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A self-determination theory based investigation of life skills development in youth sport

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ABSTRACT

This study investigated if basic need satisfaction and frustration mediated the associations between autonomy-supportive and controlling coaching behaviours and participants' development of eight different life skills in youth sport. British sports participants (N = 309, Mage = 14.71) completed measures assessing the study variables. Correlational analyses showed that autonomy-supportive coaching behaviours were positively associated with the satisfaction of participants' three basic needs (autonomy, competence, and relatedness) and their development of all eight life skills, whereas controlling coaching behaviours were only positively related to the frustration of participants' three basic needs. Mediational analyses revealed that satisfaction of all three basic needs combined (total need satisfaction) mediated the associations between autonomy-supportive coaching behaviours and participants' development of the eight life skills. Relatedness satisfaction mediated the associations between autonomy-supportive coaching behaviours and participants' development of all eight life skills except for goal setting; autonomy satisfaction mediated the associations between autonomy-supportive coaching behaviours and participants' time management skills; and competence satisfaction mediated the associations between autonomy-supportive coaching behaviours and participants' goal setting and emotional skills. Based on such findings, coaches should look to display autonomy-supportive behaviours that help to satisfy participants' three basic psychological needs and promote their life skills development in sport.

Life skills have been defined as "functional skills that individuals develop in one context (such as the home, school, sport, community, workplace) and that are also used effectively in other contexts beyond that in which they were learnt" (Williams et al., 2020, p. 5). Examples of life skills include leadership, problem solving, time management, and communication skills. Such life skills are vital as evidence suggests that young people utilize the life skills learned through sport in other important life domains such as education, the workplace, and personal relationships (Kendellen & Camiré, 2019). Moreover, past research has highlighted that life skills help promote young people's health, academic achievement, and occupational success (Steptoe & Wardle, 2017). As such, it is important that young people develop life skills that will help them to live healthy, happy, and productive lives, where they contribute positively to their family and wider society.

Youth sport has been identified as a key context in which young people's life skills can be developed (Johnston et al., 2013; Holt et al., 2017). To begin with, the popularity of youth sport makes it an important developmental context for young people (Holt et al., 2020). Moreover, the interactive, social, emotional, and competitive nature of sport provides ample opportunities for development (Camiré & Kendellen, 2016; Danish et al., 2004; Fraser-Thomas et al., 2005; Hellison et al., 2008). Nonetheless, it is important to note that some researchers have provided a critique of the life skills development

through sport literature. The foremost examples include Coakley's (2016) questioning of the inherent goodness of sport for young people's development and Ronkainen et al.'s (2021) suggestion that the research literature has prematurely narrowed its focus onto life skills which are "deemed functional, teachable and economically productive" (p. 214). This being said, numerous studies have shown that young people develop a range of life skills through sport (e.g., Mossman & Cronin, 2019; O'Connor et al., 2020; Tamminen et al., 2020).

But how exactly do young people develop life skills through sport? Several researchers (e.g., Bean et al., 2018; Holt et al., 2017; Turnnidge et al., 2014) have suggested through their models for life skills development that life skills can be developed both implicitly and explicitly in sport. Participants are said to develop life skills implicitly when the sports context is well structured, and coaches, parents and peers create a positive developmental climate (Bean et al., 2018; Holt et al., 2017). Additionally, it has been proposed that participants will develop life skills explicitly when a life skills focus exists that involves discussing and practicing life skills in the sport (Bean et al., 2018; Holt et al., 2017). Other models have sought to describe how young people develop their life skills through sport (e.g., Gould & Carson, 2008; Pierce et al., 2017). Models proposed by Gould and Carson (2008) and Pierce et al. (2017) have suggested that the inherent demands of the sport, programme design, coach characteristics, direct and indirect

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teaching strategies, the social environment, and the utility of life skills all play a part in the development of life skills in sport. Alongside such models, Newman et al. (2017) proposed that experiential learning theory could help explain how young people develop their life skills through sport. Despite these important developments in the research literature, few theory-based quantitative studies have been conducted to uncover the exact pathways or mechanisms by which young people develop a range of life skills through sport (Jørgensen et al., 2020; Williams et al., 2020).

A theory that can be used for examining life skills development in youth sport is Self-Determination Theory (SDT; Hodge et al., 2016; Ryan & Deci, 2017). Ryan and Deci (2017) proposed via SDT that certain social/environmental conditions are needed for people to develop optimally. In sport, the coach is a key agent of the social environment who can help to either foster or forestall an athlete's life skills development (Martin & Camiré, 2020; Pierce et al., 2017). Within SDT, coaching behaviours can be categorized as autonomy-supportive and controlling (Haerens et al., 2018). Autonomy-supportive behaviours include providing choice within boundaries, a rationale for tasks, opportunities to take initiative, competence feedback, and acknowledging athletes' feelings and perspectives (Mageau & Vallerand, 2003). Controlling behaviours include the use of tangible rewards, controlling feedback, excessive personal control, intimidating behaviours, promoting ego-involvement, and conditional regard (Bartholomew et al., 2009). Ryan and Deci (2017) suggested that an autonomy-supportive environment will foster young people's development, whereas a controlling environment will frustrate young people's development (Reeve et al., 2004). Indeed, past studies have shown that coach autonomy support is positively related to athletes' well-being (Haerens et al., 2018), engagement (Delrue et al., 2019), mental toughness (Mahoney et al., 2014), and the development of life skills (Cronin & Allen, 2015; Cronin & Allen, 2018). Conversely, controlling coaching has been negatively associated with athlete's well-being (Haerens et al., 2018), engagement (Delrue et al., 2019), and mental toughness (Mahoney et al., 2014). Regarding life skills development, research is required to examine whether both autonomy-supportive and controlling coaching behaviours are associated with participants' learning of life skills in youth sport.

