

**Toward a Multidimensional Model of Athletes' Commitment to Coach-Athlete Relationships and Interdependent Sport Teams: A Substantive-Methodological Synergy**

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To appear in: *Journal of Sport & Exercise Psychology*

Manuscript accepted: October 27<sup>th</sup>, 2013

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### Abstract

Drawing from a three-factor model of organizational commitment, we sought to provide validity evidence for a multidimensional conceptualization designed to capture adolescent athletes' commitment to their coach-athlete relationship or their team. In Study 1, 335 individual-sport athletes ( $M_{age} = 17.32$ ,  $SD = 1.38$ ) completed instruments assessing affective, normative, and continuance commitment to their relationship with their coach, and in Study 2, contextually-modified instruments were administered to assess interdependent-sport athletes' ( $N = 286$ ,  $M_{age} = 16.31$ ,  $SD = 1.33$ ) commitment to their team. Bayesian structural equation modeling revealed support for a three-factor (in comparison to a single-factor) model, along with relations between commitment dimensions and relevant correlates (e.g., satisfaction, return intentions, cohesion) that were largely consistent with theory. Guided by recent advancements in Bayesian modeling, these studies provide a new commitment instrument with the potential for use and refinement in team- and relationship-based settings, and offer preliminary support for a conceptual framework that may help advance our understanding of the factors underpinning individuals' engagement in sport.

Key words: Affective; BSEM; cohesion; continuance; normative; sport participation

## **Toward a Multidimensional Model of Athletes' Commitment to Coach-Athlete Relationships and Interdependent Sport Teams: A Substantive-Methodological Synergy**

Substantive and methodological issues are inextricably linked within the process of developing cumulative bodies of knowledge within the behavioral sciences (MacKenzie, Podsakoff, & Podsakoff, 2011). Despite this connection, research is typically directed toward addressing either methodological (e.g., demonstrating the value and application of new analytical techniques) *or* substantive issues (e.g., theoretical interpretations of psycho-social phenomena). Papers that bridge these two foci – referred to as *substantive-methodological synergies* (Marsh & Hau, 2007) – have the potential to provide important theoretical, methodological, and practical insight for scholars and practitioners. Substantive-methodological synergies have gained increased attention in recent years (e.g., Nagengast et al., 2011), yet their application in sport and exercise settings is sparse (cf. Myers, Chase, Pierce, & Martin, 2011). The purpose of this paper was to examine support for a multidimensional conceptualization of athletes' commitment perceptions relating to their coach-athlete relationship or their interdependent sports team (i.e., the substantive contribution). In addition, we utilized an emerging methodological approach by addressing this aim through the use of Bayesian structural equation modeling (BSEM; Muthén & Asparouhov, 2012).

### **Substantive Focus: Commitment to Coach-Athlete Relationships and Interdependent Sports Teams**

Participation in organized sport during adolescence is recognized for its capacity to promote adaptive physical, social, and psychological outcomes (for a review, see Fraser-Thomas, Côté, & Deakin, 2005), as well as favorable physical activity patterns throughout one's adult life (e.g., Tammelin, Näyhä, Hills, & Järvelin, 2003). Despite these benefits, dropout from sport is particularly pronounced in adolescence (cf. Guzmán & Kingston, 2012), and there has been a continued research emphasis devoted toward understanding (and trying to reverse) the elevated attrition rates that accompany this stage of development (e.g., Fraser-Thomas, Côté, & Deakin,

2008). With particular relevance for the present investigation, athletes' *commitment* levels appear to be an important factor underpinning sustained sport involvement among this cohort (e.g., Raedeke, 1997).

Sport commitment represents a psychological state reflecting an athlete's desire and resolve to continue his or her sport participation (Scanlan, Carpenter, Schmidt, Simons, & Keeler, 1993), and there is empirical support for the view that high levels of sport commitment accompany greater behavioral persistence (e.g., Raedeke, 1997; Weiss & Weiss, 2003). Over the last two decades, a number of researchers have examined adolescents' sport commitment perceptions (e.g., Carpenter, Scanlan, Simons, & Lobel, 1993; Raedeke, 1997; Weiss, Weiss, & Amorose, 2010), and although pioneering work in this area often focused on commitment as a unidimensional construct (e.g., Carpenter et al., 1993), scholars have now begun to consider the distinct forms of commitment that may exist. The empirical roots of this approach can be traced to work by Raedeke (1997), who drew from conceptual assertions (Schmidt & Stein, 1991) in order to test the notion that individuals might resolve to continue with their sport either because they *want* to, or alternatively because they feel that they *have* to do so (see also Weiss & Weiss, 2003).

Importantly though, although these studies have offered valuable insight into the commitment perceptions that individuals hold about their sport in a general sense, our sporting experiences are invariably couched within *relationship and/or team environments*, and little is currently known about the different dimensions of commitment that may develop in relation to one's membership in these networks. It is well documented that one's relational (see Carr, 2012) and team (see Carron, Shapcott, & Burke, 2008) experiences are fundamental in shaping judgments about one's overall sport involvement. Nevertheless, although investigators have previously examined the commitment perceptions that athletes hold within interpersonal (e.g., coach-athlete; Jackson, Grove, & Beauchamp, 2010; Jowett & Ntoumanis, 2004) and interdependent (e.g., Fry & Gano-Overway, 2010) settings, the assessment of the commitment

construct in these instances has been unidimensional in nature, and therefore unable to capture an alternative, multidimensional perspective.

In this investigation, we drew from the commitment literature within organizational (and to a lesser extent, close relationship) settings, in order to examine a multidimensional model reflecting adolescent athletes' commitment to either their relationship with their coach (in individual sports), or their commitment to their team (in interdependent contexts). By targeting athletes within coach-athlete relationships, as well as those performing within interdependent teams, we aimed to provide insight into the commitment perceptions that develop within two of the most pervasive interpersonal networks that exist in sport. In addition, we explored commitment specifically among adolescents in light of the benefits associated with sustained sport participation for this cohort.

**Commitment frameworks in organizational and relationship psychology.** In workplace and close relationship settings, the notion that commitment might comprise distinct dimensions was first documented approximately half a century ago (e.g., Becker, 1960; Johnson, 1973). In fact, although the organizational (see Meyer, Stanley, Herscovitch, & Topolnytsky, 2002) and close relationship (see Johnson, Caughlin, & Huston, 1999) literatures on this topic have developed largely in isolation from one another, there is a general consensus in both research streams that three distinct commitment dimensions may develop for those within team-based interactions (Meyer & Allen, 1991) and one-to-one exchanges (Johnson, 1991). First, individuals may be committed to staying with their team/in their relationship due to their emotional and affective attachment to, and identification with, the team/relationship; in the organizational literature this dimension is referred to as *affective* commitment (or personal commitment in the relational literature). Second, it is also possible that individuals might resolve to continue with their team/in their relationship due to a feeling of being 'locked in' that arises from the perceived costs associated with ending one's participation; this dimension is typically termed *continuance* (or structural) commitment. Finally, individuals may desire to remain with

their team/in their relationship due to a sense of obligation, or moral attachment, termed *normative* (or moral) commitment.

