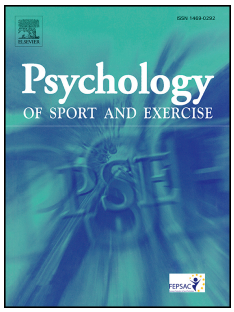
Accepted Manuscript



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PII: S1469-0292(17)30275-3

DOI: 10.1016/j.psychsport.2017.06.004

Reference: PSYSPO 1229

To appear in: *Psychology of Sport & Exercise*

Received Date: 26 April 2017

Revised Date: 14 June 2017

Accepted Date: 16 June 2017

Please cite this article as: Jowett, S., Adie, J.W., Bartholomew, K.J., Yang, S.X., Gustafsson, H., Lopez-Jiménez, A., Motivational processes in the coach-athlete relationship: A multi-cultural self-determination approach, *Psychology of Sport & Exercise* (2017), doi: 10.1016/j.psychsport.2017.06.004.

Motivational processes in the coach-athlete relationship:

A multi-cultural self-determination approach

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Paper submitted for publication in *Psychology Sport and Exercise*

Date of submission: 30th August 2016
Date of resubmission: 21st December 2016
Date of 2nd resubmission: 19th April, 2017

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Abstract

Objective: Grounded in self-determination theory, the present study examined the cultural invariance of a model that hypothesized sport performers' well-being will be predicted by both their perceptions of motivation and the quality of the relationship held with their coach.

Method: Participants (N = 756), originating from five countries (British, Chinese, Greek, Spanish, and Swedish), completed a questionnaire that measured perceived coach-athlete relationship quality, basic psychological need satisfaction, self-determined motivation, and well-being. Structural equation modelling (SEM) was employed to analyze the data.

Results: Analysis revealed that athletes who perceived a high quality relationship experienced heightened levels of basic need satisfaction. Need satisfaction positively predicted self-determined motivation, which, in turn, linked to enhanced well-being. Moreover, mediation analyses supported the explanatory roles of need satisfaction and self-determined motivation within the model. Lastly, multi-sample SEM invariance testing revealed the model to be largely invariant across cultures.

Conclusions: The results support the universal application of self-determination theory and the central role interpersonal relationships play in promoting well-being.

Key words: Coach-athlete relationships, self-determination, basic psychological needs, motivation, optimal functioning.

Motivational processes in the coach-athlete relationship:

A multi-cultural self-determination approach

Self-determination theory (SDT; Deci & Ryan, 1985, 2000) has been applied extensively in sport research to study the *social influences* (e.g., coach behaviors) associated with the motivational processes underpinning athletes' well-being (e.g., Adie & Bartholomew, 2013; Taylor, 2015). It is, therefore, surprising that the SDT-based literature has rarely considered the role of *social relationships* relevant to the motivation and optimal functioning of competitive sport participants (e.g., Felton & Jowett, 2013b). Across the world of sport, the coach-athlete dyad is viewed as a fundamental relationship for determining the motivation and well-being of sport performers (e.g., Jowett, 2007). Drawing from SDT (Ryan & Deci, 2002; Vallerand, 2007), and in extending the motivational model of coach-athlete relationships (Magaeu & Vallerand, 2003), the current study provided a comprehensive test of the motivational processes involved in how perceived coach-athlete relationship quality links to athletes' well-being. Secondly, the cross-cultural invariance of this model was examined across five different countries.

Self-Determination Theory and Well-Being in Sport

Aligned with an SDT approach (e.g., Deci & Ryan, 2008), we define well-being as the self-realization of an individual (athlete) that is optimally functioning, and meaningfully engaged in pursuing their potential in a designated context (sport). To this end, theBasic Psychological Needs Theory (Ryan & Deci, 2002; Taylor, 2015) and the Hierarchical Model of Intrinsic and Extrinsic

Motivation (HMIEM; Vallerand, 2007) are two prominent SDT frameworks applied to enhance our understanding of coaching behaviors relevant to the motivational processes underpinning the well-being of athletes. .

A key assumption of BPNT and the HMIEM is that humans have three innate psychological needs essential for motivation and well-being (Ryan & Deci, 2002; Vallerand, 2007): *autonomy,* is fulfilled when individuals assume personal control over their decision-making and choices (DeCharms, 1968); *competence,* is fulfilled when individuals feel a sense of being effective in the context at hand (White, 1959); and *relatedness,* is fulfilled when individual's feel a sense of belongingness to and by significant others (Baumeister & Leary, 1995).

According to BPNT, the fulfilment of the three psychological needs is assumed to result in enhanced well-being, whereas frustration of one or more of these needs is expected to result in ill-being. Basic need satisfaction is not viewed as an automated process; it requires ongoing support from the social influence of significant others (Ryan & Deci, 2000). In particular, the coach has emerged as a proximal contact in sport settings for influencing the motivation and optimal functioning of athletes (e.g., Jowett & Shanmugam, 2016; Mallet, 2005). Many BPNT-based sport studies have tested the implications of different perceived coaching behaviors (autonomy support and control) on the motivational processes associated with athletes' well-/ill-being (see Adie & Bartholomew, 2013; Taylor, 2015 for reviews).

Despite Deci and Ryan's (2000) assertion that all three psychological needs are essential for

for optimal growth and health to occur; each psychological need has not always independently and consistently predicted indices of well- and ill-being in sport research (e.g., Adie et al., 2012; Quested & Duda, 2010). Such findings may suggest that one need may have a greater functional significance than another in any given setting (Deci & Ryan, 1985; Felton & Jowett, 2013a; Reinboth, Duda & Ntoumanis, 2004). Alternatively, it may also suggest that other motivational processes, in addition to need satisfaction, may be at play in determining athletes' well-being.