In addition to autonomy-supportive and controlling coaching behaviours, another aspect of SDT in sport is the extent to which people's basic psychological needs for autonomy, competence, and relatedness are either satisfied or frustrated (Ntoumanis et al., 2017). Autonomy refers to the need to self-regulate one's experiences and actions; competence pertains to the need to feel effective or have a sense of mastery in one's activities; and relatedness refers to feeling social connected and cared for by others (Ryan & Deci, 2017). Both basic need satisfaction (BNS) and basic need frustration (BNF) have been examined in sport (e.g., Balaguer et al., 2012; Bartholomew et al., 2011; Ntoumanis et al., 2017). Within sport, researchers have suggested that autonomy-supportive coaching behaviours help satisfy participants' three basic psychological needs; and, in turn, promote adaptive outcomes in sports participants (Bartholomew et al., 2011; Ntoumanis et al., 2017). In contrast, controlling coaching behaviours are said to frustrate

participants' basic psychological needs; and, in turn, negatively impact positive outcomes in sports participants (Bartholomew et al., 2011; Ntoumanis et al., 2017). These propositions support Vansteenkiste and Ryan's (2013) idea that need satisfaction helps facilitate a person's development, whereas need frustration undermines a person's development. Some past SDT-based studies in sport have addressed autonomy-supportive coaching, controlling coaching, BNS and BNF. For example, in a cross-sectional study with 221 Australian youth cross-country runners, Mahoney et al. (2014) found that coach autonomy support and BNS were positively related to runner's mental toughness, whereas controlling coaching behaviours and BNF were negatively related to runner's mental toughness. Additionally, in an experimental vignette-based study involving 101 Belgian Judo players, Delrue et al. (2019) found that autonomy-supportive coaching behaviours and BNS were positively associated with athlete engagement, whereas controlling coaching behaviours and BNF were negatively related to athlete engagement.

In terms of life skills development, Hodge et al. (2016) highlighted that SDT could be used to investigate and promote participant's life skills in sport. These researchers proposed via their conceptual model for life skills development that coach autonomy support is positively associated with participant's BNS, which, in turn, is positively associated with their life skills development. Through their model for life skills development, Hodge et al. (2016) also suggested numerous processes that help explain the mechanisms by which young people develop life skills in sport. To begin with, these researchers proposed that an autonomy-supportive coaching climate should help nurtures participants' three basic psychological needs. In turn, nurturing of the three basic psychological needs is suggested to cause participants to internalize the values or life skills emphasised in their sport and the displaying of such life skills in practice. Finally, Hodge et al. (2016) proposed that the internalization of the three basic psychological needs should result in participants developing the ability to generalize the life skills they have learned in sport to other life contexts such as school, family or work. Past research in youth sport has supported the idea that coach autonomy support (Cronin & Allen, 2015, Cronin & Allen, 2018) and BNS (Taylor & Bruner, 2012) are associated with participant's life skills development in sport. Further supporting Hodge et al.'s (2016) propositions, research involving 445 Canadian youth sport participants found positive associations between coach autonomy support measured at mid-season, participants' BNS at the end of the season, and the development of initiative, personal and social skills at the end of the season (Bean et al., 2020).

Including both BNS and BNF, Cronin et al. (2019) investigated students' development of life skills in physical education (PE) using a cross-sectional study design. After surveying 407 British and Irish PE students, these researchers found that autonomy and relatedness satisfaction mediated the positive associations between autonomy-supportive teaching and students' learning of a range of life skills including teamwork, interpersonal communication, time management, social skills, goal setting, leadership, emotional skills, problem solving and decision making. Furthermore, satisfaction of students' need for competence mediated the positive

associations between autonomy-supportive teaching and students' development of leadership, teamwork, and goal setting skills. When examining BNF, Cronin et al. (2019) concluded that frustration of the three basic needs did not mediate any potential relationships between controlling teaching and students' development of life skills in PE. In fact, contrary to Cronin et al. (2019) hypothesis, controlling teaching behaviours were not negatively related to students' life skills development in PE. Nonetheless, previous youth sport research conducted by Delrue et al. (2019) found negative associations between controlling coaching and athlete engagement, along with negative relationships between BNF and athlete engagement . Similarly, in their research with youth sport participants, Mahoney et al. (2014) found that BNF mediated the negative associations between controlling coaching and an athlete's level of mental toughness.

The current study

Taking account of the studies highlighted above and expanding upon Cronin et al.'s (2019) research in PE, the current study sought to examine how coach autonomy support, controlling coaching, BNS and BNF either positively or negatively related to participants' life skills development in youth sport. Given the differences between PE and youth sport (e.g., compulsory versus voluntary participation, multisport versus single sport offering, hours of participation per week), this study will add to our understanding of how exactly young people develop their life skills within the context of youth sport. This is a novel addition to the research literature as few studies have investigated if SDT or other theories explain the pathways implicated in young people's life skills development through sport (Jørgensen et al., 2020; Williams et al., 2020). Such a study is warranted as a long-standing criticism of the literature is the lack of quantitative theory-based studies investigating life skills development in sport (e.g., Hodge et al., 2016; Holt & Jones, 2008; Newman et al., 2017; Williams et al., 2020). Moreover, theory-based studies which explain how participants learn life skills in sport will better inform coaches and life skills programme organizers how they can best promote young peoples' development through sport.

The main objective of this study was to examine participants' development of life skills through sport using SDT (Ryan & Deci, 2017). The first aim was to examine if BNS would mediate the associations between autonomy-supportive coaching behaviours and participants' development of life skills through sport. In line with the tenets of SDT (e.g., Hodge et al., 2016; Vansteenkiste & Ryan, 2013) and past research findings (e.g., Bean et al., 2020), we hypothesized that BNS would mediate the positive associations between autonomy-supportive coaching behaviours and participants' development of eight different life skills. The second aim of this study was to assess if BNF would mediate the associations between controlling coaching and participants' development of life skills in sport. In line with past studies in sport (e.g., Delrue et al., 2019; Mahoney et al., 2014) and SDT-based propositions (Vansteenkiste & Ryan, 2013), we hypothesized that BNF would mediate the negative associations between controlling coaching and participants' development of eight different life skills.

