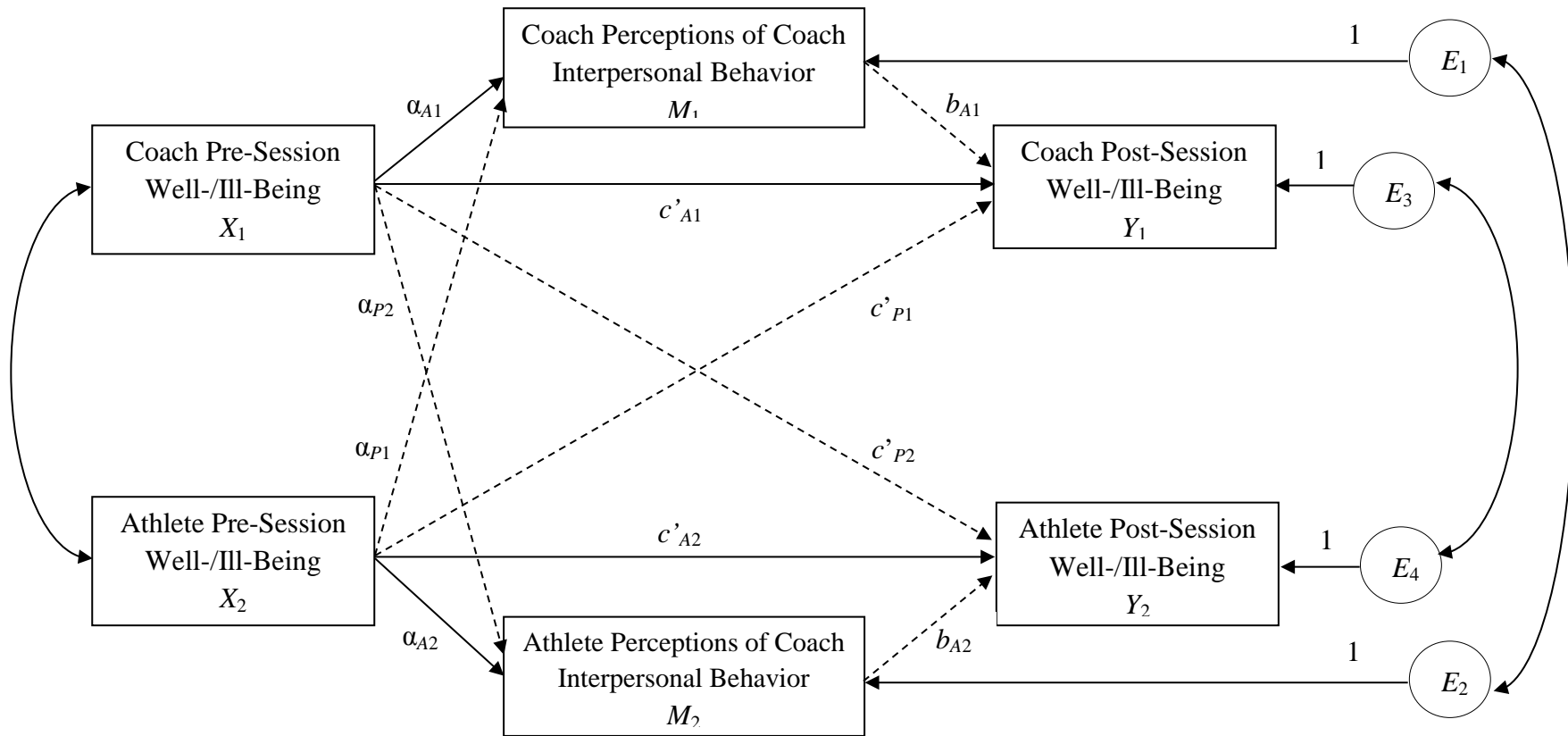
*Unstandardized bootstrapped effect estimates for the APIMeM models*

Effects	Model A		Model B		Model C	
	<i>b</i>	95% CI	<i>b</i>	95% CI	<i>b</i>	95% CI
<i>a</i> effects (X→M)						
Coach actor effect ( $\alpha_{A1}$ )	.32	.15 to .49	.24	.13 to .35	.98	.38 to 1.65
Athlete actor effect ( $\alpha_{A2}$ )	.24	.06 to .40	.11	-.20 to .40	.53	.16 to .92
<i>Coach partner effect (<math>\alpha_{P1}</math>)</i>	<i>.05</i>	<i>-.18 to .25</i>	<i>.20</i>	<i>-.07 to .46</i>	<i>-.31</i>	<i>-.69 to .07</i>
<i>Athlete partner effect (<math>\alpha_{P2}</math>)</i>	<i>.23</i>	<i>.05 to .41</i>	<i>.13</i>	<i>.01 to .27</i>	<i>.19</i>	<i>.01 to .43</i>
<i>b</i> effects (M→Y)						
Coach actor effect ( $b_{A1}$ )	.20	.08 to .47	.13	.01 to .34	.14	.05 to .21
Athlete actor effect ( $b_{A2}$ )	.22	.01 to .49	.14	.03 to .23	.05	-.10 to .20
<i>c'</i> effects (X→Y)						
Coach actor effect ( $c'_{A1}$ )	.43	.23 to .66	.37	.20 to .57	.94	.79 to 1.12
Athlete actor effect ( $c'_{A2}$ )	.51	.29 to .72	.70	.46 to 1.07	.85	.68 to .99
<i>Coach partner effect (<math>c'_{P1}</math>)</i>	<i>.15</i>	<i>-.01 to .37</i>	<i>.11</i>	<i>-.07 to .32</i>	<i>.13</i>	<i>.04 to .22</i>
<i>Athlete partner effect (<math>c'_{P2}</math>)</i>	<i>.26</i>	<i>.04 to .49</i>	<i>.10</i>	<i>-.01 to .23</i>	<i>.07</i>	<i>-.07 to .23</i>

*Note.* 1 = coach, 2 = athlete; 95% CI = 95% Confidence Interval; Effects shown in italics reflect the primary pathways of interest for the study hypotheses.

Figure 1.

*APIMeM model of the hypothesized relationships between coach and athlete pre- and post-session well- and ill-being, mediated by coach and athlete perceptions of coach interpersonal behavior.*



*Note.* Dotted lines delineate the pathways of interest for the two study hypotheses; 1 = coach, 2 = athlete; Actor and partner effects are denoted by A and P, respectively.  $\alpha$ ,  $b$ , and  $c'$  represent the effects of X on M, M on Y, and X on Y, respectively.