The hierarchical model of intrinsic and extrinsic motivation (HMIEM; Vallerand, 2007), a four-stage sequence (social factors → basic need satisfaction → motivation regulations → consequences), has also been applied to provide a comprehensive examination of the motivational mechanisms accounting for how coaching behaviors influence athlete well-being (e.g., Álverez, Balaguer, Castillo & Duda, 2009). According to the HMIEM (Vallerand, 2001), the motivation of an individual (in this case, athlete) is regulated by the degree to which their behavior is more or less self-determined (Ryan & Deci, 2002, 2007). At the highest end of the self-determination continuum is *intrinsic motivation* which represents the inherent satisfaction and enjoyment derived from performing an activity (Deci & Ryan, 1985). *Extrinsic motivation* is regulated by behavior that is concerned with obtaining aseparate outcome other than participating in the activity itself (Ryan & Deci, 2000). It is a multi-dimensional construct represented by: *integrated* (e.g., participating in a behavior that is congruent with one's sense of self), *identified* (e.g., engaging in an activity because the underlying value of it has been accepted), *introjected* (e.g., participating in an activity out of

internal pressures), and *external* (e.g., feeling controlled by external pressures to participate in an activity) forms of regulation (Ryan & Deci, 2007). Finally, *amotivation* reflects the complete absence of self-determination in an activity (Deci & Ryan, 2000).

In accordance with the HMIEM, the motivational regulations have been found to have different antecedents and consequences in the extant sport literature (Vallerand, 2007). The majority of research in the sport domain has found support for the supposition that satisfaction of the psychological needs is essential for experiencing more self-determined motivation, whereas frustrating one or more of the psychological needs has resulted in less self-determined motivation or amotivation (e.g., Pope & Wilson, 2012; Sarrazin et al., 2002). Aligned with theoretical postulates, sport research has also found more self-determined types of motivation (i.e., intrinsic, integrated, identified regulations) to be associated with adaptive consequences (e.g., Álverez *et al.*, 2009; Pelletier, Fortier, Vallerand & Brière, 2001), whereas for less self-determined types of motivation (i.e., introjected, external regulations), and amotivation, they have been maladaptive (e.g., Calvo et al., 2010; Kowal & Fortier, 1999).

In summarizing the extant sport literature that has used both these frameworks, partial support has been evidenced for BPNT (see Adie & Bartholomew, 2013). Research has emerged to suggest that psychological need satisfaction may not only predict the well-being of competitive athletes directly (Quested et al., 2013), but also indirectly via self-determined motivation (e.g., Álverez et al. 2009). Therefore, the HMIEM provides a comprehensive examination of the potential motivational

mechanisms accounting for variance in the well-being of athletes.

Collectively, the findings in the sport literature, guided by these two theoretical frameworks, also point towards key coaching behaviors (e.g., autonomy-supportive, task-involving climates) that have consistently been shown to support basic need satisfaction (and self-determined motivation) for the experience of athlete well-being (e.g., Adie & Bartholomew, 2013; Gagné et al., 2003). Although this line of work holds important implications for theory and practice, it is limited to investigating coach behaviors. A handful of studies (e.g., Felton & Jowett, 2013a; 2013b) have tested the proposition that the coach-athlete relationship may have the potential to explain motivational processes and well-being in sport settings (see La Guardia & Patrick, 2008).

An Extended Motivational Model of Coach-Athlete Relationships and Well-Being

The significance of the coach-athlete relationship for athletes' motivation was emphasized by Mageau and Vallerand (2003). In their motivational model of coach-athlete relationships, three facets of coach behavior (i.e., perceived autonomy support, structure, and involvement) are assumed to predict basic need satisfaction and, in turn, self-determined motivation. The tenets of this model have been empirically supported in the extant literature (Pope & Wilson, 2012). Nevertheless, these three coaching behaviors are not entirely reflective of the interdependent nature of quality coach-athlete relationships where not only behavioral but also cognitive and affective facets are involved (see Jowett &Shanmugam 2016). Thus, the application of this model in understanding the nature and function of coach-athlete relationships and their links to basic need satisfaction and

self-determined motivation is limited. It is therefore necessary to consider an *extended motivational model of coach-athlete relationships* that is conceptualized holistically and can be readily integrated with SDT principles.

The coach-athlete relationship is defined as a state in which a coach's and an athlete's thoughts of commitment, feelings of closeness, and complementarity behaviors are mutually interdependent (Jowett, 2007). Commitment refers to the intent of the coach and athlete to form a close and healthy longstanding partnership. Closeness defines the emotional kinship experienced between the dyad members and is characterized by appreciation, trust, and respect for one another. Complementarity reflects the level of co-operation between the coach and athlete and incorporates behaviors such as friendliness, responsiveness, and willingness as well as the key roles each member undertakes in the dyad. The 3Cs model has received empirical support with athletes and coaches of different ages, genders, and levels of performance (e.g., Jowett & Nezlek, 2012), different types of sport (e.g., Rhind, Jowett & Yang, 2012), personality traits (Yang, Jowett, & Chan, 2015), and different cultural groups (e.g., Yang & Jowett, 2013).

The 3Cs model of the coach-athlete relationship (see Jowett & Shanmugam, 2016), is assumed to hold theoretical implications for athletes' motivation and psychological well-being (Jowett, 2007). To date, seldom sport research exists linking coach-athlete relationship variables to motivational processes and subsequent well-being. This is surprising given Jowett (2005, 2007) has posited that the coach-athlete relationship is a medium in which dyad members' (basic psychological) needs can

be expressed and fulfilled. Although still in its infancy, SDT research has emerged to find that perceived coach-athlete relationship quality (as operationalized by the 3 C's), serves as important determinants of basic need satisfaction (Choi et al., 2013, Felton & Jowett, 2013b; Riley & Smith, 2011), self-determined motivation (Riley & Smith, 2011), and well-being (Felton & Jowett, 2013b).