Methods

Participants

Our participants included 309 sport participants (M_{age} = 14.71, SD = 1.64, range = 11–18 years) and comprised of both males (n = 150) and females (n = 159). Participants were predominantly English (82.2%), with a smaller number of other ethnicities also included (e.g., mixed race, Irish, and Indian). These participants were taking part in club sport at a competitive level (Bean et al., 2021), took part in their main sport for an average of 4.38 hours per week (SD = 3.87), had participated in their sport for 6.12 years (SD = 3.70), and were with their current coach for an average of 2.87 years (SD = 2.28). The main sports represented in the sample were soccer (n = 93), field hockey (n = 62), basketball (n = 22), dance (n = 20), netball (n = 19), and rugby union (n = 15). A small number of participants took part in 28 other sports (e.g., swimming, badminton, track and field). Along with their main sport, participants were taking part in 0–6 other sports (M = 0.91; SD = 1.17). Participants completed the measures outlined below in relation to their main sport and head coach.

Measures

Autonomy-supportive and controlling coaching

Autonomy-supportive coaching was measured via a scale (see supplementary materials) previously used by Cronin et al. (2019). Example items from the 10-item scale include "Listens to how athletes would like to do things" and "Encourages athletes to use their initiative". The controlling subscale of the Empowering and Disempowering Motivational Climate Questionnaire (Appleton et al., 2016) was used to measure controlling coaching. Example items from this 10-item scale include "Shouts at athletes in front of others to make them do certain things" and "Pays less attention to athletes if they displease him or her". The item stem for each scale was "My coach … " and participants answered on a scale anchored from 1 (*strongly disagree*) to 5 (*strongly agree*). Cronin et al. (2019) supported the validity and reliability of the autonomy support scale in PE, and Appleton et al. (2016) provided evidence for the validity and reliability of the controlling scale in sport. After the removal of one controlling item ("Mainly uses rewards/praise to make athletes complete all the tasks he/she sets during training/practice") which displayed a poor factor loading (FL = .44), confirmatory factor analysis (CFA) supported the factorial validity of a two-factor model including autonomy-supportive and controlling coaching behaviours (see supplementary materials). The alpha coefficients for autonomy-supportive and controlling coaching were .94 and .92 respectively.

Basic needs satisfaction and frustration

Psychological need satisfaction was measured using the Basic Need Satisfaction in Sport Scale (BNSSS; Ng et al., 2011). This 20-item scale assesses three factors: competence satisfaction ("I feel I am good at my sport"), relatedness satisfaction ("I have close relationships with people in my sport"), and autonomy

satisfaction, which contains items related to volition ("I feel I participate in my sport willingly"), choice ("In my sport, I get opportunities to make choices"), and internal perceived locus of causality ("In my sport, I feel I am pursuing goals that are my own"). Participants respond to items on a 1 (*not true at all*) to 7 (*completely true*) response scale. Ng et al. (2011) supported the validity and reliability of this scale in sport. Need frustration was assessed using the Psychological Needs Thwarting Scale (Bartholomew et al., 2011). This scale uses the item stem "In my sport . . . " and assesses autonomy frustration ("I feel forced to follow training decisions made for me"), competence frustration ("There are situations where I am made to feel inadequate"), and relatedness frustration ("I feel other people dislike me"). Participants respond to the 12 items on a 1 (*strongly disagree*) to 7 (*strongly agree*) response scale. Bartholomew et al. (2011) have supported the validity and reliability of this scale in sport. Following the removal of one reversed scored autonomy satisfaction item ("In my sport, I feel that I am being forced to do things that I don't want to do") with a poor factor loading (FL = .25), our CFA analysis supported a model which included two higher-order factors (need satisfaction and frustration) and six lower-order factors (autonomy, competence, and relatedness satisfaction and frustration) (see supplementary materials). The alpha coefficients ranged from .85 to .95 for the subscales.

Life skills

The Life Skills Scale for Sport (Cronin & Allen, 2017) assessed participants perceptions of life skills development. The item stem for this 43-item scale is "This sport has taught me to . . . " and example items include: teamwork (7 items; "Help build team/ group spirit"), social skills (5 items; "Interact in various social settings"), emotional skills (4 items; "Know how to deal with my emotions"), problem solving and decision making (4 items; "Evaluate a solution to a problem"), leadership (8 items; "Be a good role model for others"), time management (4 items; "Control how I use my time"), goal setting (7 items; "Check progress towards my goals"), and interpersonal communication (4 items; "Communicate well with others"). Participants respond to items on a 1 (*not at all*) to 5 (*very much*) response scale. The validity and reliability of this measure has been supported in youth sport (Cronin & Allen, 2017, 2018). In this sample, CFA analyses supported an eight-factor model consisting of all eight life skills (see supplementary materials). The alpha coefficients ranged from .82 to .93 for the life skills.

Procedures

Following approval from the authors' institutional ethics committee (approval number = SPA-REC-2016-350), youth sport participants were recruited from local sports clubs and schools in England. Prior to the data collection, the participant or the participant's parent or guardian (if participants were less than 16 years) provided written informed consent. Before participants completed the survey, the researcher explained the aims of the study, that all answers provided were anonymous and confidential, and that questions should be answered as accurately and honestly as possible. The data collection took place when participants were at the midpoint of their sports season. Participants took roughly 15–25 minutes to complete the survey.

