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A multi-study examination of the complementarity dimension of the coach-athlete relationship

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Abstract

This multi-study aimed to examine the complementarity dimension of the coach-athlete relationship in relation to individual and group outcomes, specifically well-being and cohesion. Self-report data was collected from athletes in the UK ($n = 304$). In Study 1 ($n = 106$), mediation analysis demonstrated significant indirect effects between direct and meta complementarity and vitality via basic psychological needs satisfaction. In addition, a significant direct effect between direct complementarity and vitality was also seen, independent of the indirect effect. In Study 2 ($n = 198$), mediation analysis demonstrated significant indirect effects between direct and meta complementarity and task and social cohesion via the basic psychological needs. A significant direct effect between meta complementarity and task cohesion was also identified, independent of the indirect effects. No direct or indirect effects were observed for reciprocal complementarity. Findings highlight the importance of complementarity, and satisfaction of the basic psychological needs, within the coach-athlete relationship for enhancing athletes' feelings of well-being and cohesion.

Keywords: well-being, cohesion, coaches, athletes, relationships

A multi-study examination of the complementarity dimension of the coach-athlete relationship

Within the coaching context, interactions between coaches and athletes consist of attempts to influence the behaviour of each other (Jowett & Arthur, 2019). There is evidence in sport psychology and throughout social, personality, clinical and developmental psychology that an individual's behaviour influences and is influenced by the behaviour of others (e.g., Horowitz, 2004; Jowett & Cockerill, 2003; Mischel & Shoda, 1995). Coaches and athletes' actions and interactions aim to bring about a positive change in performance (e.g., skill development, overall competence and performance, confidence) and well-being related (e.g., positive affect, vitality, overall satisfaction) outcomes. Interpersonal complementarity is a construct that has been employed to assess behaviours that facilitate harmonious interactions between people in any relationship (Tracey, 2002). The principle of complementarity in interpersonal theory states that an actor's behaviour tends to "pull, elicit, invite, or evoke" responses from relationship members who are similar in affiliation (i.e., warmth versus hostility) and opposite in control (i.e., dominance versus submissiveness) (see e.g., Pincus & Ansell, 2013). Subsequently, no complementarity in interactions is often demonstrated when two people pull in opposite directions or their interactions are characterised by divergence as opposed to convergent behaviours. For example, a coach may express hostility, distance or coldness whereas his/her athlete may express friendliness, proximity or warmth in their interactions. Such interpersonal interactions are far from ideal and can create inappropriate or inadequate interpersonal communications and relationships difficulties (see Kiesler, 1996).

In sport literature, complementarity forms a dimension of the 3Cs model of quality coach-athlete relationships (see e.g., Jowett, 2007; Jowett & Shanmugam, 2016). According to this model, complementarity as well as closeness and commitment shape the quality of the dyadic coach-athlete relationship by capturing a coach and an athlete's interpersonal

behaviours, feelings and thoughts respectively. While *closeness* refers to the affective bond that is formed between the coach and athlete and is reflected in feelings of trust, respect, and appreciation, *commitment* refers to their thoughts and intentions to maintain a close relationship over time, *complementarity* reflects athletes' and coaches' interpersonal behaviours that are either *corresponding* or *reciprocal* in nature. Corresponding behaviours encompass *friendliness*, *responsiveness*, *readiness* and *easiness* and are manifested by both a coach and an athlete in an interaction. Reciprocal behaviours capture the behaviours that a coach and an athlete are expected to manifest in their respective roles. Subsequently, a coach's role is to *lead*, instruct and orchestrate (Lyle, 2002) whereas an athlete's role is to *follow*, listen and learn, take initiative (Driska, Kamphoff, & Armentrout, 2012; Giacobbi, Roper, Whitney, & Butryn, 2002). According to Kiesler's (1996) work, corresponding complementarity reflects *affiliation* (friendliness versus hostility and warm versus cold interactions) and reciprocal complementarity reflects *control* (dominance versus submission and directive versus deference-type interactions). Reciprocal behaviours are complementary if they are opposite; for example, coach leads and athlete follows ("mismatch"). While corresponding behaviours are complementary if they are similar and so both the coach and the athlete are friendly to one another ("match"). Complementarity, in traditional interpersonal theory (see e.g., Kiesler, 1996), predicts the likely outcomes of these interactions and relationships. For example, greater complementarity has been found to reduce negative affect (e.g., anger, anxiety) and increase relationship satisfaction and commitment (Sadler, Ethier, & Woody, 2011; Cundiff et al., 2015).

The quality of the coach-athlete relationship as defined by complementarity, commitment and closeness (3Cs) has been highlighted as an important factor for athletes' experiences including but not limited to their perceptions of satisfaction (Jowett & Nezlek, 2011), physical self-concept (Jowett, 2008), collective efficacy (e.g., Hampson & Jowett,

2014; Jowett, Shanmugam, & Caccoulis, 2012), team cohesion (Jowett & Chaundy, 2004), burnout (Isoard-Gautheur, Trouilloud, Gustafsson, & Guillet-Descas, 2016) and well-being (e.g., Davis & Jowett, 2014; Felton & Jowett, 2013). Overall, findings have demonstrated a positive association between high quality coach-athlete relationships and important outcomes. These findings therefore highlight the importance of developing quality coach-athlete relationships that has the 3Cs as its foundation.