In delineating between these different commitment dimensions, Meyer and colleagues (Meyer, Allen, & Smith, 1993) outlined that individuals “with a strong affective commitment remain... because they *want* to, those with a strong continuance commitment remain because they *need* to, and those with a strong normative commitment remain because they feel they *ought* to” (p.539, emphasis added). Importantly, it is theorized that individuals can experience all three independent dimensions of commitment to varying degrees at any given point in time; that is, affective, normative, and continuance commitment are not considered to be mutually exclusive (Meyer & Allen, 1991). For example, an individual might feel a strong emotional desire and normative obligation to remain in a given situation, but at the same time report relatively little need to do so. Theory and research in organizational and relationship settings has helped chart the nature of these commitment dimensions (i.e., inter-relationships, antecedents, consequences); however, extensive work has taken place specifically within the organizational context regarding conceptual and measurement optimization, and so our efforts at developing and evaluating commitment instruments related to one’s relationship or team involvement in sport were grounded in Meyer and Allen’s (1991) multidimensional workplace model. This notion of multidimensionality differs substantively from the view of commitment that has most typically been considered in sport settings. For example, much of the sport-based work has examined a number of relevant factors (e.g., enjoyment, investments, social constraints) that are theorized to act as *determinants* (i.e., predictors or sources) of a single-factor commitment construct. Meyer and colleagues (Meyer & Allen, 1991), on the other hand, asserted that commitment itself comprises three distinct dimensions, outlining that “commitment is a multidimensional construct and... the antecedents, correlates, and consequences of commitment *vary across dimensions*” (Meyer et al., 2002, p.21, emphasis added).

That being the case, although each of the commitment dimensions are theorized to align positively with retention (Meyer & Allen, 1991; Meyer et al., 1993), the utility of Meyer and colleagues' multidimensional model lies largely in the unique antecedents and diverse persistence-related implications with which the dimensions are theorized to be associated. Meyer and colleagues (Meyer & Allen, 1991) posited that supportive environments should foster greater affective attachment, and there is meta-analytic evidence that affective commitment is indeed bolstered in supportive workplaces, as well as by leaders who display transformational leadership qualities (Meyer et al., 2002). Meyer et al. (2002) also reported that role ambiguity and role conflict align negatively with affective commitment, and they demonstrated that individuals with a strong emotional attachment to their organization (i.e., affective commitment) reported greater satisfaction with their coworkers and their job, in addition to greater commitment to their occupation, improved job performance, and reduced stress (see also Meyer & Maltin, 2010). Normative commitment has consistently been shown to correlate in a positive direction with affective commitment, and feelings of obligation to remain are typically correlated with desirable outcomes in the same direction as affective commitment. That said, correlations for those who report strong normative commitment (e.g., in relation to performance, satisfaction, etc) tend to be somewhat weaker in magnitude than those for their counterparts who report particularly strong affective commitment scores (cf. Meyer et al., 2002). Finally, evidence for the relationships between continuance commitment and other dimensions is mixed; however, strong continuance perceptions have been shown to coincide with a perceived lack of support and concerns over one's role, as well as decreased satisfaction with one's position and colleagues, reduced performance and well-being, and elevated stress levels (Meyer et al., 2002).

Collectively, the correlates that have been demonstrated in workplace settings suggest that, in sport, whereas affective and normative commitment may align with pro-social variables, continuance commitment may coincide with deleterious implications. Moreover, given the links with individuals' feelings and decisions about their occupation (e.g., Meyer et al., 2002), it is

important to consider whether affective, normative, and continuance commitment perceptions about one's team/relationship might not only shape athletes' intentions to remain part of that team/relationship, but might also correlate with their intentions to continue their involvement in their sport. To date though, empirical recognition of the three-factor model within sport has been sporadic (e.g., Turner & Pack, 2007), and there has been no systematic construct validation work conducted within athletic contexts. With that in mind, the guiding aims of the two studies presented within this paper were substantive and methodological in nature, and were specifically to (a) examine support for Meyer and Allen's (1991) multidimensional conceptual model in sport relationships and teams, and (b) provide preliminary validity evidence for instruments that were designed to assess athletes' commitment perceptions in coach-athlete relationship and interdependent team contexts.

### **Methodological Focus: Bayesian Structural Equation Modeling**

When there is sufficient a priori substantive theory to guide examinations of factorial validity, a confirmatory approach is typically adopted (Russell, 2002). Confirmatory factor analysis (CFA) encompasses a set of constraints regarding the relationships between observed (e.g., item indicators) and unobserved variables (e.g., latent constructs, error variances) derived from substantive theory, whereby each indicator is allowed to load on only one latent factor, with all nontarget loadings and error covariances constrained to zero. However, this independent clusters model (ICM) is highly restrictive, is often rejected because of poor model fit, and can contribute to distorted factors and biased factor correlations (Marsh et al., 2009). When the ICM is inappropriate for the measurement of substantive theory, post hoc modifications are typically applied to compensate for poor model-data fit (Asparohov & Muthén, 2009). Pertaining to instrument development, researchers often remove items considered inadequate according to statistical criteria (e.g., modification indices), despite those items having previously been deemed important for the conceptual coverage of a construct via expert reviews, and without reconsidering content validity of the revised model.

Bayesian estimation offers an alternative to the restrictions imposed by the ICM of CFA. Specifically, a Bayesian approach replaces these restrictive specifications (e.g., fixing parameters at zero) with *approximate* zeros using informative (i.e., zero mean and small variance) ‘priors’ based on substantive theory or previous research (Muthén & Asparouhov, 2012). Bayesian estimation thereby allows some degree of uncertainty in the parameters by applying a less restrictive operationalization of one’s substantively-driven measurement model. In a multidimensional measurement model, for example, one may wish to model nontarget loadings that are small (relative to target loadings) but are not fixed at zero, alongside freely estimated intended factor loadings. Model-data fit statistics aside, excluding such nonzero loadings would lead to (a) inflated correlations between factors, thereby affecting discriminant validity, and (b) distorted relationships with antecedents and/or outcomes, thus influencing other forms of validity that are of substantive interest (e.g., predictive validity; Marsh et al., 2009).

Several other important distinctions exist between Bayesian estimation and the traditional approach that draws from a frequentist perspective (for detailed overviews, see Gelman, Carlin, Stern, & Rubin, 2009; Lynch, 2010), which typically encompasses a normal distribution based maximum-likelihood estimation procedure (ML-CFA). First, in Bayesian analysis, unknown parameters are treated as random variables with a distribution (Lynch, 2010). The condition in Bayesian estimation that there is no true parameter value in the population contrasts with the frequentist perspective in which parameters are considered as quantities whose values are fixed but unknown (Dienes, 2011). Second, in Bayesian analysis, one’s a priori knowledge of the model and parameters is summarized in the probability distribution, and integrated with the data’s evidence about the parameters, in order to describe the relative probability of different values in the posterior distribution (Muthén & Asparouhov, 2012). In ML estimation, the parameter estimates are continuously refined through an iterative process until the discrepancy between the sample covariance matrix (i.e., data) and the implied covariance matrix (i.e., measurement model) can no longer be reduced (Brown & Moore, 2012); that is, the best model in ML-CFA is the one

that maximizes the probability of the observed data. From a Bayesian perspective, one is interested in the probability of a hypothesized theoretical model, given the data; guided by the frequentist approach, the researcher is interested in the probability of the data, given the hypothesized theoretical model. Third, the Bayesian approach is more intuitive than frequentist approaches because it provides an interpretable estimate in which the probability of the population parameter falls within the bounds of the credibility interval (Dienes, 2011). In contrast, the frequentist approach tells us about hypothetical repetitions of the study or experiment, with one's data representing the results from the one real repetition, and 95% of the hypothetical repetitions producing a correct interval. Finally, as the Bayesian approach does not assume that the data are normally distributed (i.e., asymptotic theory), it should yield more accurate inferences than frequentist significance testing approaches because it provides the entire distribution (i.e., posterior distribution; Muthén & Asparouhov, 2012).

The analytical and epistemological distinctions between Bayesian and frequentist estimation mean that, through the use of Bayesian methods, scholars may be able to learn more about parameter estimates and model fit, obtain better small-sample performance, perform less computationally demanding analyses, and analyze new types of models (Muthén & Asparouhov, 2012). Aligned with this methodological focus, we aimed to demonstrate the utility of Bayesian analysis for the development and validation of a multidimensional measurement tool when compared with the traditional ICM of ML-CFA.