Riley and Smith (2011) are credited as the first researchers to test Mageau and Vallerand's (2003) model incorporating a relationship perspective. They found the three psychological needs to mediate the positive association between perceived coach-athlete relationship quality (as defined by the 3 C's) and self-determined motivation among young sport participants. In testing BPNT, Felton and Jowett (2013a, 2013b, 2015) conducted a series of studies demonstrating the predictive utility of social relationships in sport (i.e., secure coach-attachment, perceived coach-athlete relationship quality) for satisfaction of the basic psychological needs and subsequent well-being among adult athletes. One novel contribution of this work, in following the approach of relationship researchers in SDT (e.g., La Guardia et al., 2000; Patrick et al., 2007), is that the findings are based on need satisfaction within one's relationship. On the basis that coaches' contribution is instrumental in organized sport, and the quality of the relationship they develop with their athletes forms a platform for experiencing basic need satisfaction, we too deemed it necessary to study relationship need satisfaction. Guided by and extending past research (e.g., Jowett & Felton, 2013b; Riley & Smith, 2011), our study aimed to provide a more comprehensive model of the motivational processes associated with perceived coach-athlete relationship quality and well-being. Drawing from

Vallerand's work specifically (e.g., Mageau & Vallerand, 2003; Vallerand, 2007), this study is the first to test the full sequence of associations between perceived coach-athlete relationships, relationship need satisfaction, motivation and well-being in sport among competitive athletes.

The Universality Concept of SDT

According to SDT (Ryan & Deci, 2002), the basic psychological needs are postulated to be universal regardless of age, gender, setting or culture. In the sport domain, there have been very limited cross-cultural studies testing this universality concept. Quested *et al.* (2013) conducted and found support for invariance of a model predicting basic need satisfaction, enjoyment and intention to drop out of sport among youth soccer players across 5 European countries. Taylor and Lonsdale (2010) also found invariance of a BPNT model predicting vitality and effort across Chinese and UK physical education students. To date, no studies have tested the assumed cross-cultural invariance in the hypothesized relationships between perceived coach-athlete relationships, relationship need satisfaction, motivation, and well-being among competitive athletes. Inaddressing this gap in the literatureour cross-cultural study is the first to test the motivational processes associated with the links between perceived coach-athlete relationship quality and well-being among athletes across five countries. It may generate understanding concerning how the relationship with one's coach, and not merely the influence of their coaches' behaviour, could potentially impact the motivational processes linked to well-being regardless of the cultural background of the athlete. This could suggest the universal importance of developing quality coach-athlete relationships in order to foster

meaningful participation and optimal functioning in competitive sport.

The Present Study: Aims and Hypotheses

In proposing an extended motivational model of coach-athlete relationships (Jowett, 2007, Magaeu & Vallerand, 2003) in the form of the HMIEM (Vallerand, 2007), the first aim of the study was to test a hypothesized model with a four stage sequence: coach-athlete relationship quality → relationship psychological needs → self-determined sport motivation → well-being among multi-national sport participants. Based on the tenets of the HMIEM (Vallerand, 2007), and guided by past research (e.g., Riley & Smith, 2011; Felton & Jowett, 2013a, 2013b), perceived coach-athlete relationship quality was theorized to positively predict athletes' basic need satisfaction within their relationship. Relationship need satisfaction was expected to positively correspond to self-determined motivation, which in turn, would lead to enhanced well-being.

The second aim of the study was to test the mediational role of relationship need satisfaction and self-determined motivation in the hypothesized model across the five countries. Drawing from the HMIEM (Vallerand, 2007), and guided by past sport research (e.g., Álverez et al., 2009; Riley & Smith, 2011), it was proposed that relationship need satisfaction would directly mediate the link between perceived coach-athlete relationship quality and self-determined motivation. Based on BPNT (Ryan & Deci, 2002) and also the HMIEM (Vallerand, 2007), the present study also aimed to discern whether relationship need satisfaction functions as a direct, or indirect (via self-determined motivation), mediator in the association between perceived coach-athlete relationship quality and

the optimal functioning of athletes.

A final aim of the study was to test the cultural invariance of the hypothesized model. Ryan and Deci (2002) assert that whilst the needs themselves are hypothesized to be universal, and the relations between the psychological needs, self-determined motivation, and well-being should apply across cultures (Deci, et al., 2001; Taylor & Lonsdale, 2010), the means through which the psychological needs are satisfied may vary as a function of culture (Ryan & Deci, 2000). Based on the assumption that the coach-athlete relationship, as evidenced by the 3 C's, is also assumed to be a universal phenomenon (Jowett & Yang, 2012), we also expected high quality coach-athlete relationships to positively predict relationship need satisfaction, although the amount of variance explained in this outcome may differ across cultures. Furthermore, despite potential differences in mean levels, perceived support for relationship psychological needs fulfilled by high quality coach-athlete relationships should be positively associated with both optimal motivation and well-being in all cultures, particularly given that needs do not have to be valued explicitly within a particular culture to have functional import (Doyal & Gough, 1991). In sum, we expected our hypothesized mediational model to remain invariant for competitive athletes from different cultural backgrounds.

Methods

Participants and Procedures

Elite athletes from 5 countries, including China (N = 143; Mean age = 19.09 (*SD* = 3.16);

50.30% male), Greece (N = 168; Mean age = 19.84 (*SD* = 5.78); 76.8% male), Spain (N = 137; Mean age = 23.46 (*SD* = 4.67); 80.9% male), Sweden (N= 171; Mean age = 16.78 (*SD* = 1.04); 61.4% male), and UK (N = 137; Mean age = 22.45 (*SD* = 4.53); 62.00% male), voluntarily participated in this study. Athletes competed in 40 different sporting events (length of participation = 7.84 years; *SD* = 4.63), and received training (mean training hours = 11.79 per week; *SD* = 6.29) regularly from their coaches (mean length of relationship = 2.07 years; *SD* = 2.52). Before data collection, approval was obtained from the lead authors' University Ethics Committee. After obtaining informed consent , participants were asked to complete a multi-section questionnaire measuring relationship quality, relationship need satisfaction, motivation, and well-being.