In the present study, the focus is on the complementarity dimension of the 3Cs model. While the 3 Cs are thought to be separate yet related dimensions of a model that aims to capture the quality of the coach-athlete relationship (Jowett, 2009; Jowett & Ntoumanis, 2004), rarely are these dimensions examined separately especially in quantitative research (e.g., Jowett, 2008; Rhind & Jowett, 2011). A more in-depth examination of each of the 3Cs may supply additional knowledge as this pertains to their unique functions. Subsequently, based on the assertion that complementarity provides “an indicator of the general interactional harmony in any relationship” (Tracey, 2002, p. 267) and in turn a key factor for satisfying and lasting relationships (e.g., Philippe & Seiler, 2006; Jowett & Cockerill, 2003; Markey & Markey 2007), we hypothesised that perceptions of athletes’ complementarity with the coach associate with higher levels of feeling energetic and spirited as well as more cohesive and united within the team and with team-mates. Moreover, we sought to explore whether these associations can be explained through the satisfaction of athletes’ basic needs. Complementarity as a relationship quality dimension creates a social situation within which athletes and coaches interact (Jowett, 2007) and so we hypothesised that when there is great complementarity, athletes are more likely to feel more fulfilled in terms of their competence in their sport performance as well as autonomy and connectedness relative to their coaches, leading in turn to higher levels of vitality and team cohesion.

Basic psychological needs theory (BPNT; Deci & Ryan, 2000), proposes that humans have three innate psychological needs that are essential for continued motivation and well-being (Ryan & Deci, 2002). These needs include; *autonomy*, the need to feel in control of one's actions (deCharms, 1968), *competence*, the need for effective interaction within a particular context to produce desired outcomes (White, 1959), and *relatedness*, the need feel connected to and understood by others (Baumeister & Leary, 1995). Whilst not being researched extensively, previous research has demonstrated the positive associations that exist between coach-athlete relationship quality and the psychological needs (Choi, Cho, & Huh, 2013; Felton & Jowett, 2013, Jowett et al., 2017; Riley & Smith, 2011). Within this research different approaches to examining the coach-athlete relationship and basic psychological needs were taken, with some employing composite variables and others examining the individual dimensions. In their study of Korean collegiate athletes, Choi et al., examined the associations between each of the 3Cs and each basic need, demonstrating positive associations for commitment and closeness with autonomy and competence, and complementarity with competence and relatedness. In contrast, Felton and Jowett used a composite variable for coach-athlete relationship quality and demonstrated a positive association with competence and relatedness. Finally, Jowett et al., in their multi-cultural study demonstrated positive associations between composite variables of both coach-athlete relationship quality and basic needs.

In addition to the associations that exist between coach-athlete relationship quality and basic needs, the association between the basic needs and individual and group outcomes is of relevance to the current study. While previous research has consistently shown that athletes experience greater well-being when they perceive their psychological needs are satisfied (e.g., Adie, Duda, & Ntoumanis, 2008; Balaguer et al., 2012; Felton & Jowett, 2013), satisfaction of the basic needs has also been shown to be a potential mediating

mechanism in the association between coaching variables (e.g., coaches interpersonal style, coach-athlete relationship quality) and well-being outcomes (see Balaguer et al., 2012; Felton & Jowett; Jowett et al., 2017). Consequently, satisfaction of the basic needs may act as a mechanism through which the coach, through their behaviour towards the athlete, can influence the athletes psychological functioning. Whilst the basic needs have been continually linked with individual factors such as well-being, the association with group level processes is less understood. In one of the only studies to investigate the associations between cohesion and the basic needs, Blanchard, Amiot, Perreault, Vallerand, and Provencher (2009) reported positive associations between team cohesion and each of the basic psychological needs, with the strongest association being to relatedness. These findings warrant further investigation in order to generate better understanding of how group outcomes can be influenced by the basic needs. From a practical point of view, such information could potentially help athletes and coaches appreciate the role of their interpersonal behaviours (complementarity) in fostering a sense of togetherness within their teams.

The present study aimed to examine the specific associations between the complementarity dimension of the 3Cs model and two important outcomes related to performance, namely team cohesion, and well-being, namely vitality. To date, there is only one study that has examined separately the dimension of complementarity (corresponding and reciprocal subdimensions) in an attempt to expand this notion and assess its invariance within the context of the coach-athlete relationship (Yang & Jowett, 2013). As mentioned earlier, corresponding complementarity is displayed when the coach and athlete interact in “matching” ways demonstrating responsiveness and friendliness for example. Reciprocal complementarity is evident when the coach and athlete interact in “mismatching” ways demonstrating dominance (e.g., lead, direct) on the part of the coach and submissiveness (e.g., listen, execute) on the part the athlete. Consistent with previous research in domains

other than sport coaching (Sadler, Ethier, & Woody, 2011; Cundiff et al., 2015), Yang and Jowett found a positive association between athletes' submissive interpersonal behaviours and their satisfaction with the coach-athlete relationship, as well as a positive association between coaches' dominant interpersonal behaviours and their satisfaction with the relationship. This two-study paper extended Yang and Jowett's research in two ways. First, it aimed to further understand the functions of corresponding and reciprocal complementarity relative to athletes' vitality and team unity. Second, it aimed to explore the mechanisms by which corresponding and reciprocal complementarity associates with such important outcomes as personal vitality and team unity guided by basic psychological needs theory.