Statistical analyses

For our preliminary analysis, correlations, and descriptive statistics, we used SPSS Version 25.0 (IBM Corporation, 2017). The correlations could be judged as small ($r = \pm 0.10$ to ± 0.29), medium ($r = \pm 0.30$ to ± 0.49), or large ($r > \pm 0.50$) based on Cohen's (1988) criteria. The PROCESS macro (Hayes, 2013) for SPSS was used for our mediation analyses. This analysis calculates indirect and direct effects in models with several mediators and produces results which are substantively identical to the mediation results produced using structural equation modelling programs (Hayes et al., 2017). As it is not based on large-sample theory, the non-parametric bootstrapping mediation analysis used in this study can be applied to smaller sample sizes (e.g., 143 participants; see Gonzalez et al., 2011) with greater confidence (Preacher & Hayes, 2004). Moreover, the sample size of 309 in the present study exceeded the median sample size for mediation studies in major psychology journals (Sim et al., 2021) and for cross-sectional studies in sport and exercise psychology (Schweizer & Furley, 2016). When deciding whether to conduct mediation analysis, we began by assessing if significant correlations existed between our independent, mediator, and dependent variables. Our main criteria for assessing mediation analyses was that our independent variable was correlated with our dependent variables (Mathieu & Taylor, 2006). A second criteria was whether the independent variable was associated with the mediators and the mediators were associated with the dependent variables. For our mediation analyses, we began by examining if mediation was evident before evaluating the indirect effect for each mediator (Mathieu & Taylor, 2006). Mediation involves the regression coefficient for the total effect reducing in value for the direct effect when the model includes the mediators. When zero is not contained within the lower and upper bound CIs and $p < .05$ for a potential mediator, there is a significant indirect effect. For each mediation model, R^2 values were converted to Cohen's f^2 (an effect size measure) using the following formula (R^2 divided by $1 - R^2$) and can be interpreted as small ($f^2 \geq .02$), medium ($f^2 \geq .15$), or large ($f^2 \geq .35$) according to Cohen's (1988) guidelines.

Results

Preliminary analyses

Missing value analysis found the missing data percentage in the sample was very low (0.3%). As a result, a mean substitution was performed to minimise lost data. According to Tabachnick and Fidell (2013), mean substitution is a valid approach for dealing with missing data in a moderately sized data set. To assess normality, both skewness and kurtosis values were calculated for the study variables. The data showed reasonable normality as the skewness values ranged from −1.34 to 0.84 and kurtosis values ranged from −0.61 to 3.14 (Curran et al., 1996). Given that individual differences may affect life skills

development in sport (Gould & Carson, 2008), both gender and age group differences were assessed across all variables. Age groups were established based on Steinberg's (1993) classification of early (11–14 years old) and middle (15–18 years old) adolescence. As results showed gender and age group differences (see supplementary materials), these two factors were controlled for in our mediation analyses.

Descriptive statistics

Table 1 displays means, standard deviations, and intercorrelations for all variables. Mean scores for the coaching behaviours on the 1–5 response scale were: autonomy-supportive coaching (4.08) and controlling coaching (2.21). On the 1–7 response scale, mean scores for participants' BNS ranged from 5.59 to 5.70; whereas mean scores for participants' BNF ranged from 2.36 to 3.13. The mean scores for the eight life skills on the 1–5 response scale ranged from 3.55 to 4.11. The associations between autonomy-supportive coaching and participants' BNS (r range = .49–.64) and the eight life skills (r range = .32–.49) were positive and significant. Both total need satisfaction and satisfaction of the three basic needs were positively and significantly associated with the eight life skills (r range = .40–.65). The associations between controlling coaching and participants' BNF (r range = .57–.67) were positive and significant. However, controlling coaching had no statistically significant association with the eight life skills and 28 of 32 potential associations between autonomy frustration, competence frustration, relatedness frustration, and total need frustration, and the eight life skills were not statistically significant. The only exceptions were four small statistically significant negative associations between relatedness frustration and teamwork ($r = -.15$), social skills ($r = -.15$), and leadership ($r = -.16$), and between total need frustration and teamwork ($r = -.12$). Given that there were no statistically significant associations between controlling coaching and the eight life skills, and the lack of consistent associations between BNF and the eight life skills, mediation analyses was not conducted for BNF. In contrast, the clear and consistent associations between autonomy-supportive coaching, BNS and the eight life skills meant that we conducted mediation analyses for BNS.

Mediation analyses

Figures 1 and 2 display the mediation models we tested. The models in Figure 1 include autonomy, competence, and relatedness satisfaction as the three mediators, whereas the models in Figure 2 include total need satisfaction as the mediator. In all models tested, we controlled for age, gender, autonomy frustration, competence frustration, and relatedness frustration by including these variables as covariates. Table 2 contains the indirect effects of autonomy-supportive coaching on the eight life skills through the three mediators and the total indirect effects for each model (this represents total need satisfaction).

From Figure 1, we can see that autonomy-supportive coaching was positively related to the three mediators. Regarding the three mediators, autonomy satisfaction was positively related to goal setting, time management, and interpersonal communication; competence satisfaction was positively associated with goal setting, emotional skills, and time management; and relatedness satisfaction was positively related to all life skills except for goal setting. In all models (see Figure 1, Models A – H), the total effect of autonomy-supportive coaching on the eight life skills was statistically significant. For the models including teamwork, social skills, goal setting, emotional skills, leadership, and time management, mediation was evident as the direct effect of autonomy-supportive coaching on the life skills was not statistically significant when the mediators were included in the model. For the models including problem solving and decision making, and interpersonal communication, mediation was also evident as the direct effect of autonomy-supportive coaching on the life skills was reduced but still statistically significant when the model included the mediators. From the indirect effects in Table 2, we can see that relatedness satisfaction mediated the associations between autonomy-supportive coaching and participants' development of all life skills except for goal setting; autonomy satisfaction mediated the relationships between autonomy-supportive coaching and participants' time management skills, whereas competence satisfaction mediated the associations between autonomy-supportive coaching and participants' goal setting and emotional skills. From Table 2, we can also see that each model explained a considerable portion of the variance for each life skill (R^2 range = .30–.47). After converting the R^2 values to Cohen's f^2 values (f^2 range = .43 to .89), the effect sizes were judged to be large in size (Cohen, 1988).

From Figure 2, we can see that autonomy-supportive coaching was positively related to total need satisfaction and total need satisfaction was positively related to the eight life skills. When total need satisfaction was included as the mediator, the direct effect of autonomy-supportive coaching on teamwork, goal setting, social skills, emotional skills, leadership, and time management was not statistically significant, whereas the direct effect of autonomy-supportive coaching on problem solving and decision making, and interpersonal communication, was still statistically significant although reduced. From Table 2, we can see that total need satisfaction mediated the relationships between autonomy-supportive coaching and participants' development of the eight life skills.