**Framework for assessing instrument validity.** In presenting his unified view of construct validity, Messick (1995) contended that it is important for researchers to satisfy a number of evaluative criteria. Specifically, in addition to ensuring underlying content and substantive aspects of validity (i.e., content relevance, representativeness, theoretical rationale) by drawing from a previously-validated model and using expert review, we sought to provide evidence relating to measurement and external aspects of validity. The measurement aspect of validity, or factorial validity, refers to the fidelity of the scoring structure and relations between

indicators and target constructs, and is typically assessed through factor analytic methods.

Messick also advocated that external aspects of validity must be satisfied via discriminant and criterion relevance (often referred to as criterion validity); that is, by demonstrating associations with relevant correlates.

### **The Present Studies: Overview and Hypotheses**

In Study 1, we sought to develop a three-factor instrument to measure individual-sport athletes' commitment to their relationship with their coach, as well as examine the structural properties of this measure, and establish relations between commitment perceptions and relevant correlates (i.e., satisfaction with the coach's instruction, confidence in the coach's ability, and intentions to continue with the coach, and with the sport). We chose to measure athletes' coach- and sport-related intentions, and satisfaction with their coach, given that organizational research has demonstrated associations between commitment dimensions and workplace intentions and satisfaction (Meyer et al., 2002). In addition, we assessed athletes' confidence in their coach's ability (i.e., other-efficacy) in light of recent sport-based work in which positive relations between (unidimensional) commitment perceptions and other-efficacy have been reported (e.g., Jackson et al., 2010). In line with existing theory and research (Meyer et al., 2002), we anticipated that (a) athletes' affective commitment to their coach would display the most positive associations with these variables, (b) normative commitment would also display positive associations, but that these would be weaker in magnitude than those observed for affective commitment, and (c) continuance commitment would be unrelated or negatively related to these adaptive correlates.

In order to attempt to replicate and extend our Study 1 findings, we followed the same general procedure in Study 2. In this instance, though, we measured interdependent sport athletes' commitment to their team, and again assessed a number of relevant correlates for the purpose of examining external aspects of validity. Consistent with Study 1, intention and satisfaction perceptions were measured in light of empirical support for relations between

commitment dimensions and these variables (Meyer et al., 2002). In addition, given the role that cohesion plays in shaping various adaptive individual and group outcomes in sport teams (Carron et al., 2008), we also sought to explore relations between commitment dimensions and athletes' perceptions of task and social cohesion. We anticipated a pattern of associations that was consistent with our predictions in Study 1. Alongside the substantive focus of our research, we also addressed an important methodological consideration pertaining to instrument development and validation. Specifically, we examined the usefulness of BSEM, and compared its utility against the commonly adopted ICM in ML-CFA. Consistent with recent research (Muthén & Asparouhov, 2012), we expected that model-data fit would be superior and parameter estimates (e.g., latent variable correlations) would be less biased with BSEM when compared with ML-CFA.

In summary, existing research in non-sport contexts has provided evidence regarding a potential three-factor commitment model that may be applicable to studying athletes' persistence, performance, and well-being in relationship and team settings. Nonetheless, sport relationship- and team-based instruments that account for this potential multidimensionality have yet to be developed and evaluated, and it is important to not only establish valid and reliable multidimensional measures in these contexts, but also to begin mapping out the nomological net (i.e., correlates) associated with these constructs.

### **Study 1: Individual-Sport Athletes' Commitment to their Relationship with their Coach**

#### **Method**

**Participants and procedure.** A total of 335 adolescents ( $n_{male} = 189$ ,  $n_{female} = 146$ ,  $M_{age} = 17.32$ ,  $SD = 1.38$ ) were recruited from a variety of individual sports, namely swimming ( $n = 42$ ), triathlon ( $n = 20$ ), track and field ( $n = 91$ ), tennis ( $n = 87$ ), gymnastics ( $n = 30$ ), squash ( $n = 42$ ), and cycling ( $n = 23$ ). Athletes were drawn from regional-level competition, and were split between community- ( $n = 194$ ) and school-/university-based ( $n = 141$ ) settings. On average, participants reported 5.73 years experience in their sport ( $SD = 3.53$ ), had been working with

their current coach for 2.89 years ( $SD = 2.47$ ), and spent 6.75 hours per week with their coach during the season ( $SD = 4.94$ ). At the time of data collection, all athletes were active in competition (i.e., were not injured or out of season).

Upon receiving ethical approval, recruitment letters were mailed electronically to individual-sport regional governing organizations. Regional governing organizations were asked to forward information about the study to relevant clubs and/or coaches that were associated with athletes who competed regularly in regional competition. Those clubs and/or coaches who were interested were instructed to contact the lead investigator, at which time the nature of the study and data collection procedures were explained. Questionnaire administration took place at the start of a pre-arranged training session. Athletes were first given an information sheet that outlined their rights as a participant, and explained that the questionnaire focused on their thoughts and feelings about their relationship with their coach. Participants were asked to confirm that the coach in question was their 'primary' coach (i.e., that they did not spend a greater amount of time training and competing under another coach in their sport), before being given the opportunity to ask questions and provide their informed consent to take part. At the close of data collection, all individuals aged 17 and under received a parent information sheet, which contained the information about the study and a stamped addressed envelope in order for parents/guardians to withdraw their son/daughter should they wish. This passive consent process (i.e., parents return a letter if they wish to withdraw their son's/daughter's participation) was approved by the institutional review board given the confidential, non-invasive nature of the project, and the maturity/comprehension level of intended participants (National Health and Medical Research Council, 2007).

### **Measures.**

*Athletes' commitment to their relationship with their coach.* Meyer et al.'s (1993) 18-item instrument comprises three six-item subscales assessing one's affective (e.g., "this organization has a great deal of personal meaning for me"), normative (e.g., "this organization

deserves my loyalty”), and continuance (e.g., “right now, staying with my organization is a matter of necessity as much as desire”) commitment to one’s organization. Psychometric support has been demonstrated for measures derived from this instrument in workplace contexts (e.g., Allen & Meyer, 1996). Thus, we made contextual modifications to Meyer and colleagues’ original instrument in order to shift the referent of items from vocational activities to athletes’ membership within their coach-athlete relationships (e.g., “my relationship with this coach has a great deal of personal meaning for me”, “this coach deserves my loyalty”). Prior to data collection, we assessed the content validity of these 18 items via expert review. Specifically, five researchers with expertise in sport commitment, relational processes, and/or group dynamics were provided with definitions of the focal constructs and invited to rate item relevance using a scale ranging from -2 (*very poor*) to 2 (*very good*). Reviewers were also requested to provide qualitative feedback on ambiguity, understanding, and jargon (Delgado-Rico, Carretero-Dios, & Ruch, 2012). This review process resulted in the removal of one item from the affective commitment measure (i.e., “I do not feel like ‘part of the family’ in my relationship with this coach”) due to unacceptable reviewer scores (i.e., mean and median scores  $\leq 0$ ). As a result, athletes were asked to complete a 17-item instrument (see Appendix). In line with the original scoring format, and consistent with recommendations regarding the optimal number of response options (Preston & Colman, 2000), a response scale anchored at 1 (*strongly disagree*) and 7 (*strongly agree*) was used, and respondents were instructed that, “below are a series of statements that may or may not be reflective of your relationship with your coach; please respond to all the statements according to how you feel about your relationship with your coach right now at this moment in time.” Analyses of readability statistics indicated that the 17 items within this instrument achieved a Flesch-Kincaid Grade Level of 5.9, demonstrating that the items were appropriate for those in Grade 6 and above.

***Satisfaction with the coach.*** The three-item ‘training and instruction’ subscale from the Athlete Satisfaction Questionnaire (ASQ; Riemer & Chelladurai, 1998) was used to measure

athletes' satisfaction with the training provided by their coach. Respondents were instructed to "consider your feelings at this moment in time", and rated items including "the instruction I have received from my coach this season", and "the training I receive from my coach during the season", from 1 (*not at all satisfied*) to 7 (*extremely satisfied*). Reimer and Chelladurai (1998) provided support for the factorial and concurrent validity of measures derived from this ASQ subscale. The composite reliability estimate (Raykov, 1997) for the measure derived from this instrument in this study was .85.