Study 1

Guided by theory and research, the aim of Study 1 was to examine the association between athletes' perspectives of corresponding complementarity and their experience of well-being, measured through subjective vitality. In addition, the indirect role of basic psychological needs satisfaction was investigated. It was predicted that corresponding complementarity would be positively associated with vitality (Hypothesis 1), corresponding complementarity would be positively associated with basic need satisfaction (Hypothesis 2), basic need satisfaction would be positively associated with vitality (Hypothesis 3), and finally that basic need satisfaction would mediate the association between corresponding complementarity and vitality (Hypothesis 4). The study hypotheses are illustrated in Figure 1.

Method

Participants

One hundred and six athletes, including 39 males and 67 females, participated in the study. The mean age of the participants was 19.91 (SD=1.54). Seventy-one participants

participated in team sports, and 35 participated in individual sports. The participants participated in more than 20 types of sports, with the majority performed in hockey (n=18), football (n=14), rugby (n=12), and water polo (n=12). Thirty-one percent of the participants participated/competed at university level and the rest at club (26%), regional (23%), national (9%), international (10%) and other levels of performance (1%). Twenty-eight participants (26%) had been training with their present coach for two years or more, and the rest 78 participants (74%) had less than two years' training with their present coach. Forty-four participants (42%) had been involved in the sport for 10 years or more, and 62 participants (58%) had less than 10 years' involvement. The participants' coaches consisted of 73 males and 32 females.

Measures

The *Complementarity* dimension of the *Coach-Athlete Relationship Questionnaire* (CART-Q; Jowett, 2009; Jowett & Ntoumanis, 2004) was used to measure athletes' interpersonal behaviours. Both athletes' direct perspective of corresponding complementarity (i.e., When I am coached by my coach, I am at ease; When I am coached by my coach, I am ready to do my best; When I am coached by my coach, I adopt a friendly stance; When I am coached by my coach, I am responsive to his/her efforts) and athletes' meta-perspective of corresponding complementarity (i.e., My coach is at ease when he/she coaches me; My coach is ready to do his/her best when he/she coaches me; My coach adopts a friendly stance when he/she coaches me; My coach is responsive to my efforts when he/she coaches me) were assessed; a total of 8 items. All items were rated on a 7-point scale from "strongly disagree" (1) to "strongly agree" (7).

The *Basic Need Satisfaction in Relationships Questionnaire* (BNSRQ; La Guardia, Ryan, Couchman, & Deci, 2000) was used to measure the extent athletes' basic psychological

needs were satisfied within the context of the coach-athlete relationship. The nine items in the BNSRQ consisted of three items for autonomy (e.g., When I am with my coach, I feel to be who I am), three items for competence (e.g., When I am with my coach, I feel like a competent person), and three items for relatedness (e.g., When I am with my coach, I feel cared about). All items were rated on a 7-point scale from “not at all true” (1) to “very true” (7).

Finally, the *Subjective Vitality Scale* (SVS; Ryan and Frederick, 1997) was used to measure athletes’ mental and physical vitality (e.g., I feel alive and vital; I feel energised). All six items were rated on a 7-point scale from “not at all true” (1) to “very true” (7).

Procedure

The University Ethical Advisory Committee granted ethical approval before data collection was undertaken. Prospective participants were contacted either directly or indirectly via their coaches or club organisers and invited to participate in the study. Athletes were informed of the overall aims of the study and the requirements as well as criteria for participation. Participants who were subsequently agreed to participate, were supplied a questionnaire pack. Each pack contained an invitation participation letter, consent form and the questionnaire; they were either completed in the presence of the test administrator or in the athletes’ own time before being returned to the test administrator in the next training session. The athletes returned the completed questionnaire in an envelope supplied.

Data analysis

The data was screened for normality using SPSS 24 prior to further analysis being performed, with skewness and kurtosis values for all variables falling within the accepted range. Descriptive statistics and bivariate correlations were then performed. Mediation

analysis was conducted using the PROCESS command in SPSS in accordance with the procedures outlined by Hayes (2018) in order to examine the direct and indirect effects. Two mediation analyses were conducted in which the models varied in terms of the independent variable (i.e., direct or meta complementarity) and the covariate (i.e., direct or meta complementarity). The relevant covariate (e.g., direct or meta complementarity), was included in the models due to the significant association that exists between the two independent variables. Within each model the mediating variable (i.e., basic need satisfaction) and dependent variable (i.e., vitality) remained the same. Analysis was conducted using PROCESS Model 4 with the bootstrap resampling set to 5000 and the percentile confidence intervals set to 95%. A significant indirect effect is indicated if the 95% confidence interval (95% CI) does not contain zero (Preacher & Hayes, 2004; 2008).

Results

Descriptive Statistics

Means, standard deviations, Cronbach's alpha coefficients, and correlations for all the variables are presented in Table 1. Athletes in the current study reported moderate to high levels of complementarity, basic psychological need satisfaction, and vitality. Correlations between all study variables were significant, therefore all variables were included within the mediation analysis.

Mediation analysis – Direct effects

Mediation analysis was conducted using Model 4 of the PROCESS macros in SPSS to test the study hypotheses. The direct and indirect effects can be seen in Figure 2. In terms of the direct effects, direct complementarity was significantly positively associated with vitality

and basic need satisfaction, and need satisfaction was positively associated with vitality. Meta complementarity was not significantly associated with vitality.