Measures

Coach-Athlete Relationship Questionnaire (CART-Q). The CART-Q (Jowett & Ntoumanis, 2004) assesses athletes' perceptions of the quality of the relationship they have with their coaches within three aspects: closeness ("I trust my coach"; 4 items); commitment ("I am committed to my coach"; 3 items); and complementarity ("I am responsive to his/her efforts"; 4 items). These 11 items were responded to on a 7-point Likert-scale with anchors ranging from "strongly agree" (7) to "strongly disagree" (1). We adopted the translated versions of the scale for Chinese, Greek, Spanish and Swedish participants. Psychometric tests from previous studies supported the validity and reliability of the CART-Q across these countries (e.g., Yang & Jowett, 2012; Balduck, Jowett, & Buelens, 2011), and the internal reliability of the closeness (α = .86 - .93), commitment (α = .74

- .89), and complementarity (α = .79 - .88) subscales was good in the present study. Given the strong inter-correlations between the 3C's (Jowett & Ntoumanis, 2004), and aligned with past SDT research (Riley & Smith, 2011; Jowett & Felton, 2013a,b), we simplified our model by using an overall measure of coach-athlete relationship quality, as indicated by the three CART-Q dimensions.

Basic Need Satisfaction in Relationship Questionnaire (BNRSQ). The BNSRQ (La Guardia et al., 2000) measures the satisfaction of the 3 basic psychological needs within a particular relationship (in this case, the coach-athlete relationship). The stem used in the questionnaire was "when I am with my coach" and athletes responded to 9 items, 3 competence items ("I feel like a competent person"), 3 autonomy items ("I feel free to be who I am"), and 3 relatedness items ("I feel loved and cared about"). Respondents reported how true the items were on a 7-point Likert-scale ranging from "Very true" (7) to "Not true at all" (1). The scale has previously demonstrated sound discriminant and predictive validity as well as good reliability. Following Hambleton's (2005) recommendations, the original scale was translated into Chinese, Greek, Spanish, and Swedish for athletes of these countries to complete. The autonomy (α = .74 - .88), competence (α = .71 - .81), and relatedness (α = .62 - .83) subscales demonstrated acceptable levels of internal reliability. On the basis that the three needs are inter-related constructs (Deci & Ryan, 2000) and in line with past research (e.g., Quested et al., 2013), we formed a single composite variable of relationship need satisfaction using the three subscales as indicators.

Behavioral Regulations in Sport Questionnaire (BRSQ). The BRSQ (Lonsdale, Hodge &

Rose, 2008) assesses each of the behavioral regulations on SDT's self-determination continuum by asking why participants (athletes) participate in their sport. Each item started with a common stem "I participate in my sport…" and participants rated how true the items were for them on a 7-point Likert-scale ranging from "Very true" (7) to "Not true at all" (1). The 6 dimensions of the BRSQ include intrinsic motivation ("because it's fun"; α = .77 - .94), integrated regulation ("because what I do in my sport is an expression of who I am"; α = .71 - .86), identified regulation ("because the benefits of sport are important to me"; α = .67 - .84), introjection ("because I would feel guilty if I quit"; α = .79 - .85), external regulation ("because people push me to play"; α = .78 - .86), and amotivation ("but I question why I continue"; α = .81- .91) and are assessed by 24 items (4 items for each dimension). The BRSQ was originally developed in English and has been shown to have robust psychometric properties (Lonsdale et al., 2008). A Chinese translated version of the scale has also demonstrated good reliability in previous studies (Chan, Hagger, & Spray, 2011). Thus the English and Chinese versions of the scale were adopted and the scale was translated into Greek, Spanish and Swedish following the aforementioned procedure. To reduce the complexity of the model, we computed a relative autonomy index (RAI) from the scores of the 5 BRSQ dimensions which represented athletes' overall levels of self-determined motivation. This approach has been widely used in SDT-based sport research (Álverez et al., 2009). Moreover, Sheldon and colleagues (2015) confirmed the validity of the RAI as a suitable assessment of self-determination levels. Therefore, following the guidelines outlined by Lonsdale et al. (2009), we assigned different

weightings to each type of motivation: intrinsic motivation (+2), integrated motivation (+1), identified motivation (+1), introjection (-1), and external motivation (-2). The RAI was subsequently computed by summing the weighted-item-scores. Four RAI indicators were derived from the 20 BRSQ items.

Warwick-Edinburgh Mental Well-being Scale (WEMWBS). The WEMWBS (Tennant et al., 2007) was developed to measure well-being, a key indicator of mental health. The 14-item measure assesses the following well-being dimensions: affective-emotional ("I've been feeling good about myself"), cognitive-evaluative ("I've been dealing with problems well") and psychological functioning ("I've had energy to spare"). Participants rated how often they experienced the feeling or emotion described in the statement on a 5 point Likert-scale ranging from "All the time" (5) to "None of the time" (1). The original scale was translated into Chinese, Greek, Spanish, and Swedish so that athletes of these countries could complete the multi-section questionnaire. Consistent with the evidence of the convergent validity provided during the scales validation, the reliability indices of the WEMWBS were high (α = .84 - .92) in the present study. To reduce the complexity of the model, the items were parceled to form 5 well-being indicators.

Analysis

Covariance-based structural equation modeling (SEM) using EQS 6.1 (Bentler, 2004) was employed in the present study. Robust maximum likelihood was used to estimate the goodness of fit and paths of the models (Satorra & Bentler, 1988). The goodness of fit was acceptable when the

root-mean square error of approximation (RMSEA) and standardized root-mean square residual (SRMR) were lower than .08 (Hu & Bentler, 1999). Comparative fit index (CFI) and Tucker Lewis index (TLI) greater than .95 was indicative of very good fit (Hu & Bentler), with values greater than .90 interpreted as adequate fit (Bentler, 1990).