***Other-efficacy.*** Athletes reported their confidence in their coach's ability with a 15-item instrument developed for use in individual sports by Jackson, Gucciardi, and Dimmock (2011). Using a 5-point response format anchored at 1 (*no confidence at all*) and 5 (*complete confidence*), participants were instructed, "at this moment in time, rate your confidence in your coach's ability to..." Example items for this instrument include, "always make his/her expectations of you clear", and "communicate effectively toward you at all times". Previous research has demonstrated evidence for the internal reliability and unidimensional factor structure of measures created from this instrument (Jackson et al., 2011), and in this study we observed an acceptable composite reliability estimate for this measure (i.e.,  $\rho = .95$ ).

***Intention to return.*** Using a response scale ranging from 1 (*completely uncertain*) to 9 (*completely certain*), we first asked athletes to respond to the statement, "at this moment in time, given the choice, I intend to play this sport next season". Respondents were then presented with the following statement to assess their intentions regarding their coach, "at this moment in time, given the choice, I intend to work with the same coach next season". The phrase, "given the choice", was included in order to encourage athletes' to reflect upon their genuine intentions, rather than basing their responses on other factors that may influence their return intentions (e.g., financial commitments, parental pressures). Single-item intention measures have been widely used in sport and exercise contexts (e.g., Eys, Carron, Bray, & Beauchamp, 2005; Spink, 1995),

and Eys et al. (2005) provided support for the predictive utility of single-item intention measures similar to those used in this study.

**Data analyses.** In stage one of our analyses, we examined item-level descriptive statistics in order to determine distributional properties for the three dimensions of commitment and to screen for outliers. In stage two, we estimated measurement fit indices for a three-factor model comprising 17 total indicators in Mplus 7 (Muthén & Muthén, 1998-2012), in which affective, normative, and continuance commitment were treated as correlated latent variables. We also compared the fit indices derived for the three-factor model with those obtained from a unidimensional model. We analyzed the factorial validity of the commitment instrument using both BSEM (Muthén & Asparouhov, 2012) and a conventional frequentist analysis via the ICM with ML-CFA. Missing data were handled with full-information maximum likelihood (Enders & Bandalos, 2001).

With regard to ML-CFA, the multidimensional measurement model was designed such that each item had a nonzero loading on the latent factor it was designed to measure (i.e., freely estimated) and zero loadings on the other two latent factors, and error terms associated with each item were uncorrelated (Model 1a). For the unidimensional model, each item loaded on a single latent factor, and error terms associated with each item were uncorrelated (Model 1b). For both CFA models, we used a robust maximum likelihood estimator (MLR), which produces standard errors that are robust to any deviation from normality within the model, and to the use of categorical indicators that comprise four or more response categories (e.g., Beauducel & Herzberg, 2006). As specific cut-offs for goodness-of-fit indices cannot be generalized across all models (Hu & Bentler, 1999; Marsh, Hau, & Wen, 2004), we employed ranges to ascertain the degree of model-data fit. In addition to the  $\chi^2$  goodness-of-fit index, we report the comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). For the CFI and TLI, values < 0.90 were considered to indicate poor fit, values between 0.90 and 0.95 were considered to indicate

acceptable fit, and values  $> 0.95$  were considered to indicate excellent fit. For the RMSEA and SRMR, values  $> 0.08$  were indicative of poor fit, values between 0.05 and 0.08 were indicative of acceptable fit, and values  $< 0.05$  were indicative of excellent fit.

For the BSEM approach, we progressively examined three variations associated with item cross-loadings and residual correlations for each measurement representation. First, we considered exact zero cross-loadings and residual correlations for the three-factor (Model 2a) and unidimensional models (Model 2b). Second, we applied approximate zero cross-loadings and exact zero residual correlations for the three-factor (Model 3a) and unidimensional models (Model 3b). Finally, we examined approximate zero cross-loadings and residual correlations for the three-factor (Model 4a) and unidimensional models (Model 4b). In all BSEM models, approximate zeros were specified using zero-mean, small-variance informative priors of .01 thereby representing a 95% credibility limit of  $\pm .20$ . We also applied informative priors on intended factor loadings to model expectations regarding the strength and direction of their relationship with the latent construct (Rindskopf, 2012). Specifically, we specified these loadings to have a normal prior of .7 and a standard deviation  $\pm .28$ , meaning that these loadings are likely to be between .42 and .98. We drew from statistical recommendations regarding the quality of factor loadings (e.g., Comrey & Lee, 1992) and empirical evidence (e.g., Meyer et al., 1993) to inform the specification of priors for both intended and nontarget factor loadings. The Markov chain Monte Carlo (MCMC) estimation algorithm founded on the Gibbs sampler method is employed for BSEM within Mplus to generate the posterior distribution based on the parameter specifications and observed data (Muthén & Asparouhov, 2012). We assessed model fit using posterior predictive checking (Gelman, Meng, & Stern, 1996) and deviance information criterion (DIC; see Gelman et al., 2009), with a potential scale reduction factor value of 1.1 or smaller indicative of model convergence (Gelman et al., 2009). In Mplus, the posterior predictive  $p$  value (PPP) is computed, with a small positive value (e.g., 0.005) indicative of poor fit, and a value around 0.5 suggestive of excellent fit (Muthén & Asparouhov, 2012). The model with the lowest

DIC value is considered best supported. We considered parameters in which the 95% credibility interval did not encompass zero to have gained substantive support (Muthén & Asparouhov, 2012).

In the final stage of our data analyses, we examined external aspects of validity by modeling covariance pathways between each latent commitment construct and all latent and observed correlates. We computed these analyses using BSEM in order to account for measurement error when determining associations between variables. For the latent variables, we specified intended factor loadings to be informative (i.e., normal prior of .7 and a standard deviation  $\pm .28$ ) and approximate zero cross-loadings and residual correlations (i.e., zero-mean with a standard deviation  $\pm .20$ ). Owing to the exploratory nature of these analyses, we did not apply informative priors to the covariance pathways between latent (i.e., commitment dimensions, other-efficacy, satisfaction) and observed (i.e., intention) variables.

## Results

**Item-level analyses.** Data for all affective commitment items were normally distributed as evidenced by skewness (-0.26 to 0.04) and kurtosis (-0.51 to 0.12) statistics. Corrected item-total correlations ranged between .74 and .81, and inter-item correlations were acceptable in the range .63 to .74 (Hair, Black, Babin, & Anderson, 2010). Skewness (-0.43 to -0.14) and kurtosis (-0.57 to 0.08) statistics were acceptable for normative commitment items, and corrected item-total correlations (.53 to .77) and inter-item correlations (.33 to .67) were in desirable ranges. Continuance commitment items were normally distributed as evidenced by skewness (-0.25 to -0.11) and kurtosis values (-0.22 to 0.22), and corrected item-total correlations ranged between .57 and .61; inter-item correlations were also adequate (.30 to .54).

**Factorial validity.** ML-CFA analyses revealed that the data displayed a marginal fit for the three-factor model (Model 1a) according to our multiple criteria of model fit,  $\chi^2(116) = 323.67, p < .001$ , CFI = .901, TLI = .897, RMSEA = .078 (90% confidence interval .065 to .085), SRMR = .081. Affective commitment was significantly associated with continuance ( $r = -.27, p$

<.001) and normative commitment ( $r = .73, p < .001$ ); in contrast, normative and continuance commitment were unrelated ( $r = .06, p = .45$ ). The unidimensional model (Model 1b) displayed an inadequate fit with the data,  $\chi^2(119) = 1050.78, p < .001, CFI = .648, TLI = .597, RMSEA = .153$  (90% CI = .144 to .161), SRMR = .145. For the multidimensional model, two continuance items displayed marginal factor loadings (i.e., .43 and .40); “It would be very hard for me to leave this coach right now, even if I wanted to”, and “Too much of my sporting life would be disrupted if I decided to leave this coach now”.