Mediation analysis – Indirect effects

The results indicated two indirect effects, as shown in Figure 2. In relation to direct complementarity, athletes experiencing higher levels of direct complementarity in their coach-athlete relationship would be likely to perceive greater satisfaction of the basic needs ($a = .36$), and greater satisfaction of the basic needs would increase experiences of vitality ($b = .35$). A bootstrap confidence interval of the indirect effect through basic need satisfaction ($ab = .12$), based on 5000 bootstrap samples, was entirely above zero (.020 to .262). There was also evidence that direct complementarity was associated with vitality independent of its effect on the basic psychological needs ($c' = .29$).

Similar results were evident for meta complementarity. Athletes experiencing higher levels of meta complementarity in their relationship with the coach would likely perceive greater need satisfaction ($a = .52$), and greater need satisfaction would increase vitality ($b = .35$). A bootstrap confidence interval of the indirect effect through competence satisfaction ($ab = .18$), based on 5000 bootstrap samples, was entirely above zero (.056 to .342). In this model there was no evidence that meta complementarity was associated with vitality independent of its effect on the psychological needs ($c' = -.06, p = .91$).

Discussion

The aim of Study 1 was two-fold: (a) to examine the associations between athletes' perceptions of corresponding complementarity (direct and meta) and vitality and (b) to explore whether the satisfaction of basic psychological needs explain the above-mentioned associations. The results demonstrated that while direct corresponding complementarity (e.g.,

When I am coached by my coach, I am responsive to his/her efforts) associated with athletes' perceptions of vitality, meta corresponding complementarity (e.g., My coach is responsive to my efforts when he/she coaches me) did not associate with athletes' vitality, partially supporting hypothesis 1. Nonetheless, both direct and meta-perspective of corresponding behaviours associated with athletes' perceptions of vitality through the satisfaction of basic psychological needs supporting hypotheses 2, 3 and 4. Overall the findings suggest that if an athlete perceives the coach to allow him/her to be responsive, at ease, ready and friendly (direct corresponding complementarity) in their coach-athlete interactions, then this athlete is more likely to experience greater personal vitality, energy and drive. In contrast, a coach's responsiveness, readiness, easiness and friendliness as perceived by the athlete (meta corresponding complementarity) did not seem to directly link with the athlete's experience of vitality. On one hand, it would appear that when athletes perceive the interactions with their coach as friendly, relaxed and responsive for example, are more likely to feel uplifted and strengthened. On the other hand, athletes' vitality won't seem to be affected by how they think their coaches may be rating these interaction (meta corresponding complementarity). So, coaches as far as the athletes are concern may rate positively or negatively these interactions, either way their vitality would not be affected. Subsequently, it is plausible to suggest that direct corresponding complementarity is more important to athletes' vitality (how one thinks directly affects their own feelings) than meta corresponding complementarity (how one believes another person thinks indirectly affects their feelings). This conjecture seemed to be supported by the mediational results where it was found that both direct and meta corresponding complementarity affected athletes' vitality through the satisfaction of their basic needs. The findings are consistent with previous research in the coach-athlete relationship (Choi et al., 2013; Yang & Jowett, 2013) and other types of

relationship including romantic and therapeutic relationships (Sadler et al., 2011; Cundiff et al., 2015).

Study 2

Guided by previous theory and research outlined earlier, the aim of study 2 was to examine not only the direct and meta-perspective of corresponding complementarity but also reciprocal complementarity and their associations with task cohesion and social cohesion. There is a dearth of research that examines the links between the coach-athlete relationship and team cohesion. Previous research (e.g., Jowett & Chaundy, 2004) has shown that closeness, commitment and corresponding complementarity are associated with both social and task cohesion. Based on previous findings, this study aimed to extend them by exploring the mechanisms by which coach-athlete relationship quality (via both reciprocal and corresponding complementarity) associates with team cohesion. The indirect or mediating effects of basic psychological need satisfaction were therefore investigated. It was hypothesised that all forms of complementarity would be positively associated with task and social cohesion (Hypothesis 5), all forms of complementarity would be positively associated with basic needs (Hypothesis 6), basic needs would be positively associated with task and social cohesion (Hypothesis 7), and that basic needs would mediate the association between complementarity and cohesion (Hypothesis 8). The study hypotheses are illustrated in Figure 3a and 3b.

Method

Participants

One hundred and ninety-eight athletes, including 105 males (53%) and 93 females, participated in the study. The mean age of the participants was 20.84 (SD=2.96). The

participants participated in a range of sports, with the majority participating in football (28%), rugby (20%), and netball (19%). Sixty-two percent (n=124) of the participants generally competed at university level, and the rest at club (13%), regional (19%), national (2%), and international level (4%). One hundred and twenty-five participants (63%) had been training with their present coach for two years or more, and the remaining 73 (37%) participants had less than two years' training with their present coach. One hundred and forty-four participants (73%) had been training with their present team for two years or more, and 54 participants (27%) had less than two years' training with their present team. Finally, the participants' coaches in the current sample were mostly male (70%).

Measures

As in study 1, Jowett and Ntoumanis' (2004) and Jowett's (2009) direct and meta-perspective of the corresponding complementarity dimension of the *Coach-Athlete Relationship Questionnaire* (CART-Q), as well as La Guardia et al's., (2000) *Basic Need Satisfaction in Relationships Questionnaire* (BNSRQ) were employed.