Initially, a confirmatory factor analysis (CFA; a saturated SEM model with full covariates between the latent factors) was tested to examine the factor structure and reliability of measurement across the data drawn from the 5 countries. After ensuring the measurement models demonstrated a good fit to the data, single-group structural models were employed (various factor-to-factor paths were inputted for hypotheses testing). Finally, multi-group SEMs were carried out to examine the invariance of the measurement model and structural model across the 5 countries.

Single-group SEM. For the data set from each country, we freely estimated the factor paths in the hypothesized model (i.e., coach-athlete relationship quality → psychological need satisfaction → self-determined motivation → well-being). We also investigated whether mediation existed in the hypothesized associations. Specifically, the following indirect effects were examined: (a) coach-athlete relationship quality on self-determined motivation via need satisfaction (b) need satisfaction on well-being via self-determined motivation and (c) coach-athlete relationship quality on well-being via both need satisfaction and self-determined motivation. Mediation was evidenced when (a) the independent variable (coach-athlete relationship) and the mediator (motivational processes) had significant direct effects on the dependent variable (well-being), (b) the direct effect

of the independent variable on the dependent variable was not significant after controlling the effect of the mediator (Baron & Kenny, 1986), and (c) the indirect effect of the independent variable on the dependent variable was significant (Zhao, Lynch & Chen, 2010).

Multi-group SEM. First, a baseline multi-group model with factor paths and loadings freely estimated across the 5 countries was tested. Once the model demonstrated an acceptable fit to the data, we further tested the invariance of the hypothesized model by systematically constraining the factor loadings and then the factor paths to be equal across the 5 countries (Byrne, 2006). When the constraints decreased the model fit by a CFI value of more than .010, it was concluded that the hypothesized model was not invariant across culture. In addition, the Lagrange Multiplier test (LM test) was employed to examine if certain constraints were responsible for the decrease of model fit. If the decrease of the model fit became less than .010 after releasing the paths indicated by the LM test, we concluded that the hypothesized model was partially invariant.

Results

Preliminary Analysis

The data sets from the 5 countries were screened and there appeared to be no significant multivariate and univariate outliers ($p > .05$) nor an apparent pattern of missing data (<1%). Therefore, the missing values were replaced using the expectation maximization algorithm. CFA of the 5 data sets yielded satisfactory goodness of fit (CFI > .92, TLI > .90, RMSEA ≤.08, SRMR = .08; full model fit indices are presented in Table 1), which supported the factor structure and

convergent validity of the measures used in the study. The correlation matrix and descriptive statistics are displayed in Table 2.

Single-group SEM

Apart from the Chinese sample (CFI = .904, TLI =.882, RMSEA = .101, SRMR = .093) which demonstrated a mediocre fit, the hypothesized model fitted the data acceptably well for all other countries (CFI > .921, TLI >.903, RMSEA <.071 , SRMR < .088; full model fit indices are presented in Table 1). The structural path estimates were in line with our hypothesis across the 5 data sets: positive associations were observed in the relationships between (a) coach-athlete relationship quality and need satisfaction, (b) need satisfaction and self-determined motivation, and (c) autonomous motivation and well-being (all $p < .05$; details are displayed in Table 3). Mediation analyses also supported the explanatory role of need satisfaction and self-determined motivation within the hypothesized model, however partial mediations presented in some of the data sets which implied that the independent variables involved in these mediations were likely to have both direct and indirect effects on the dependent variables (see Table 4).

Multi-group SEM

The baseline multi-group model as well as the models with constrained factor paths and loadings all demonstrated a satisfactory fit to the data. Constraining the factor loadings resulted in a change in the CFI value of .009 and further constraining the structural paths led to a reduction in the CFI of .006 (see Table 5). Therefore, we concluded that the measurement and structural model were

invariant across culture.

Discussion

The aim of the study was to examine the cultural invariance of an integrated coach-athlete relationship and motivational model predicting the well-being of athletes from different nations. Drawing from the HMIEM (Vallerand, 2007), the findings provided strong support for a model in which perceived coach-athlete relationship quality positively predicted athletes' basic need satisfaction within their relationship. Furthermore, relationship need satisfaction predicted higher levels of self-determined motivation, which in turn, led to enhanced well-being. Mediation analyses provided partial support for the explanatory roles of need satisfaction and self-determined motivation within the hypothesized model. Finally, given the multi-national nature of competitive sport, the integrated model was shown to be invariant across the five nations examined. These results provide support for the universal application of self-determination theory and corroborate the integration of a coach-athlete relationship and motivational model.

Beyond Perceptions of Coach Behavior

In line with the tenets of the HMIEM (Vallerand, 2007) and past research (e.g., Felton & Jowett, 2013a,b, 2015; Riley & Smith, 2011), perceived coach-athlete relationship quality positively predicted athletes' basic need satisfaction within their relationship. Whilst limited previous research has examined the impact of closeness, commitment, and complementarity on motivation (e.g., Riley & Smith, 2011) and well-being (Felton & Jowett, 2015), the present study is the first to link

coach-athlete relationship quality as defined by the 3C's, to SDT-based motivational regulations and provides support for the notion that interpersonal relationships have motivational significance in this context cross-culturally. Using the 3C's model to examine athletes' perceptions of the mutual and causal interconnections between themselves and their coach's feelings, thoughts, and behaviors (Jowett, 2007), this study extends previous SDT-based research beyond simply examining the impact of coach behaviors (see Adie & Bartholomew, 2013). The focus on what one person does to another may not accurately reflect what goes on between coaches and their athletes (Jowett, 2005, 2007) and the generated findings provide evidence that the quality of the coach-athlete relationship characterized by care, commitment, and collaboration are strong predictors of motivation and well-being via the satisfaction of psychological needs. Furthermore, it is recognized that successful coach-athlete relationships can take many different forms that of adaptability, flexibility and accessibility as what one athlete wants and needs from a coach can be very different to what another athlete wants or needs (Jowett & Shanmugam, 2016). Ultimately, coach-athlete relationships must be meaningful at the personal and cultural level if they are to promote optimal motivational processes and well-being (Jowett & Yang, 2012).