An overview of the fit indices of BSEM is detailed in Table 1. The exclusion of all informative priors for the three-factor (Model 2a) and unidimensional models (Model 2b) revealed that the probability of these models, given the data, was poor. The addition of informative priors for unintended factor loadings (i.e., cross-loadings) did not substantially improve the probability of both the three-factor (Model 3a) and unidimensional models (Model 3b). The specification of informative priors for unintended factor loadings alongside correlated residuals, however, revealed that the probability of both the three-factor (Model 4a) and unidimensional models (Model 4b), given the data, was good. The DIC values indicated that the three-factor model was a better representation of the data than the unidimensional model. When compared with the unidimensional model, the three-factor model also displayed higher standardized estimates for intended factor loadings, along with smaller residual correlations. Only 16 of the 135 correlated residuals (i.e., 11.85%) were significant for the three-factor model, compared with 87% of the residual correlations for the unidimensional model. An overview of the standardized estimates for intended and unintended factor loadings of the three-factor model are displayed in Table 2. Affective commitment was significantly associated with normative commitment ( $r = .65$ ) but not continuance commitment ( $r = -.23$ ); normative and continuance commitment were unrelated ( $r = .02$ ). For the three-factor BSEM approach (Model 4a), composite reliability estimates (Raykov, 1997) were acceptable for affective, normative, and continuance commitment measures (i.e.,  $\rho = .87, .85, \text{ and } .81$ , respectively).

Prior to examining external aspects of validity, we computed a one-way MANOVA to screen for potential differences on commitment scores according to athletes' competitive level. This analysis revealed a significant multivariate effect,  $F(6, 660) = 2.33, p = .03, \eta_p^2 = .02; \lambda = .96$ ; however, univariate follow-up analyses using a significance level that was adjusted for multiple comparisons (i.e.,  $\alpha = .017$ ) revealed no significant effects for affective ( $F(2, 332) = 3.14, p = .04, \eta_p^2 = .02$ ), normative ( $F(2, 332) = 2.62, p = .08, \eta_p^2 = .02$ ), or continuance ( $F(2, 332) = 1.79, p = .17, \eta_p^2 = .01$ ) scores, indicating that commitment perceptions did not differ significantly across the school-, university-, and community-based athletes.

**External aspects of validity.** An overview of the fit indices of BSEM is detailed in Table 1. All intended loadings were good-to-excellent (i.e.,  $>.50$ ) and significant, with all cross-loadings small and non-significant. Additionally, less than 8% of the residual correlations were significant. Correlations between latent and observed variables are detailed in Table 3. In terms of external aspects of validity, we observed significant positive associations between athletes' affective commitment to their coach and (a) their satisfaction with their coach, (b) their confidence in their coach's ability (i.e., other-efficacy), and (c) their intentions to continue playing their sport and working with the same coach the following season. Normative commitment perceptions aligned positively (and significantly) with these correlates, though all associations were weaker in magnitude than those that were observed for affective commitment. Continuance commitment perceptions, however, were inversely associated with all correlate variables, though only the association with coach-focused intentions was significant. That is, athletes reported less favorable intentions to persist with their coach the following season when they felt strongly that they *needed* to remain with their coach.

## **Study 2: Interdependent-Sport Athletes' Commitment to their Team**

### **Method**

**Participants, procedure, and data analysis.** In this stage, 286 adolescent athletes ( $n_{male} = 139$ ,  $n_{female} = 147$ ,  $M_{age} = 16.31$ ,  $SD = 1.33$ ) nested within 31 single-sex teams were recruited from four interdependent sports, namely soccer ( $n = 96$ ), field hockey ( $n = 77$ ), rugby ( $n = 75$ ), and volleyball ( $n = 38$ ). Athletes were drawn from regional-level competition, and were split between community- ( $n = 183$ ) and school-/university-based ( $n = 103$ ) settings. Participants reported an average of 6.63 years experience in their sport ( $SD = 3.27$ ), had been playing on their current team for an average of 2.77 years ( $SD = 2.06$ ), and typically spent 8.25 hours ( $SD = 3.29$ ) each week training, competing, and/or socializing with their team during the season. As with the individual-sport sample, athletes were asked to confirm that the team in question was their ‘primary’ team. In addition, all athletes were active in competition at the time of questionnaire completion, and the procedures for data collection and analysis were identical to those outlined previously with the individual-sport sample.

### **Measures.**

***Athletes’ commitment to their team.*** The referent of all 17 relationship-based items from Study 1 was modified in order to focus on athletes’ team-based experiences (see Appendix). Using the response scale outlined in Study 1, respondents were instructed that, “below are a series of statements that may or may not be reflective of your feelings about this sports team; please respond to all the statements according to how you feel about your membership on this team right now at this moment in time.” Readability analyses for this version of the instrument indicated that the 17 items achieved a Flesch-Kincaid Grade Level of 5.1.

***Satisfaction with team performance.*** We measured athletes’ general satisfaction with their team’s performance using the three-item ‘team performance’ subscale from the Athlete Satisfaction Questionnaire (ASQ; Reimer & Chelladurai, 1998). Using a 1 (*not at all satisfied*) to 7 (*extremely satisfied*) scale, respondents were instructed to “consider your feelings at this moment in time”, and responded to items including, “the team’s overall performance this season”, and “the extent to which the team is meeting its goals for the season”. Reimer and

Chelladurai (1998) demonstrated that measures derived from this ASQ subscale possess acceptable factorial and predictive properties, and more recent research has provided continued support for the validity and reliability of measures derived from this ASQ dimension (e.g., Sullivan & Gee, 2007). In this study, the composite reliability estimate for the measure derived from this instrument was .86.

**Cohesion.** Athletes' cohesion perceptions were measured using the Youth Sport Environment Questionnaire (YSEQ; Eys, Loughead, Bray, & Carron, 2009). The 18-item YSEQ is a two-factor instrument that was designed to measure respondents' appraisals regarding the task- (eight items; e.g., "as a team, we are united") and social-related (eight items; e.g., "some of my best friends are on this team") aspects of team interaction (two spurious negatively worded items are also included; e.g., "our team does not work well together"), and was designed and validated for use with adolescent sport participants. Using a 1 (*strongly disagree*) to 9 (*strongly agree*) scale, athletes were instructed, "below are a series of statements regarding your current feelings about your team; please respond to these statements according to how you feel about your team right at this moment in time". Eys and colleagues' (2009) provided support for the proposed two-factor measurement model, and composite reliability estimates for the measures of task and social cohesion in this study were .93 and .92, respectively.

**Intentions to return.** Using the same 1 to 9 response scale as in Study 1, athletes responded to the statements, "at this moment in time, given the choice, I intend to play this sport next season" (i.e., sport-related intentions), and, "at this moment in time, given the choice, I intend to play on the same team next season" (i.e., team-related intentions).

**Data analyses.** See Study 1.

## Results

**Item-level analyses.** Affective commitment items did not deviate from normality as evidenced by skewness (-0.70 to -0.18) and kurtosis (-0.77 to -0.37) statistics. Corrected item-total correlations ranged between .55 and .72, and inter-item correlations were acceptable in the

range .43 to .68 (Hair et al., 2010). Skewness (-0.61 to -0.02) and kurtosis (-0.73 to 0.02) statistics indicated that the distribution of normative commitment items did not deviate from normality; corrected item-total correlations (.45 to .68) and inter-item correlations (.35 to .60) were also in acceptable ranges. Continuance commitment items were normally distributed as evidenced by skewness (-0.16 to 0.47) and kurtosis values (-0.39 to 0.07); corrected item-total correlations were between .46 and .64, and inter-item correlations were adequate (.30 to .61).