Discussion

The overall objective of this study was to examine youth sport participants' development of life skills using SDT. The correlational findings demonstrated that autonomy-supportive coaching was positively related to participants' BNS and their development of the eight life skills. Moreover, participants' BNS was positively related to their development of the life skills. The correlational findings were comparable to studies showing that autonomy-supportive coaching and BNS are positively associated with youth sport participant's development of initiative, personal and social skills (Bean et al., 2020). Given that few quantitative theory-based studies have investigated life skills development in sport (Jørgensen et al., 2020; Williams et al., 2020), our findings highlight that SDT (namely coach autonomy support and BNS) can serve as a theoretical framework for further investigating life skills development in this context.

Table 1. Reliability Coefficients, Means Scores, Standard Deviations, and Correlations for All Variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Autonomy support	–																	
2. Controlling coaching	-.27***	–																
3. Autonomy satisfaction	.64***	-.18**	–															
4. Competence satisfaction	.49***	-.09	.82***	–														
5. Relatedness satisfaction	.49***	-.11	.75***	.69***	–													
6. Total need satisfaction	.61***	-.15**	.96***	.89***	.88***	–												
7. Autonomy frustration	-.26***	.61***	-.17**	-.07	-.09	-.13*	–											
8. Competence frustration	-.24***	.63***	-.21***	-.19**	-.13*	-.20***	.72***	–										
9. Relatedness frustration	-.18**	.57***	-.21***	-.13*	-.19**	-.20***	.62***	.73***	–									
10. Total need frustration	-.25***	.67***	-.22***	-.14*	-.15**	-.20***	.88***	.92***	.88***	–								
11. Teamwork	.36***	-.06	.47***	.40***	.51***	.51***	-.08	-.08	-.15**	-.12*	–							
12. Goal setting	.39***	-.03	.51***	.49***	.44***	.53***	-.06	-.07	-.09	-.08	.52***	–						
13. Social skills	.36***	-.09	.45***	.40***	.55***	.51***	-.07	-.04	-.15*	-.10	.67***	.44***	–					
14. Problem solving	.42***	-.03	.49***	.46***	.46***	.52***	-.004	.000	-.03	-.01	.55***	.59***	.59***	–				
15. Emotional skills	.32***	.003	.50***	.49***	.49***	.54***	.02	.000	-.03	-.004	.47***	.50***	.53***	.59***	–			
16. Leadership	.41***	-.03	.59***	.52***	.65***	.64***	-.05	-.07	-.16**	-.10	.73***	.57***	.66***	.63***	.61***	–		
17. Time management	.32***	.04	.54***	.51***	.53***	.57***	.03	.02	-.03	.01	.45***	.56***	.48***	.54***	.53***	.55***	–	
18. Communication	.49***	-.02	.60***	.52***	.61***	.63***	-.02	-.06	-.09	-.06	.55***	.47***	.65***	.62***	.62***	.67***	.56***	–
Mean score	4.08	2.21	5.64	5.70	5.59	5.64	3.13	2.62	2.36	2.70	4.11	3.91	3.75	3.55	3.62	3.84	3.68	3.85
Standard deviation	0.83	1.03	1.04	1.08	1.13	0.99	1.58	1.54	1.53	1.38	0.70	0.86	0.88	0.95	1.05	0.80	0.96	0.87
Range	1–5	1–5	1–7	1–7	1–7	1–7	1–7	1–7	1–7	1–7	1–5	1–5	1–5	1–5	1–5	1–5	1–5	1–5
Alpha values	.94	.92	.90	.88	.85	.95	.88	.91	.89	.94	.86	.93	.85	.90	.88	.91	.86	.82

$N = 309$. Problem solving = problem solving & decision making; Communication = interpersonal communication skills.
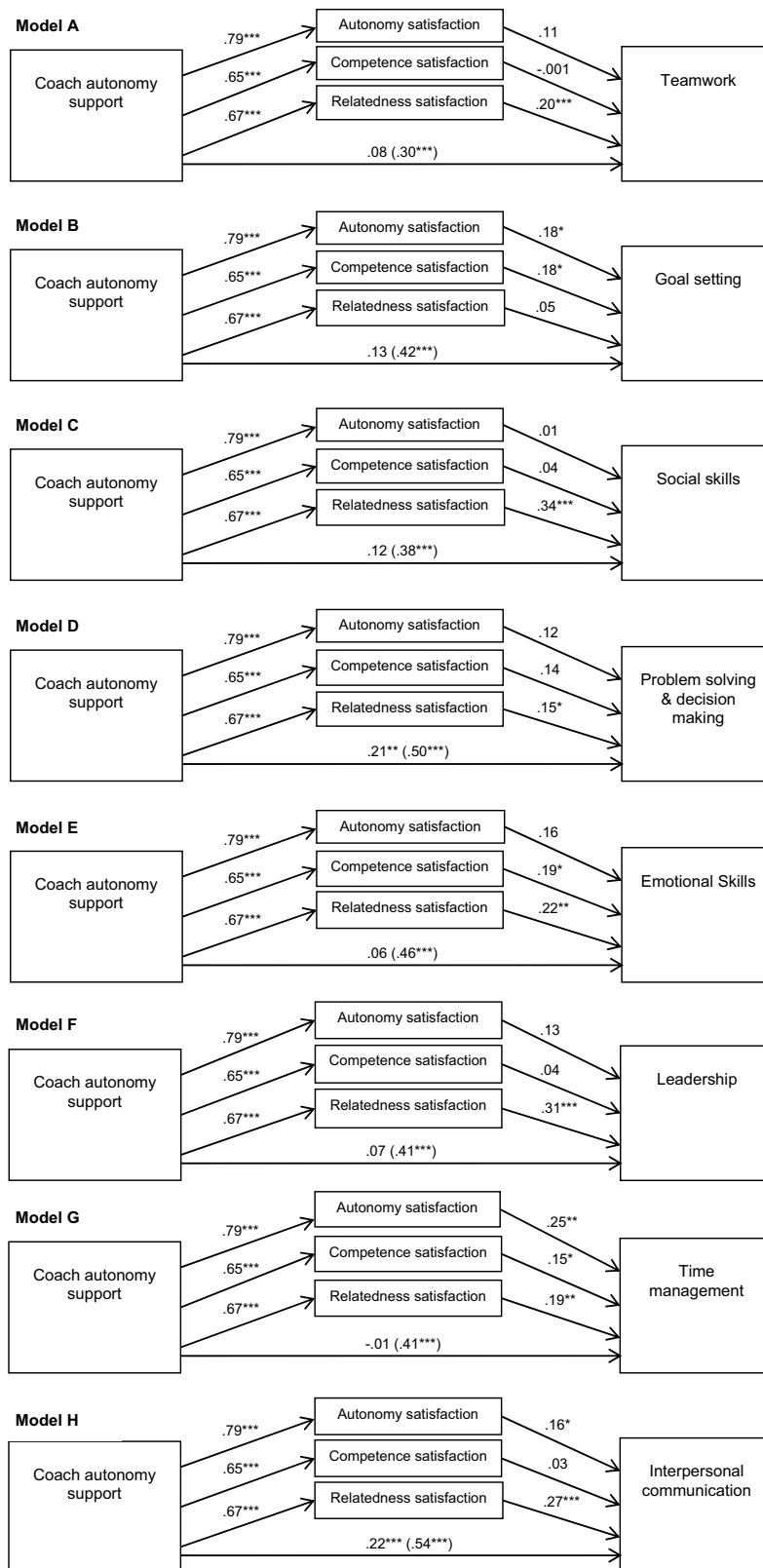$*p < .05$, $**p < .01$, $***p < .001$.