The present findings provide novel cross-cultural support for Jowett's (2005; Jowett & Shanmugam, 2016) proposition that the coach-athlete relationship is a medium through which the needs of dyad members' can be expressed and, in turn, fulfilled. On average, athletes' perceptions of overall relationship quality were high and equivalent across all five nations. However, whilst

athletes' perceptions of the coach-athlete relationship explained a large amount of the variation in perceptions of need satisfaction among Greek, Swedish and Spanish sub-samples, a smaller amount of variance was explained in Chinese and British sub-samples. Future research should attempt to explain these differing findings by examining the separate components of closeness, commitment, and complementarity in the coach-athlete relationship in order to examine their independent effects on need satisfaction across culture. For example, it may be that perceptions of commitment and closeness play a key role in supporting the psychological needs of Greek athletes and complementarity plays a key role in explaining the variance in need satisfaction scores among Swedish athletes (cf. Jowett & Yang, 2012). In addition, examining the impact of coach-athlete relationship quality on each of the three needs separately may offer further insight into this relationship. For example, Jowett and Felton (2013b) found that British athletes' perceptions of quality coach-athlete relationship predicted levels of competence but not autonomy or relatedness. Is this link a reflection of the purposeful task-focused nature of the coaching relationship (Jowett & Shanmugam, 2016) or a cultural effect: Would this finding hold across countries or would it be specific to some? Would closeness be a stronger predictor of relatedness need satisfaction while complementarity a stronger predictor of competence across cultures or within one particular culture (Greece and Sweden respectively). Thus, future research looking at the individual dimensions of the 3 C's and needs satisfaction in relation to athlete motivation is warranted.

The Universal Application of SDT

In line with SDT, relationship need satisfaction was expected to positively correspond to self-determined motivation, which in turn, was hypothesized to lead to enhanced well-being. In line with previous research (e.g., Gagné et al., 2003; Kowal & Fortier, 1999), the present findings supported this model in each national sub-sample however variations among the size of the pathways and the amount of variance explained in the outcome variables were observed. For example, basic psychological need satisfaction explained a large amount of the variance in self-determined motivation among Chinese athletes, a moderate amount among Greek and Swedish athletes, and a small amount among Spanish and British athletes. As mentioned earlier future research should distinguish between the three psychological needs in order to examine whether one has greater functional significance for motivation and well-being in a given culture (e.g., relatedness in collectivistic cultures). Furthermore, whist higher levels of self-determined motivation predicted well-being across the board, relative autonomy only explained a moderate (among Chinese, Greek, Swedish athletes) to low (among Spanish and British athletes) amount of the variance in this outcome.

SDT views concerning the universal significance of autonomously regulated behaviors have been much debated. For example, Oishi (2000) argued that greater autonomy only yields benefits to people inside a few highly individualistic Western nations where autonomy is valued (e.g., Sweden, Britain). Similarly, Miller (1999) argued that lack of autonomy is not likely to be detrimental within cultures based in authority or tradition (e.g., China, Greece). In contrast, the current findings

indicated that self-determined motivation had a greater influence on well-being among Chinese and Greek athletes and a smaller impact on the well-being of Spanish and British athletes. Whilst this apparent reversal in terms of what would ordinarily be expected among collectivistic and individualistic cultures is interesting (see Hofstede, 2001), it is important to note that the present findings support previous research (e.g., Sheldon et al, 2004; Taylor & Lonsdale, 2010) and indicate that self-determined motivation is associated with well-being in all of the countries and cultures examined.

Thus, our findings provide strong support for the universal nature of the psychological needs and the motivational processes outlined in SDT. However, researchers and theorists continue to debate the cross-cultural importance of autonomy and these arguments often center on the way in which 'autonomy' is interpreted (Kagitcibasi, 1996). It is likely that the arguments proposed by Oishi (2000) and Miller (1999) are based upon an interpretation of autonomy as individualism or independence (Chirkov, Ryan & Willness, 2005). It is, therefore, important to note that SDT explicitly differentiates autonomy (being volitional or endorsing one's goals and actions) from individualism (cultures which focus on the needs of the individual rather than the needs of the collective) and independence (being separate from others). Thus, one can be autonomously interdependent. This is important given that the coach-athlete relationship is defined as a state in which coaches' and athletes' feelings, thoughts and behaviors via the 3Cs are mutually interdependent (Jowett, 2007). Interdependence Theory (Kelley & Thibaut, 1978) explains that

good quality interpersonal relationships are associated with rewards (satisfaction and gratification) and poor quality relationships with costs (dissatisfaction and punishment), while SDT views interdependence (mutual/shared dependence) as lying between two extremes of dependence (complete reliance on the other) and independence (complete separation from other). The notion of interdependence provides an opportunity to nurture one's autonomy in the knowledge that there is always a trustworthy partner nearby to support when need be. It would appear that athletes who find themselves in interdependent or good quality coaching relationships, act with a sense of volition, experience an elevated well-being irrespective of cultural and personal preferences.

Given the postulates of SDT (Ryan & Deci, 2002) and the HMIEM (Vallerand, 2007), another reason for the relatively low explanatory power of self-determined motivation could be because the psychological needs also have a direct effect on well-being and thus explain some of the variation in this outcome (Adie et al., 2012). Support for this argument comes from the results of the mediation analysis in which the direct effect of relationship need satisfaction was consistently stronger than the indirect effect of the needs via self-determined motivation. Furthermore, mediational evidence observed in the current study indicated that need satisfaction had a direct and indirect effect on well-being in Greek and Spanish samples. In line with previous research (e.g., Álverez et al., 2009; Balaguer et al., 2012), this finding provided support for the proposition that self-determined motivation serves as a proximal mediator, and need satisfaction in one's relationship acts as a distal mediator, in the association between relationship quality and well-being (see Vallerand, 2007).