**Factorial validity.** With regard to ML-CFA, our analyses revealed that the data displayed a poor fit for the three-factor, 17-indicator model (Model 1a) according to our multiple criteria of model fit,  $\chi^2(116) = 335.84, p < .001$ , CFI = .860, TLI = .836, RMSEA = .081 (90% CI = .071 to .092), SRMR = .097. Affective commitment was significantly associated with continuance ( $r = -.45, p < .001$ ) and normative commitment ( $r = .82, p < .001$ ); in contrast, normative and continuance commitment were unrelated ( $r = -.18, p = .06$ ). The unidimensional model (Model 1b) also displayed a poor fit with the data,  $\chi^2(119) = 656.98, p < .001$ , CFI = .658, TLI = .609, RMSEA = .126 (90% CI = .116 to .135), SRMR = .126.

An overview of the fit indices of BSEM is detailed in Table 1. The exclusion of all informative priors for the three-factor (Model 2a) and unidimensional models (Model 2b) revealed that the probability of these models, given the data, was poor. The addition of informative priors for unintended factor loadings (i.e., cross-loadings) did not substantially improve the probability of both the three-factor (Model 3a) and unidimensional models (Model 3b). The specification of informative priors for unintended factor loadings alongside correlated residuals, however, revealed that the probability of both the three-factor (Model 4a) and unidimensional models (Model 4b), given the data, was good. In line with Study 1, the DIC values indicated that the three-factor model was a better representation of the data than the unidimensional model, and the superiority of the three-factor model was also supported by the strength of factor loadings (i.e., higher standardized estimates) and the degree of correlation among the residuals (i.e., smaller residual correlations). None of the correlated residuals were

significant for the three-factor model, compared with 93% of the residual correlations for the unidimensional model. When parameter estimates constrained by zero-mean, small-variances substantially differ from zero, these deviations suggest that the model may be incorrectly specified in some way, such as the number of latent factors (Muthén & Asparouhov, 2012). An overview of the standardized estimates for intended and unintended factor loadings of the three-factor model is displayed in Table 2. Affective commitment was significantly associated with normative commitment ( $r = .63$ ) and continuance commitment ( $r = -.37$ ); in contrast, normative and continuance commitment were unrelated ( $r = -.14$ ). For the three-factor BSEM approach (Model 4a), composite reliability estimates (Raykov, 1997) were acceptable for affective, normative, and continuance commitment measures (i.e.,  $\rho = .77, .77, \text{ and } .80$ , respectively). As with Study 1, prior to exploring the external aspect of validity, we computed a one-way MANOVA to check for potential differences on commitment scores according to athletes' competitive level; this analysis revealed a non-significant multivariate effect,  $F(6, 562) = 1.39, p = .22, \eta_P^2 = .02; \lambda = .97$ .

**External aspects of validity.** An overview of the fit indices of BSEM is detailed in Table 1. All intended loadings were good-to-excellent (i.e.,  $>.50$ ) and significant, with all cross-loadings small and non-significant. Additionally, less than 18% of the residual correlations were significant. Correlations between latent and observed variables are detailed in Table 4. Strong, positive associations emerged between athletes' affective commitment to their team and (a) their satisfaction with their team's performance, (b) their perceptions of task and social cohesion, and (c) their intentions to continue playing their sport and playing on the same team the following season. Normative commitment scores aligned significantly, and in a positive direction, with these correlates, and in contrast to Study 1, all associations were either similar or slightly greater in magnitude than those that were observed for affective commitment. In line with Study 1, continuance commitment perceptions were inversely associated with all correlate variables, though only the association with team-focused intentions was significant.

## Discussion

A number of authors have considered the multidimensional nature and behavioral implications of sport commitment (e.g., Raedeke, 1997); however, relatively little attention has been directed toward the different dimensions of commitment that may exist regarding the relational and interdependent networks in which athletes' sporting pursuits are couched. Thus, we drew from research in organizational and relationship settings in order to examine support for a model comprising affective, normative, and continuance commitment within sport relationships and teams, and sought to provide preliminary evidence for instruments that were designed to assess these commitment perceptions in coach-athlete exchanges and interdependent team settings. Alongside this substantive focus, we also compared an emerging methodology, namely BSEM (Muthén & Asparouhov, 2012), with the traditional ML-CFA approach for instrument development and validation purposes.

Consistent with our methodological expectations, we demonstrated the flexibility and usefulness of BSEM when compared with the more restrictive ICM of ML-CFA. Indeed, modification indices of our CFA with the 17-item, three-factor representation (Model 1a) showed that overall fit was weakened due to two poorly fitting continuance items and the omission of residual correlations. Our results demonstrated the flexibility and usefulness of BSEM (Muthén & Asparouhov, 2012) as an alternative approach in those instances when the restrictive ML-CFA leads to model rejection. Through a series of progressively informative models in which priors were allocated to cross-loadings and then residual correlations, we revealed support for the original 17-item, three-factor representation of commitment within sport relationships and teams. Additionally, the latent correlations between the three commitment factors were less biased in BSEM when compared with the ML-CFA. As detailed in Table 2, all intended factor loadings were good (i.e.,  $> .50$ ) and cross-loadings were small and non-significant (i.e.,  $< .10$ ). Encouragingly, though none of the residual correlations were significant in Study 2, only a small portion (approximately 12%) of the parameters in Study 1 were deemed of substantive

importance. Moreover, the three-factor model was considered superior to the unidimensional representation because the majority of the residual correlations in the single factor model were moderate and significant in both studies, thereby suggesting that the factor pattern was misspecified (Muthén & Asparouhov, 2012). Collectively, these results indicated that omitted residual correlations appear to have been the source of model misfit for the ML-CFA, and that our data best represented a three-factor measurement model within BSEM. Despite these encouraging findings, however, it is important to recognize that construct validation is an ongoing process, and that further work is required to identify support for, or necessary refinements to, measures derived from these instruments.

Beyond these methodological considerations, our assessment of external aspects of validity provided important substantive insight in the form of inter-relationships between latent commitment variables, and associations with relevant cognitive, affective, and persistence-related correlates. Within our factorial validity modeling, we observed strong, positive correlations between affective and normative commitment in both studies, and despite the conceptual distinction that exists between these dimensions, associations of this magnitude are not atypical in empirical reports (Meyer et al., 2002). Although correlations of this order are not considered to indicate unity/redundancy (Meyer et al., 2002), the shared variance of approximately 40% does demonstrate a degree of overlap between the constructs. This issue has been discussed in detail in the workplace literature, and a number of strategies have been forwarded that may be relevant for teasing apart this association in sporting relationships and teams (for an excellent overview, see Bergman, 2006). For instance, this issue might be addressed, in part, through qualitative work that seeks to examine contextual differences in the meaning individuals ascribe to ‘obligation’. Alternatively, researchers might consider the temporal separation of affective and normative measures during instrument completion, the refinement of normative items in order to remove any affective tone (e.g., removing any reference to ‘feelings’), and partialling out the confounding effects of shared antecedents when computing correlations between the constructs.

Existing evidence for the other inter-relations within the commitment model is equivocal (Meyer et al., 2002); in this investigation, factorial validity analyses demonstrated that affective and continuance commitment were correlated in a negative direction in relationship and team contexts (though this correlation was significant only in Study 2), whereas normative and continuance commitment were unrelated in both studies. The negative associations that emerged between affective and continuance commitment were encouraging at least in terms of directional consistency; however, this study is the first to explore these variables within relational and team contexts, and so it would be somewhat speculative to draw firm conclusions from these data. Future work in sporting contexts will undoubtedly advance our knowledge of the inter-relations between these constructs, and promises to offer valuable insight into the situational and psychosocial factors that might support or disrupt these associations.