Figure 1. Models predicting all eight life skills. Values signify unstandardized regression coefficients. The direct effect of coach autonomy support on each of the life skills are outside the parentheses. The total effects are inside the parentheses. Gender, age group, controlling coaching, and autonomy, competence, and relatedness frustration were entered as covariates in all models. *$p < .05$, **$p < .01$, ***$p < .001$.

Figure 2. Models predicting all eight life skills. Values signify unstandardized regression coefficients. The direct effect of coach autonomy support on each of the life skills are outside the parentheses. The total effects are inside the parentheses. Gender, age group, controlling coaching, and autonomy, competence, and relatedness frustration were entered as covariates in all models. *$p < .05$, **$p < .01$, ***$p < .001$.
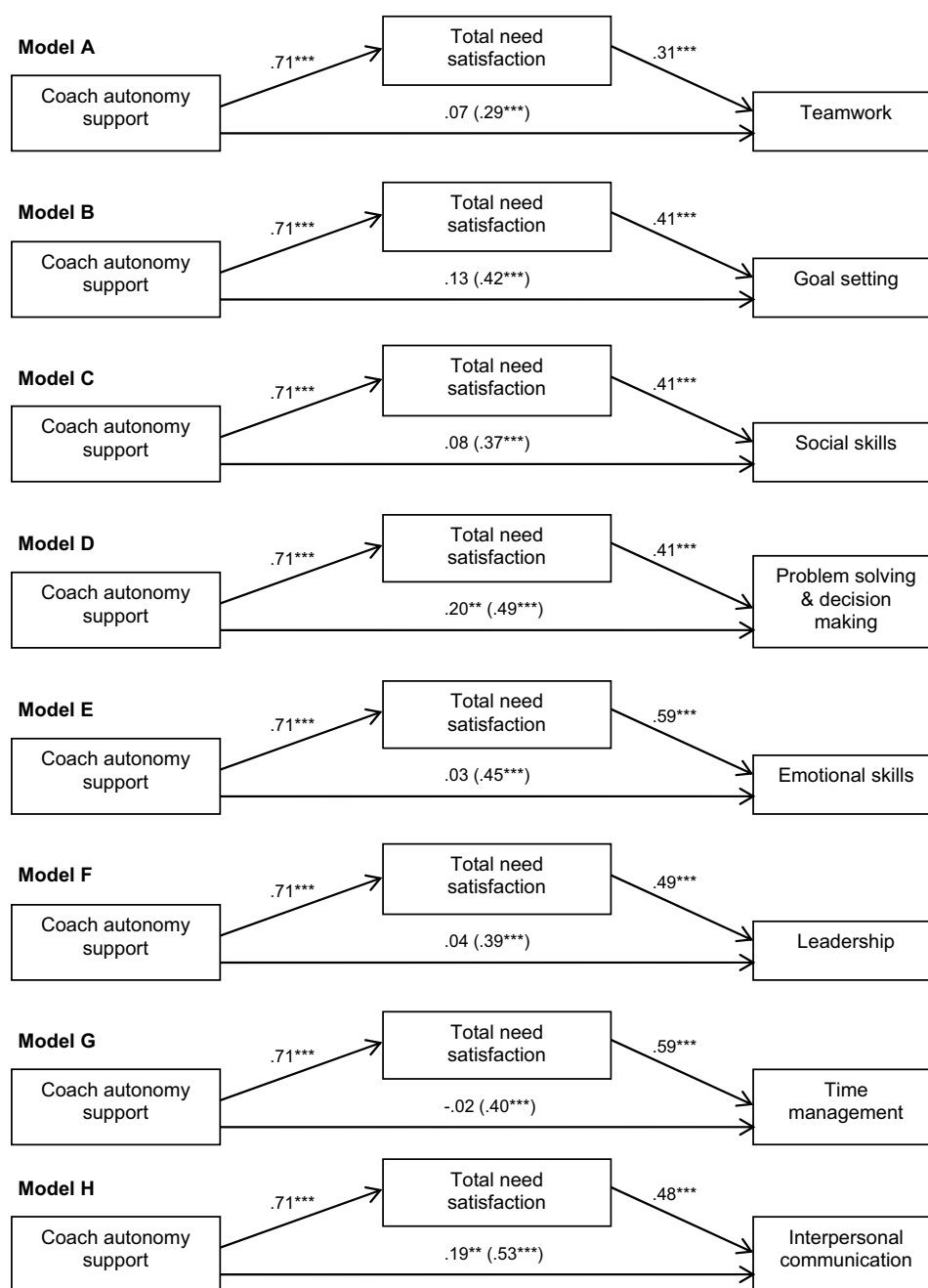
The correlational findings in the present study also showed that controlling coaching was only associated with BNF and had no statistically significant associations with participants' life skills development. Moreover, only four small significant negative associations were found between relatedness frustration and teamwork, social skills, and leadership, and between total need frustration and teamwork. Thus, the hypothesis that the negative associations between controlling coaching and participants' development of the life skills would be mediated by BNF was not supported. Such findings contrasted with previous studies in sport showing that controlling coaching and BNF are negatively associated with other positive outcomes such as an athletes' well-being (Haerens et al., 2018), engagement (Delrue