Need satisfaction was also expected to mediate the link between coach-athlete relationship quality and self-determined motivation. However, whilst this hypothesis was supported among Chinese, Spanish, and Swedish athletes, need satisfaction only partially mediated the link between relationship quality and self-determined motivation in British and Greek sub-samples. These partial mediations indicated that the coach-athlete relationship had a direct influence on well-being as well as impacting on it indirectly via self-determination. Furthermore, partial mediations also indicated that perceived coach-athlete relationship quality had direct and indirect effects on athlete well-being (Chinese, Greek, and Spanish). These findings highlight the influential role of the coaching relationship in performance environments (Jowett 2005; Jowett & Shanmugam, 2016).

The third and final study aim was to test the cultural invariance of the hypothesized mediational model. Based on the universality hypotheses (Ryan & Deci, 2002) and past research (Jowett & Yang, 2012; Taylor & Lonsdale, 2010), it was hypothesized that the proposed model would remain equivalent across cultures. Invariance testing supported this expectation and revealed that the factor loadings (the measurement model) and structural paths (the structural model) remained equivalent across culture. Thus, regardless of culture, the more athletes' perceive the coach-athlete relationship to support their basic psychological needs, the more self-determined their motivation, and the greater their well-being. These findings provide substantial support for SDT's prediction that the impact of need support is universally positive for optimal functioning and well-being because it fits with the intrinsic growth tendencies inherent in human nature (Grolnick,

2003; Ryan & Deci, 2002). Thus, the current research has supported the integration of a coach-athlete relationship and motivational model which has universal appeal and can, therefore, generate research findings that should be generalizable across cultures and countries.

Practical Applications

The current research has the potential to supply key stakeholders including coaches and sport psychology consultants with sound theoretical knowledge and empirical evidence to assess the quality of a key relationship in an increasingly multi-cultural coaching context (Gill, 2007). Furthermore, the current findings suggest that the coach-athlete relationship has important links to athlete motivation and well-being which are equivalent across cultures. A major advantage of the 3C's model is its emphasis on the bidirectional nature of the relationship which is manifested through the construct of co-orientation (Jowett, 2007; Jowett & Lorimer, 2013). This construct contains two sets of interpersonal perceptions: direct perceptions (I trust my coach/athlete) and meta-perceptions (My coach/athlete trusts me). The measurement of the 3C's and co-orientation can, therefore, be used to analyze coach-athlete dyads and identify areas of dissimilarity or disagreement across the closeness, commitment, and complementarity dimensions. Thus, future research and applied practice should consider obtaining both athletes and coaches direct and meta-perceptions of the coach-athlete relationship. This will enable problem areas to be identified and should result in improvements in the way that coaches and athletes relate, communicate, and interact with each other. According to the findings of the present research, this, in turn, could lead to improvements in

motivation and well-being among athletes of all nationalities.

Limitations and Additional Future Directions

Whilst the current research provides new insight into how perceptions of coach-athlete relationship quality affect SDT-based motivational processes and athlete well-being, it is important to acknowledge some limitations. First, the cross-sectional nature of the study limits our ability to infer causal relations between the variables. It is possible, therefore, that athletes' well-being influences how they perceive their relationship with their coach. Thus, whilst there is theoretical and empirical support in the SDT literature for the present study's proposed sequence (e.g., La Guardia & Patrick, 2008; Jowett & Felton, 2013b), research adopting a longitudinal design with the opportunity to investigate changes in the coach-athlete relationship over time and both within- and between-subject relations is an important direction for future research. Second, whilst the exclusive use of self-report measures was primarily predetermined by the nature of the variables included in the theoretical model, the use of more objective indicators of well-being would definitely benefit future research (Bartholomew et al., 2011b). Third, our study was limited to predicting the well-being of athletes. It is also important that future research examines how coach-athlete relationship quality is related to ill-being among athletes (e.g., overtraining and burnout). Adopting direct measures of psychological need thwarting (Costa, Ntoumanis, & Bartholomew, 2015) may be particularly helpful in this respect.

Fourth, we used the RAI (see Ryan & Connell, 1989) to form a single variable representing

self-determined behavior in the present study. Despite supporting our hypothesized model across culture, it is possible that using the RAI may have masked over the unique predictive effects of the different motivational regulations that make-up the full self-determination continuum. In light of this debate (see Chemolli & Gagné, 2014), future studies may consider replicating our model using each of the motivational regulations. Fifth, and drawing parallels to the work by Quested et al. (2013), there was over-representation of males in our sample except for one country (China). To help verify past and present findings, we propose that future studies testing the cultural invariance postulate in SDT recruit more homogenous samples (e.g., age, gender, sport) across different countries. Sixth and finally, our claims of universality may have been confounded by constructs derived from a theory of Western origins (SDT; Deci & Ryan, 1985). Complementary studies in which indigenously derived constructs are developed and employed would significantly add to our understanding of culturally specific social-psychological processes and may better account for variation in the functioning of athletes around the world.

In sum, the current findings suggest that aspects of the interpersonal relationship between coaches and their athletes are aligned with athletes' perceptions of SDT-based motivational processes relevant to their well-being. Thus, good quality coach-athlete relationships can play a key role in creating sport environments which support athletes realizing their potential without compromising their health and well-being. Furthermore, the fact that these processes appear to operate in a similar fashion across different countries and cultures provides a basis through which

we can develop cross-cultural competencies relevant to all coaches who are interested in creating athletic partnerships that have a positive impact on the athletes' psychological growth.