From a substantive perspective, our assessment of external aspects of validity also provided preliminary evidence regarding the nomological net associated with these variables. A pattern of correlations emerged that was in part consistent with our hypotheses and the existing workplace literature (see Meyer et al., 2002). Affective commitment scores, reflecting one's emotional attachment to his/her relationship or team, were positively associated with adaptive correlates in both contexts. As anticipated, positive correlations also emerged between normative commitment and correlate variables; in line with our expectations, these associations were weaker in magnitude than those that were observed for affective commitment in Study 1. In Study 2, however, normative commitment displayed positive associations with these correlate variables that were similar to or slightly greater extent than those observed for affective commitment. Although this finding was somewhat unexpected in light of existing organizational findings, the utility of normative perceptions specifically within interdependent sport teams is well established (e.g., Munroe, Estabrooks, Dennis, & Carron, 1999), and it is plausible that the shift in context (i.e., from relationship to team settings) might have accounted for the different pattern of correlations that emerged for between Study 1 and 2. Finally, although many of the

correlations were not significant, athletes in Study 1 and 2 reported relatively lower scores across these desirable correlates when they felt strongly that they had little option but to stay with their coach/team (i.e., strong continuance commitment).

Of particular note within these findings were the negative correlations that emerged between continuance commitment and athletes' intentions to persist with their relationship or team. These associations somewhat contradict existing findings within workplace settings (Meyer & Allen, 1993); however, this finding may be due to contextual disparities and/or measurement issues. From a contextual viewpoint, although individuals who feel locked into their employer might resolve to remain in that organization due to potential financial repercussions and fears regarding re-employment should they leave, the voluntary nature of involvement and the comparative lack of withdrawal repercussions for these athletes may have prompted them to consider looking elsewhere in the face of strong continuance commitment perceptions. Additionally, although we asked athletes whether they intended to remain with their coach/team, we did not obtain any measure of actual retention/turnover, and so we were unable to gauge whether athletes would genuinely have terminated their involvement. Indeed, we simply asked athletes whether, *given the choice*, they would remain with their coach/team. As a result, although those who scored high on continuance commitment might have desired, in an ideal scenario, to leave their coach/team, in practice they may in fact have remained in their current situation (due to the perceived lack of choice that accompanies continuance perceptions). Taken together, these correlations clearly warrant further investigation that incorporates (a) prospective assessments of actual retention/turnover rates, (b) diversified approaches to the measurement of persistence intentions that remove qualifying statements, and (c) the recruitment of athletes for whom sport participation and relationship/team membership may be a more significant concern (e.g., elite performers). Importantly, should this instrument be utilized for data collection with other cohorts (e.g., elite performers, young children), it may be crucial to pilot the items with members of the target population, in order to examine issues associated with relevance and

understanding. Indeed, it is a limitation of this investigation that we did not conduct such work with an adolescent sample prior to questionnaire administration.

The future directions outlined previously promise to contribute to the ongoing process of construct validation in this area; however, it is important acknowledge additional avenues for further investigation that are rooted in our design limitations. First, despite documenting significant correlations with a number of important variables, our cross-sectional designs did not permit insight into the causal nature of these associations. In future, it would be worthwhile to implement repeated measures designs that enable investigation into potential reciprocal patterns among these constructs, as well as to assess causal ordering via manipulating commitment (or antecedent) variables through experimental approaches. Third, given that we employed an indirect recruitment strategy in both studies (i.e., via governing organizations), it is possible that selection biases may have restricted the diversity we were able to observe in commitment perceptions; future work that circumvents this concern through the use of direct (and diversified) sampling would be worthwhile. Fourth, although we focused on independent-sport athletes' commitment to their relationship with their coach, and interdependent-sport athletes' commitment to their team, these athletes undoubtedly also held commitment perceptions in relation to multiple other targets (e.g., commitment to one's training group in independent-sport contexts, and commitment to one's head coach in interdependent settings).

Finally, we would also encourage work in sporting contexts that delineates the relations between commitment and associated concepts (e.g., attitudinal processes, attraction to the group). Perhaps most significantly, scholars within organizational settings have identified and attempted to resolve concerns relating to potential overlap between constructs within Meyer and Allen's (1991) commitment model and those that exist within self-determination theory (e.g., Gagné, Chemolli, Forest, & Koestner, 2008; Gagné & Deci, 2005). These authors, for example, noted the similarities between affective commitment and intrinsic/identified motivation, normative commitment and introjection, and continuance commitment and external regulation. However,

although the authors in each of these studies recognized the close relations that exist between these concepts, they were also consistent in positioning commitment and motivation as distinguishable from one another. Specifically, whereas in a general sense commitment and motivation are both considered to represent an ‘energizing force’, Gagné et al. (2008, p.223) contended that “the target of commitment is an entity (e.g., organisation, person or event), whereas the target of motivation is a course of action (for which movement is necessary)”. They proposed, therefore, that motivation may act as a ‘basis’ for (i.e., may precede) commitment (see also Gagné & Deci, 2005), and presented results from two cross-lagged designs to demonstrate that although motivation influenced (and accounted for between approximately 10% to 50% of the variance in) commitment over time, there was limited evidence of a causal relationship between the constructs in the reverse direction. Thus, in seeking to provide further validity evidence for the multidimensional model of commitment to one’s coach-athlete relationship or sports team, researchers are encouraged to determine if and how individuals’ motivational regulations might orient them toward a particular commitment type or profile.

On a substantive level, these studies underscored the importance of examining commitment through a multidimensional lens; in addition to establishing support for a three-factor model, each of the constructs within this framework also aligned with interpersonal and persistence-related correlates. Taken together, it appears that the study of affective, normative, and continuance commitment perceptions (both together and in isolation) might provide novel information about the psychological factors that anchor athletes’ participation in sport.

Meanwhile, from a methodological perspective, these studies demonstrated the utility of BSEM in comparison to ML-CFA for the purpose of instrument validation, and provided preliminary evidence supporting the continued use and refinement of these measures. With particular relevance for our understanding of relational processes and group dynamics in sport, we encourage further research regarding the measurement, conceptualization, antecedents, and implications of commitment to one’s relationship and/or team.

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Table 1. BSEM results for Studies 1 ( $n = 335$ ) and 2 ( $n = 286$ ).

Measurement Model	# free parameters	$\Delta$ Observed and Replicated $\chi^2$ 95% CI		PPP	DIC	pD
		Lower 2.5%	Upper 2.5%			
Study 1 – Commitment to one’s Relationship						
Model 2a	54	180.94	266.16	.000	16080.42	54.33
Model 2b	51	969.38	1050.89	.000	16863.63	50.60
Model 3a	88	80.43	183.58	.000	16008.35	77.04
Model 3b	51	1010.88	1101.72	.000	16905.36	48.11
Model 4a	224	-52.58	51.59	.54	15966.35	166.27
Model 4b	187	-50.28	50.55	.51	15971.38	169.15
External validity model	900	-153.18	69.32	.79	34279.18	695.50
Study 2 – Commitment to one’s Team						
Model 2a	54	242.43	326.79	.000	15186.01	54.51
Model 2b	51	624.80	709.03	.000	15566.69	50.75
Model 3a	88	160.64	247.47	.000	15121.73	70.80
Model 3b	51	680.72	780.86	.000	15626.94	47.19
Model 4a	224	-55.93	50.24	.56	15009.20	165.67
Model 4b	187	-49.09	55.09	.46	15018.27	168.95
External validity model	989	-153.51	86.94	.72	37158.01	720.87

*Note:* PPP = posterior predictive  $p$  value; CI = credibility interval; DIC = deviance information criterion; pD = estimated number of parameters; BSEM = Bayesian structural equation modeling. We examined exact zero cross-loadings and residual correlations for the three-factor (Model 2a) and unidimensional models (Model 2b). Second, we applied approximate zero cross-loadings and exact zero residual correlations for the three-factor (Model 3a) and unidimensional models (Model 3b). Finally, we examined approximate zero cross-loadings and residual correlations for the three-factor (Model 4a) and unidimensional models (Model 4b).