et al., 2019), and mental toughness (Mahoney et al., 2014). Moreover, our findings did not support Vansteenkiste and Ryan's (2013) SDT-based proposition that BNF can undermine a person's development. Nonetheless, like the current study, a previous study in PE failed to support the hypothesis that BNF would mediate the negative associations between controlling teaching and students' learning of life skills (Cronin et al., 2019). Similar to the present study, Cronin et al. (2019) found that controlling teaching was only associated with BNF and had no significant associations with students' life skills development in PE. It is difficult to know why BNF did not mediate any potential associations between controlling coaching and life skills development in the present study. Nonetheless, an explanation to

Table 2. Indirect Effects of Coach Autonomy Support on Participants' Development of Each Life Skills Through the Three Mediators.

	Bootstrap effect	Normal effect	Normal theory tests			95% CI
			SE	z	p	
Teamwork						
Total indirect effect	.22	.22	.04	6.07	<.001	[.15, .30]
Autonomy satisfaction	.08	.08	.06	1.50	.13	[−.03, .20]
Competence satisfaction	−.001	−.001	.04	−.02	.99	[−.09, .08]
Relatedness satisfaction	.13	.13	.03	3.84	<.001	[.06, .23]
Model $F(10, 289) = 14.54^{***}$, $R^2 = .33$, Cohen's $f^2 = .49$						
Goal setting						
Total indirect effect	.29	.29	.04	6.48	<.001	[.20, .40]
Autonomy satisfaction	.14	.14	.07	2.03	.04	[−.01, .31]
Competence satisfaction	.11	.11	.05	2.38	.02	[.02, .23]
Relatedness satisfaction	.04	.04	.04	0.94	.35	[−.04, .12]
Model	$F(10, 289) = 13.43^{***}$, $R^2 = .32$, Cohen's $f^2 = .47$					
Social skills						
Total indirect effect	.29	.29	.05	6.22	<.001	[.18, .41]
Autonomy satisfaction	.01	.01	.07	0.10	.92	[−.14, .15]
Competence satisfaction	.02	.02	.05	0.52	.61	[−.06, .12]
Relatedness satisfaction	.23	.23	.05	4.93	<.001	[.13 .35]
Model	$F(10, 289) = 14.65^{***}$, $R^2 = .34$, Cohen's $f^2 = .52$					
Problem solving						
Total indirect effect	.29	.29	.05	6.01	<.001	[.19, .42]
Autonomy satisfaction	.09	.09	.08	1.22	.22	[−.08, .27]
Competence satisfaction	.09	.09	.05	1.72	.08	[−.02, .22]
Relatedness satisfaction	.10	.10	.05	2.18	.03	[.01, .21]
Model	$F(10, 289) = 12.34^{***}$, $R^2 = .30$, Cohen's $f^2 = .43$					
Emotional skills						
Total indirect effect	.42	.42	.06	7.20	<.001	[.29, .57]
Autonomy satisfaction	.13	.13	.09	1.50	.13	[−.05, .32]
Competence satisfaction	.13	.13	.06	2.14	.03	[.02, .27]
Relatedness satisfaction	.15	.15	.05	2.90	.004	[.05, .27]
Model	$F(10, 289) = 12.73^{***}$, $R^2 = .31$, Cohen's $f^2 = .45$					
Leadership						
Total indirect effect	.35	.35	.04	8.19	<.001	[.25, .46]
Autonomy satisfaction	.10	.10	.06	1.85	.06	[−.01, .24]
Competence satisfaction	.02	.02	.04	0.62	.54	[−.06, .11]
Relatedness satisfaction	.21	.21	.04	5.31	<.001	[.13, .31]
Model	$F(10, 289) = 25.27^{***}$, $R^2 = .47$, Cohen's $f^2 = .89$					
Time management						
Total indirect effect	.42	.42	.05	7.86	<.001	[.30, .55]
Autonomy satisfaction	.19	.19	.08	2.58	.01	[.03, .38]
Competence satisfaction	.10	.10	.05	1.92	.054	[−.02, .23]
Relatedness satisfaction	.13	.13	.04	2.80	.005	[.04, .24]
Model	$F(10, 289) = 16.13^{***}$, $R^2 = .36$, Cohen's $f^2 = .56$					
Communication						
Total indirect effect	.34	.34	.04	7.63	<.001	[.22, .48]
Autonomy satisfaction	.13	.13	.06	2.00	.046	[−.002, .27]
Competence satisfaction	.02	.02	.04	0.53	.59	[−.06, .12]
Relatedness satisfaction	.18	.18	.04	4.43	<.001	[.10, .29]
Model	$F(10, 289) = 23.97^{***}$, $R^2 = .45$, Cohen's $f^2 = .82$					

$N = 309$. Gender, age group, controlling coaching, and autonomy, competence, and relatedness frustration were entered as covariates in each model. 20,000 bootstrap resamples and 95% bias corrected confidence intervals were used. CI = confidence interval; Problem solving = problem solving & decision making; Communication = interpersonal communication skills.
$^{***}p < .001$.

explore is to include other SDT-based mediators such as motivation regulations in one's analysis (i.e., to assess the following serial mediation model: controlling coaching -> BNF -> motivation regulations -> life skills development).