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Table 1

Fit indices of single group SEM

	df	Chi-square	NNFI	CFI	RMSEA (90% CI)	SRMR
CFA						
British	71	96.0960	.952	.962	.051 (.019-.075)	.062
Chinese	71	156.0984	.902	.924	.082 (.072-.111)	.077
Greek	71	112.3397	.933	.948	.059 (.037-.079)	.057
Spanish	71	113.227	.990	.992	.030 (.000-.060)	.053
Swedish	71	123.7102	.937	.951	.066 (.046-.085)	.070
Structural Model						
British	74	110.0743	.933	.946	.060 (.034-.082)	.077
Chinese	74	181.1170	.882	.904	.101 (.082-.119)	.084
Greek	74	137.0084	.903	.921	.071 (.052-.090)	.088
Spanish	74	97.9391	.972	.977	.049 (.015-.073)	.093
Swedish	74	129.7314	.936	.948	.067(.047-.085)	.069

Table 2

Correlation matrix and descriptive statistics

		CA-Relation	Basic Needs	RAI	Well-Being	Mean	*SD*	α
British	CA-Relation	1				5.71	0.98	.87
	Basic Needs	.45**	1			4.37	0.70	.77
	SDI	.35**	.20*	1		15.94	5.53	.90
	Well-Being	.17*	.15*	.23**	1	3.72	0.57	.90
Chinese	CA-Relation	1				6.15	1.05	.94
	Basic Needs	.52**	1			4.89	0.87	.73
	SDI	.42**	.67**	1		9.22	5.73	.92
	Well-Being	.42**	.58**	.36**	1	3.69	0.68	.92
Greek	CA-Relation	1				5.85	0.98	.86
	Basic Needs	.73**	1			5.39	1.11	.80
	SDI	.52**	.51**	1		17.58	5.59	.89
	Well-Being	.46**	.52**	.37**	1	4.01	0.56	.84
Spanish	CA-Relation	1				5.48	1.00	.88
	Basic Needs	.66**	1			4.93	0.98	.84
	SDI	.21*	.34**	1		15.45	6.28	.90
	Well-Being	.35**	.40**	.29**	1	3.84	0.60	.89
Swedish	CA-Relation	1				5.79	0.96	.84
	Basic Needs	.74**	1			5.34	1.01	.82
	SDI	.52**	.50**	1		16.43	6.12	.93
	Well-Being	.30**	.35**	.39**	1	3.81	0.59	.88

Note. CA-Relation = coach-athlete relationship; Basic Needs = basic need satisfaction; RAI = relative autonomy index.

* $p < .05$, ** $p < .01$, at 2-tailed.

Table 3

Path estimates and variance explained

Country	Path	β	R^2
British	CA-Relation → Basic Needs	.54**	.29
	Basic Needs → RAI	.27*	.07
	RAI → Well-being	.24*	.06
Chinese	CA-Relation → Basic Needs	.60**	.37
	Basic Needs → RAI	.87**	.76
	RAI → Well-being	.52**	.27
Greek	CA-Relation → Basic Needs	.88**	.78
	Basic Needs → RAI	.61**	.37
	RAI → Well-being	.45**	.20
Spanish	CA-Relation → Basic Needs	.78**	.60
	Basic Needs → RAI	.33**	.11
	RAI → Well-being	.32**	.10
Swedish	CA-Relation → Basic Needs	.88**	.78
	Basic Needs → RAI	.56**	.31
	RAI → Well-being	.41**	.17

Note. CA-Relation = coach-athlete relationship; Basic Needs = basic need satisfaction; RAI = relative autonomy index.

* $p < .05$, ** $p < .01$, at 2-tailed.

Table 4

Mediation analyses

Country	Path	Mediators	Combined Effects	Direct Effect	Indirect Effect	Total Effect
British	CA-Relation → RAI	Basic Needs	.29**	.40**	.11*	.39**
	Needs → Well-being	RAI	.15	.23*	.07*	.21**
	CA-Relation →Well-being	Basic Needs, RAI	.11	.19*	.08*	.19*
Chinese	CA-Relation → RAI	Basic Needs	.14	.51**	.37**	.47**
	Needs → Well-being	RAI	.13	.64**	.52**	.65**
	CA-Relation →Well-being	Basic Needs, RAI	.31**	.49**	.16**	.47**
Greek	CA-Relation → RAI	Basic Needs	.39*	.60**	.20*	.69**
	Needs → Well-being	RAI	.36**	.63**	.23**	.60**
	CA-Relation →Well-being	Basic Needs, RAI	.20*	.39**	.36**	.58**
Spanish	CA-Relation → RAI	Needs	-.04	.21**	.41**	.37**
	Needs → Well-being	RAI	.24*	.48**	.38**	.51**
	CA-Relation →Well-being	Needs, RAI	.20**	.32**	.22**	.41**
Swedish	CA-Relation → RAI	Basic Needs	.16	.57**	.19*	.35**
	Needs → Well-being	RAI	.13	.42**	.31**	.34**
	CA-Relation →Well-being	Basic Needs, RAI	.15	.39**	.21**	.35**

Note. CA-Relation = coach-athlete relationship; Basic Needs = basic need satisfaction; RAI = relative autonomy index.

* $p < .05$, ** $p < .01$, at 2-tailed.

Table 5

Fit indices of multi group SEM

Constraint	df	Chi-square	NNFI	CFI	ΔCFI	RMSEA (90% CI)	SRMR
Free	370	758.689	.912	.923	-	.032 (.028-.036)	.063
All Loading	410	802.852	.905	.914	.009	.036 (.032-.039)	.085
Loading, Paths	422	878.951	.898	.908	.006	.037 (.033-.040)	.121

HighlightsCoach-athlete relationships hold motivational properties regardless of culture.

Rrelationships are situations within which psychological needs are satisfied, and self-determination and athlete potential are realised.

The motivational processes as outlined by SDT can be universallyapplied and understood.