Table 2. Standardized BSEM factor loadings using informative priors for cross-loadings and residual correlations for Studies 1 and 2 (Model 4a).

Item	Study 1 – Commitment to one’s Relationship ( <i>n</i> = 335)			Study 2 – Commitment to one’s Team ( <i>n</i> = 286)		
	Affective	Normative	Continuance	Affective	Normative	Continuance
1	<b>.69*</b>	.06	-.05	<b>.63*</b>	.05	-.01
2	<b>.75*</b>	-.04	-.03	<b>.64*</b>	.02	.00
3	<b>.72*</b>	.04	-.04	<b>.62*</b>	.01	-.02
4	<b>.73*</b>	.03	.01	<b>.63*</b>	.01	-.02
5	<b>.76*</b>	.02	.01	<b>.60*</b>	.02	.01
6	-.08	<b>.67*</b>	-.01	-.04	<b>.62*</b>	.02
7	-.02	<b>.66*</b>	.00	-.02	<b>.54*</b>	.04
8	.01	<b>.67*</b>	.05	-.02	<b>.58*</b>	.04
9	.02	<b>.71*</b>	-.01	.02	<b>.62*</b>	-.08
10	-.01	<b>.75*</b>	.06	-.03	<b>.61*</b>	.02
11	.05	<b>.68*</b>	-.07	.03	<b>.63*</b>	-.06
12	-.02	.00	<b>.63*</b>	-.02	-.04	<b>.62*</b>
13	.02	.01	<b>.66*</b>	.01	.00	<b>.66*</b>
14	-.05	-.05	<b>.64*</b>	-.01	-.03	<b>.60*</b>
15	-.01	-.04	<b>.61*</b>	-.02	.01	<b>.64*</b>
16	.05	.01	<b>.67*</b>	.03	.04	<b>.62*</b>
17	.06	.07	<b>.66*</b>	.02	.03	<b>.60*</b>

*Note:* Item numbers correspond with those presented in Appendix. Bolded values indicate intended factor loadings. Statistically significant loadings (marked with asterisks) have a 95% credibility interval (CI) that does not span zero.

Table 3. Composite-level descriptive statistics and latent factor correlations for Study 1 derived from external validity model.

Variable	<i>M (SD)</i>	Skew.	Kurt.	2	3	4	5	6	7	8	9	10
1. Affective comm.	4.71 (1.09)	-.09	-.25	.71*	-.39	.71*	.75*	.54*	.48*	.13*	.18*	.18*
2. Normative comm.	4.79 (.98)	-.27	.20	-	-.25	.53*	.61*	.42*	.46*	.08	.22*	.20*
3. Continuance comm.	4.15 (.91)	-.36	.49	-	-	-.37	-.42	-.19	-.28*	.07	.07	.06
4. Satisfaction	5.40 (.98)	-.25	-.42	-	-	-	.79*	.38*	.34*	.06	.18*	-.06
5. Other-efficacy	3.89 (.64)	-.18	-.55	-	-	-	-	.42*	.39*	.08	.12*	.02
6. Intention (sport)	7.81 (1.03)	-.58	-.30	-	-	-	-	-	.48*	.12*	.17*	.17*
7. Intention (coach)	6.68 (1.35)	.02	-.61	-	-	-	-	-	-	.09	.11*	.15*
8. Experience	5.73 (3.53)	.60	-.02	-	-	-	-	-	-	-	.15*	.53*
9. Hr/wk with coach	6.75 (4.94)	2.24	4.01	-	-	-	-	-	-	-	-	.20*
10. Relationship length	2.89 (2.47)	1.47	1.77	-	-	-	-	-	-	-	-	-

*Note.* Skew. = skewness; Kurt. = kurtosis. Commitment and satisfaction perceptions measured 1 to 7, where higher values denote greater commitment/satisfaction. Other-efficacy measured 1 to 5, and intentions 1 to 9, where higher scores represent more positive perceptions. Statistically significant correlations (marked with asterisks) have a 95% credibility interval (CI) that does not span zero.

*Table 4.* Composite-level descriptive statistics and latent factor correlations for Study 2 derived from external validity model.

Variable	<i>M (SD)</i>	Skew.	Kurt.	2	3	4	5	6	7	8	9	10	11
1. Affective comm.	5.10 (1.10)	-.37	-.52	.55*	-.30	.50*	.53*	.44*	.27*	.54*	-.09	.05	.10
2. Normative comm.	5.06 (1.01)	-.24	-.42	-	-.11	.68*	.63*	.62*	.29*	.53*	-.11	.16	-.01
3. Continuance comm.	3.83 (.93)	.40	.14	-	-	-.34	-.29	-.28	-.23*	-.32*	-.20*	.05	-.07
4. Satisfaction	4.95 (1.20)	-.53	.38	-	-	-	.80*	.77*	.33*	.62*	-.06	.13	.02
5. Task cohesion	6.56 (1.46)	-.39	-.58	-	-	-	-	.87*	.37*	.65*	-.02	.21*	.02
6. Social cohesion	6.38 (1.68)	-.33	-.86	-	-	-	-	-	.35*	.61*	.10	.29*	.10
7. Intention (sport)	8.20 (1.26)	-1.52	2.19	-	-	-	-	-	-	.53*	.17*	.11	.06
8. Intention (team)	7.15 (1.76)	-.75	.08	-	-	-	-	-	-	-	.09	.10	.09
9. Experience	6.63 (3.27)	-.23	-1.07	-	-	-	-	-	-	-	-	.11	.40*
10. Hr/wk with team	2.77 (2.06)	1.07	.75	-	-	-	-	-	-	-	-	-	.04
11. Tenure on team	8.25 (3.29)	.61	-.19	-	-	-	-	-	-	-	-	-	-

*Note.* Skew. = skewness; Kurt. = kurtosis. Commitment and satisfaction perceptions measured 1 to 7, where higher values denote greater commitment/satisfaction. Cohesion and intentions measured 1 to 9, where higher scores represent more positive perceptions. Statistically significant correlations (marked with asterisks) have a 95% credibility interval (CI) that does not span zero.

## Appendix

### Final Relationship- [and Team-] Based Items

#### Affective Commitment

1. I would be very happy to spend the rest of my sporting life with this *coach* [team]
2. I feel as if *my coach's* [this team's] problems are my own
3. I do not feel a strong sense of belonging *in my relationship with this coach* [to this team] R
4. I do not feel emotionally attached to *my relationship with this coach* [this team] R
5. *My relationship with this coach* [Being part of this team] has a great deal of personal meaning for me

#### Normative Commitment

6. I do not feel any obligation to remain with this *coach* [team] R
7. Even if it were to my advantage, I do not feel it would be right to leave *my relationship with this coach* [this team] now
8. I would feel guilty if I left this *coach* [team] now
9. This *coach* [team] deserves my loyalty
10. I would not leave this *coach* [team] right now because I have a sense of obligation to *him/her* [the people in it]
11. I owe a great deal to this *coach* [team]

#### Continuance Commitment

12. Right now, staying with this *coach* [team] is a matter of necessity as much as desire
13. I feel that I have too few other options to consider leaving this *coach* [team]
14. If I had not already put so much of myself into this *relationship* [team], I might consider *playing under a different coach* [joining a different team]
15. One of the few negative consequences of leaving this *coach* [team] would be the lack of available alternative *coaches* [teams]
16. It would be very hard for me to leave this *coach* [team] right now, even if I wanted to
17. Too much of my sporting life would be disrupted if I decided to leave this *coach* [team] now

*Note.* R = Reverse scored. For team-based items, the material in parentheses replaces the relationship-based material that is presented in italics. Items adapted from Meyer et al.'s (1993) organizational commitment instrument, with permission from the authors.