In addition, from the *Athlete Submissive and Coach Controlling Behavior Scale*, only the Athlete Submissive Behaviour Scale (ASB-S; Yang and Jowett, 2013) consisting of 4 items, was used to measure athletes' reciprocal complementarity relative to their coach. The 4 items were as follows: I enjoy following my coach's instructions and lead; I am willing to accept my coach's advice and opinion; I am happy to let my coach make the final decisions concerning my training and competitions; I tend to agree with the opinions and suggestions offered by my coach. All items were rated on a 7-point scale from "never" (1) to "always" (7).

Finally, *Group Environment Questionnaire* (GEQ; Carron, Widmeyer, & Brawley, 1985) was used to measure athletes' perceptions of team cohesion, which consists of nine

items of *social cohesion* (e.g., Some of my friends are on this team; I do not enjoy being a part of the social activities of this team; Our team members rarely party together; For me this team is one of the most important social groups to which I belong) and nine items of *task cohesion* (e.g., I do not like the style of play on this team; Our team is united in trying to reach its goal for performance; I'm not happy with the amount of playing time I get; This team does not give me enough opportunities to improve my personal performance; Our team members have conflicting aspirations for the team's performance). All items were rated on a 9-point scale from "strongly disagree" (1) to "strongly agree" (9). Composite variables for task and social cohesion were used in this study in line with previous research examining coaching behaviour and cohesion (e.g., Callow, Smith, Hardy, Arthur, & Hardy, 2009; Jowett & Chaundy, 2004; Smith, Arthur, Hardy, Callow, & Williams, 2013).

Procedure

The University Ethical Advisory Committee granted ethical approval before data collection was undertaken. Prospective participants were contacted either directly or indirectly via their coaches or club organisers and invited to participate in the study. Athletes were informed about the overall aims of the study and the requirements as well as criteria for participation. Participants who were subsequently supplied with a questionnaire pack. Each pack contained an invitation participation letter, consent form and the questionnaire. The packs were either completed in the presence of the test administrator or completed in the athletes' own time before being returned in the next training session. The athletes returned the completed questionnaire in an envelope supplied.

Data analysis

The data was screened for normality using SPSS 24 prior to further analysis being performed, with skewness and kurtosis values for all variables falling within the accepted

range. Descriptive statistics and bivariate correlations were then performed. Mediation analysis was conducted using the PROCESS command in SPSS in accordance with the procedures outlined by Hayes (2018) in order to examine the direct and indirect effects. A series of mediation analyses were conducted in which the models varied in terms of the independent variable (i.e., direct, meta, or reciprocal complementarity), the covariates (i.e., direct, meta, or reciprocal complementarity depending on the independent variable), and the dependent variable (i.e., task or social cohesion). Within each model the mediating variable (i.e., basic need satisfaction) remained the same. Analysis was conducted using PROCESS Model 4 with the bootstrap resampling set to 5000 and the percentile confidence intervals set to 95%.

Results

Descriptive Statistics

Means, standard deviations, Cronbach's alpha coefficients, and correlations for all the variables are presented in Table 2. Athletes in the current study reported moderate to high levels of all three forms of complementarity, basic psychological need satisfaction, task cohesion and social cohesion. Correlations between all study variables were significant, therefore all variables were included within the mediation analysis.

Mediation analyses – Direct effects

Mediation analysis was conducted using Model 4 of the PROCESS macros in SPSS to test the study hypotheses. The direct and indirect effects can be seen in Figures 4a and 4b. In terms of the direct effects, only corresponding meta-complementarity was significantly positively associated with task cohesion with no significant direct effects being found between the various forms of complementarity and social cohesion. Both direct and meta

(corresponding) complementarity were significantly positively associated with basic need satisfaction, and need satisfaction was positively associated with both task and social cohesion. Reciprocal complementarity was not significantly associated with basic need satisfaction.

Mediation analysis – Indirect effects

The results indicated two indirect effects in relation to both task and social cohesion, as shown in Figures 4a and b. For the task cohesion model (Figure 4a), in relation to direct complementarity athletes experiencing higher levels of direct complementarity in their coach-athlete relationship would be likely to perceive greater satisfaction of the basic needs ($a = .51$), and greater satisfaction of the basic needs would increase perceptions of task cohesion ($b = .46$). A bootstrap confidence interval of the indirect effect through basic need satisfaction ($ab = .23$), based on 5000 bootstrap samples, was entirely above zero (.109 to .361). There was no evidence that direct complementarity was associated with task cohesion independent of its effect on basic psychological needs ($c' = -.06$, $p = .71$).

Similarly, athletes experiencing higher levels of meta complementarity in their coach-athlete relationship would be likely to perceive greater basic need satisfaction ($a = .47$), with greater need satisfaction indicating greater perceptions of task cohesion ($b = .46$). A bootstrap confidence interval of the indirect effect through basic need satisfaction ($ab = .22$), based on 5000 bootstrap samples, was entirely above zero (.113 to .345). There was also evidence that meta complementarity was associated with task cohesion independent of its effect on basic needs ($c' = .32$). There were no significant results in relation to reciprocal complementarity.

For the social cohesion model (Figure 4b), associations between direct and meta complementarity and basic needs satisfaction were the same as in the task cohesion model (e.g., $a = .51$ for direct and .47 for meta). Similarly, greater basic need satisfaction would

likely increase perceptions of social cohesion ($b = .46$). Bootstrap confidence intervals of the indirect effect through basic need satisfaction ($ab = .23$ for direct and $ab = .22$ for meta complementarity), based on 5000 bootstrap samples, were entirely above zero (direct complementarity = .114 to .365 and meta complementarity = .112 to .346). There was no evidence that direct complementarity ($c' = .01, p = .93$) or meta complementarity ($c' = .17, p = .20$) were associated with social cohesion independent of their effect on basic needs. As with task cohesion, there were no significant results in relation to reciprocal complementarity.

Discussion

The aim of study 2 was to examine the associations between three forms of complementarity, basic psychological needs satisfaction within the context of the coach-athlete relationship, and perceptions of task and social cohesion. The results highlighted a range of direct and indirect effects between the study variables. There was partial support for hypothesis 5 as there was only one observed significant association between corresponding meta complementarity and task cohesion. Moreover, while corresponding direct and meta complementarity were positively associated with basic need satisfaction, reciprocal complementarity was not. These findings provide partial support for hypothesis 6 and suggest that if an athlete views that their own behaviour and that of the coach is affiliative (their interpersonal behaviours are marked by responsiveness, easiness, friendliness and readiness), then they are more likely to satisfy basic psychological needs (competence, relatedness and autonomy) within their coach-athlete relationship. These findings are in line with previous research (e.g., Hampson & Jowett, 2014; Jowett & Chaundy, 2004). Athletes' perceptions of reciprocal complementarity or interpersonal behaviours that are reflective of their role (listen, execute, filter information etc) was neither associated with perceptions of unity within the team nor with perception of basic needs satisfaction. The lack of association between these two variables may suggest that the role that the athlete plays in relation to the coach doesn't

1 affect one's perceptions of cohesion or belongingness to the larger team. The reasons for that
 2 may be that the athlete may assume a different role within the larger team and hold a different
 3 status and position (Beauchamp, Bray, Eys, & Carron, 2005). Further research is warrant in
 4 order to identify the correlates of reciprocal complementarity and its role within the context
 5 of the coach-athlete relationship. Nonetheless, psychological needs satisfaction was
 6 positively associated with both task and social cohesion thus supporting hypothesis 7.
 7 Therefore, if the athlete perceives that their coach is satisfying their needs for autonomy,
 8 competence, and relatedness they are also likely to perceive a greater degree of task and
 9 social cohesion with fellow mates and within the team.

10 Finally, results in relation to the indirect effect of basic needs provided partial support
 11 for hypothesis 8. Basic needs were found to mediate the association between direct and meta
 12 complementarity and both task and social cohesion, however no significant findings were
 13 found in relation to reciprocal complementarity. These findings suggest that direct and meta
 14 complementarity have a positive indirect impact on perceptions of task and social cohesion
 15 due to the association that exists with basic need satisfaction. If an athlete's interpersonal
 16 behaviour is affiliative relative to his/her coach and if an athlete's perceives that his/her
 17 coach's interpersonal behaviour is affiliative relative to them, then they are likely to satisfy
 18 psychological needs within the coach-athlete relationship and in turn experience higher levels
 19 of unity and belongingness with others in their teams or squads. It should also be noted that
 20 meta complementarity maintained a direct association with task cohesion within the
 21 mediation models, suggesting that perceiving the coach as behaving in an affiliative manner
 22 (responsive, easy, ready and friendly) has a positive influence on perceptions of task cohesion
 23 irrespective of the effect of basic psychological needs satisfaction. The findings of this study
 24 are consistent with Study 1 and previous research (Choi et al., 2013; Felton & Jowett, 2013;
 25 Yang & Jowett, 2013).

General Discussion

This two-study paper added to the limited evidence around the functions of complementarity of the 3Cs model of the coach-athlete relationship quality; it specifically, focused on both corresponding and reciprocal forms of the complementarity dimension relative to their associations with athletes' vitality and team unity. Results from the two studies demonstrated a range of direct effects. In study 1, it was revealed that athletes' own perceptions of affiliation with the coach (i.e., direct corresponding complementarity: athlete perceiving themselves to be responsive, at ease, ready and friendly when coached by their coach) are associated with athletes' feelings of energy, dynamism, determination and passion. Athletes' own perceptions of affiliation seem to enhance their own well-being supporting research in sport (Choi et al., 2013; Felton & Jowett, 2013; Jowett et al., 2017) and elsewhere (Ryff, 1989; Diener & Seligman, 2002). Indeed, meta-analyses show that the link between happy people and high-quality relationships is extremely robust (Lyubomirsky, King, & Diener, 2005).

For example, an athlete's perception of their behaviour (direct complementarity) may be more important for their well-being than their perceptions in relation to how they think their coach behaves towards them (meta complementarity). While direct complementarity is athletes' own perceptions of their responsiveness, readiness, friendliness and easiness – these perceptions are the result of interactions they have had with their coaches. Hence coaches' behaviours are significant in shaping athletes' perceptions of direct corresponding complementarity leading to their well-being. Subsequently, coaches need to ensure that they are creating an environment that allows athletes to feel open, accessible and available (as opposed to withdrawn, hostile and distant). Subsequently, such interpersonal behaviours experienced and manifested by athletes are more likely to have a positive influence on their wellbeing. This result may be linked to coach-created motivational climates (e.g., Duda &

Balaguer, 2007; Smith, Smoll, & Cumming, 2007) and the benefits associated with creating a mastery or task created environment for the athletes to thrive (Brown, Arnold, Reid, & Roberts, 2018); it may also be linked with growth mindset (Dweck, 2008) whereby the environment within the athlete operates values the effort exerted and not one's existing talent or performance, learning is encouraged and failures are viewed as part of one's journey of growth and development.

Whereas in study 2, it was found that athletes' perceptions of their coach affiliation (i.e., meta corresponding complementarity: coach is perceived to be responsive, at ease, ready and friendly when they coach their athletes) are associated with athletes' levels of cohesion. Consistent with previous research, albeit limited research examining relationship factors and group processes (e.g., Hampson & Jowett, 2014; Jowett & Chaundy, 2004; Jowett et al., 2012), coaches' affiliation (as perceived by the athletes) seems to enhance athletes' perceptions of team cohesion and potentially performance, since team cohesion has been found to be linked with performance in meta-analyses (Carron, Colman, Wheeler, & Stevens, 2002). On a different note, the association recorded between direct corresponding complementarity and task and social cohesion was exclusively via the indirect effect of basic needs satisfaction. This finding suggests that athletes whose behaviours are responsive, friendly and helpful are more likely to experience greater task/social cohesion due to the positive impact of these behaviours have on their need satisfaction. It is worth noting that results suggest that for corresponding complementarity to impact an athlete's social cohesion, coaches would need to ensure that athletes' basic psychological needs are satisfied. Thus, if coaching environments are created with the aim to meet the basic psychological needs of connectedness, autonomy and competence (Deci & Ryan, 2000), then it is possible to reach high levels of team cohesion among team-members but also high levels of good quality relationships between athletes and coaches.

The association hypothesised between athletes' reciprocal complementarity and group processes was not supported. Reciprocal complementarity reflects to an extent an athlete's level of being coachable, in other words, willing to learn (by working hard to outperform themselves), actively engaging (by asking question and seeking out feedback), considering alternatives (by being open to suggestions, information) and so on. Coachability may thus be a characteristic of the individual and as such it may be better associated with such individual factors as motivation, confidence and resilience (Favor, 2011) as opposed to group factors (e.g., team cohesion, collective efficacy). Further research is warranted to shed light to the unique functions of the athlete and coach reciprocal complementarity dimension within the context of the coach-athlete relationship.

Overall, these results speak on one hand to the important role coaches play in elevating through their affiliation, or meta complementary behaviours, athletes' sense of task cohesion and on the other hand their athletes' affiliation, or direct complementary behaviours, in enhancing their own well-being. This set of results provide initial evidence of the differential functions of the different forms of complementarity. At the same time, it highlights that complementarity is reflective of quality coach-athlete relationships (Jowett, 2007) that is subsequently instrumental to feelings of their happiness and belongingness (cf. Baumeister & Leary, 1995).

This study also focused on exploring the mechanisms by which corresponding and reciprocal complementarity associate with personal vitality and team unity. Results from the two studies demonstrated a range of indirect effects between the variables. In study 1, findings suggest that well-being, as measured by subjective vitality (Study 1), and team cohesion (task and social, Study 2) are indirectly influenced by the different forms of complementarity through satisfaction of the basic psychological needs within the context of the coach-athlete relationship. In relation to cohesion, direct and meta corresponding

complementarity was indirectly, through basic needs satisfaction, associated with task and social cohesion (see Blanchard et al., 2009). This finding is consistent with previous research highlighting that basic psychological needs is an important mechanism between interpersonal relationships and outcomes (see Jowett et al., 2017). Collectively, the findings uncover the potential functions of the different forms of complementarity as this relates to both the satisfaction of athletes' basic needs and group processes. Not only this study shows the associations that exist between basic needs and both task and social cohesion, but it also emphasises the importance of the psychological needs for increasing athletes' perceptions of both forms of cohesion.

Practical Applications

This research underlines the practical significance of complementarity and basic psychological needs satisfaction within coach-athlete relationships. Within the coach-athlete relationship, interpersonal behaviours that display responsiveness (openness), readiness (willingness), easiness (acceptance) and friendliness (compassion, warmth) are key for both individual-related factors (e.g., vitality, satisfaction, positive affect) and group-related processes (e.g., team cohesion, collective efficacy). Importantly, such interpersonal complementary and collaborative behaviours can shape a positive social environment that is both healthy and psychologically safe (Jowett & Wachsmuth, 2020) and provide a sound platform for building high-performing teams (Edmondson, 1999; Edmondson & Lei, 2014). Future research could explore several avenues related to complementary transactions, both corresponding and reciprocal, and its associations to efficacy (self, other, coaching, collective), stress, conflict, resilience, goal attainment, sport performance and skill improvement to name a few. The satisfaction of basic psychological needs has been a popular mediator within coach-athlete relationship research (Felton & Jowett, 2013, 2017; Jowett et al., 2017). Within the context of coaching, the current findings suggest that coaches and

athletes would benefit from engaging in complementary-type interactions as they would seem to satisfy the basic psychological needs and enhance vitality and unity. Moreover, coaches could provide the athlete with choices and opportunities for involvement in the training to develop autonomy, deliver positive and instructional feedback to enhance competence, and develop a sense of relatedness through taking an interest in the athlete's life outside of sport. This may be particularly relevant for enhancing perceptions of social cohesion as the findings demonstrated no direct associations between complementarity dimensions and social cohesion when the basic needs were included as mediators in the model. Psychological safety may be another potential mediator of the association between the dimensions of the coach-athlete relationship quality including complementarity and outcome variables (see Edmondson & Lei, 2014). For example, complementary may give rise to psychological safety leading to, for example, less interpersonal conflict, more intrapersonal resilience and performance improvement.

Limitations and future directions

Whilst this study provides further evidence for how the coach-athlete relationship, and complementarity in particular, can affect athlete well-being and group processes, there are limitations to acknowledge. Both studies were cross-sectional and therefore the direction of causality between the variables studied is impossible to determine. Previous research has also demonstrated the circular relationship that can exist between cohesion and performance (e.g., Carron et al., 2002), and therefore a circular relationship between cohesion and the independent and mediator variables in the current study could potentially exist. Future research adopting a longitudinal and/or experimental design in order to examine changes in the coach-athlete relationship, basic needs satisfaction, and well-being/cohesion over time is required to confirm the hypothesised associations and check for potential circularity of relationships. Within study 1, we examined athlete well-being through the assessment of

subjective vitality exclusively. Future research may consider examining different aspects of well-being, whilst also considering ill-being to provide a comparison, as previous research has shown the coach-athlete relationship and basic needs to relate to different well/ill-being factors (e.g., Blanchard et al., 2009; Felton & Jowett, 2013). Similarly, future research could examine the basic psychological needs separately in order to understand the associations that exist between the coach-athlete relationship and each individual need. Whilst Ryan and Deci (2017) state that all three needs are important for psychological functioning, and that no hierarchy exists between the needs, understanding the degree to which each need is satisfied could provide insights for potential interventions aimed at enhancing need satisfaction. Finally, the current study focused on the athlete's perceptions of complementarity however the coach-athlete relationship is dyadic in nature and therefore the coaches' perceptions of complementarity should be considered. Capturing the perceptions of coach-athlete dyads would provide a comprehensive picture of the many different ways complementarity (e.g., creating profiles in terms of reciprocal complementarity: dominant/coach and submissive/athlete or corresponding complementarity: capturing difference scores between coaches and athletes direct and meta) impacts important outcomes. This study is one of the first to examine how reciprocal complementarity is related to important processes in sport and therefore more research is needed in order to develop a clearer understanding of exactly what role it plays alongside corresponding complementarity.

To conclude, the current findings suggest that athlete's perceptions of corresponding complementarity are related to well-being and cohesion, with evidence for both direct effects and indirect effects through the satisfaction of basic psychological needs. Therefore, coach-athlete relationships characterised by friendly and responsive interpersonal behaviours, are likely to satisfy athletes' basic needs, and in turn contribute to their levels of energy and unity.

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Table 1. Means, standard deviations, reliability coefficients, and bivariate correlations for all study variables

Variables	1	2	3	4
1. Direct corresponding complementarity	-			
2. Meta-corresponding complementarity	.67	-		
3. Basic psychological needs	.49	.60	-	
4. Vitality	.53	.54	.69	-
Mean	5.75	5.51	4.80	5.21
SD	.84	.84	1.00	1.01
α	.79	.79	.86	.90

Note: All correlations significant at $p < .01$

Table 2. Means, standard deviations, reliability coefficients, and bivariate correlations for all study variables

Variables	1	2	3	4	5	6
1. Direct corresponding complementarity	-					
2. Meta-corresponding complementarity	.73	-				
3. Reciprocal complementarity	.62	.66	-			
4. Basic psychological needs	.65	.67	.50	-		
5. Task cohesion	.41	.49	.37	.54	-	
6. Social cohesion	.42	.46	.37	.54	.68	-
Mean	5.88	5.89	5.88	5.47	6.93	7.26
SD	.62	.76	.67	.91	1.07	1.01
α	.70	.79	.73	.89	.83	.79

Note: All correlations significant at $p < .01$.

Figure 1. Hypothesised model for Study 1 depicting the various study hypotheses. The indirect effect (Hypothesis 4) is the product of the H2 and H3 path coefficients. All pathways were hypothesised to be positive. Note: H1 = Hypothesis 1, H2 = Hypothesis 2, H3 = Hypothesis 3.

Figure 2. Mediation output for the relationships between direct-corresponding and meta-corresponding complementarity and vitality via the mediating variable of basic psychological need satisfaction. Associations between the independent and dependent variables indicate the direct effects.

Figure 3. Hypothesised models for Study 2 depicting the various study hypotheses in relation to a) task cohesion and b) social cohesion. The indirect effect (Hypothesis 8) is the product of the H6 and H7 path coefficients. All pathways were hypothesised to be positive. Note: H5 = Hypothesis 5, H6 = Hypothesis 6, H7 = Hypothesis 7.

Figure 4. Mediation outputs for the relationships between a) Direct-corresponding, meta-corresponding, and reciprocal complementarity and task cohesion and b) Direct-corresponding, meta-corresponding, and reciprocal complementarity and social cohesion, via the mediating variable of basic psychological need satisfaction. Associations between the independent and dependent variables indicate the direct effects.