Following on from our correlational findings, our mediational analyses found that total need satisfaction mediated the associations between autonomy-supportive coaching and participants' development of the eight life skills. This result provides an important insight into the pathways by which participants develop their life skills in youth sport. To begin with, our findings supported the proposition that participants can develop their life skills implicitly when coaches create a positive developmental climate in the sport (Bean et al., 2018; Holt et al., 2017; Turnnidge et al., 2014). Specifically, our findings provided support for level one and two of Bean et al.'s (2018) continuum of life skills development and transfer, which indicates that an appropriately structured sports context and a positive development climate will allow participants to implicitly develop their life skills. Regarding SDT (Ryan & Deci, 2017), our findings supported Hodge et al.'s (2016) conceptual model for life skills development and their proposition that the three basic needs combined help mediate positive associations between autonomy-supportive coaching and young peoples' life skills development. This also supports Deci and Ryan's

(2011) idea that a combination or balance of all three basic needs is needed for positive psychological development to occur.

In terms of the three basic needs, relatedness satisfaction mediated the associations between autonomy-supportive coaching and all life skills except for goal setting; autonomy satisfaction mediated the associations between autonomy-supportive coaching and time management; and competence satisfaction mediated the associations between autonomy-supportive coaching and participants' goal setting and emotional skills. The importance of relatedness satisfaction as a mediating variable supports the proposition that social interactions in sport greatly influence young people's life skills development (Holt et al., 2020). Compared to the current study, PE research has shown that both relatedness and autonomy satisfaction were the main mediators of the positive associations between autonomy-supportive teaching and students' life skills development (Cronin et al., 2019). Thus, it seems that autonomy satisfaction may have more or less of an impact on young peoples' life skills development depending on whether the context is PE or competitive club sport – a novel proposition that should be explored in future studies. Regarding autonomy satisfaction, it may be the case that autonomy satisfaction mediated the association between coach autonomy support and participants' time management skills as autonomy satisfaction involves the self-regulation of one's own actions (Ryan & Deci, 2017), which is a key aspect of time management skills. In relation to competence satisfaction, it is possible that competence satisfaction mediated the associations between coach autonomy support and goal setting as competence involves feeling effective or having a sense of mastery in one's activities (Ryan & Deci, 2017), which may lead participants to develop their goal setting skills to maintain a high level of competence in their sport. Likewise, competence satisfaction may be implicated in participants development of their emotional skills as feeling competent in one's sport is likely to affect participants' emotional regulation when participating in their sport. Such tentative explanations for our findings should be explored in future studies.

Despite the differing results for the three basic psychological needs, with the current study in youth sport and Cronin et al.'s (2019) study in PE, it is important to highlight that total need satisfaction mediated all associations between autonomy-supportive coaching/teaching and participants' development of the eight life skills. As such, these findings indicate that all three basic psychological needs should be the focus of future efforts to enhance young peoples' life skills development in sport and PE.

Practical implications

In practice, our findings highlighted that the exhibiting of autonomy-supportive behaviours is an important skill for coaches to display in order to develop sports participants' life skills. In this regard, Mageau and Vallerand's (2003) suggest that coaches should utilize the following autonomy supportive behaviours: (a) providing choice to participants; for example, choice of training activities; (b) offering a rationale for particular tasks; for instance, why a particular skill is being focused on

during practice; (c) giving participants opportunities to take initiative; for example, allowing athletes to organise the warm-up and cool-down; (d) providing non-controlling competence feedback; for instance, video feedback that allows athletes to solve problems collectively, and (e) acknowledging athletes' feelings and perspectives; for example, allow for athletes' input into practice sessions. Based on our findings, such autonomy-supportive coaching behaviours should promote participants' needs for autonomy (feeling volitional), competence (feeling effective), and relatedness (feeling connected to others) and, in turn, help them to develop their life skills in sport.

In terms of autonomy satisfaction, coaches could empower their team or group to take control of their own sporting development by planning and scheduling their own practice activities outside of formal practice sessions. Such an approach could lead to participants developing their time management skills whilst improving their sports-specific skills. Regarding relatedness satisfaction, coaches should create positive coach-athlete relationships and peer relationships that ensure sport participants feel cared for, respected, and trusted by their coaches and peers. This could involve coaches communicating consistently and positively with their athletes, listening to athlete's thoughts and concerns, facilitating team meetings where athletes communicate their views to each other in a positive manner, and encouraging team building and socialising opportunities that will help enhance team spirit. Such activities ought to promote participants perception of relatedness satisfaction and, in turn, promote their development of life skills such as communication, teamwork, and social skills. In terms of competence satisfaction, coaches could explicitly teach their athletes goal setting (e.g., setting realistic and achievable goals) and emotional skills (e.g., how to remain calm after a poor refereeing decision) that are related to competence in sport and also teach life skills that are useful in other contexts (e.g., school or family life). To translate our SDT-based findings into practice, the formal training of coaches in life skills development is required (Bean & Forneris, 2016) and existing life skills programmes should look to educate instructors/coaches about the benefits of using SDT-based principles in practice.

Limitations and future directions

A first limitation of this study was the use of self-report data, which can be affected by both social desirability and memory recall (Brenner & DeLamater, 2014). Thus, future research could measure coach autonomy support using observational methods and measure life skills development via coach/parent ratings. A second limitation was that other aspects of SDT or other potential SDT-based models were not assessed in this study. As such, future studies could assess how autonomy, competence, and relatedness support (Bean et al., 2020) emanating from peers, parents, and coaches (Holt et al., 2017) may influence participants' BNS and life skills development in sport. Given some of our correlational findings, future studies could assess if BNF mediates any potential associations between coach autonomy support and life skills development, and whether BNS mediates any potential associations between controlling coaching and life skills development. A third limitation of this

study is the sole focus on SDT (Ryan & Deci, 2017) and the eight life skills measured by the LSSS (Cronin & Allen, 2017). In line with the research of Appleton and Duda (2016), future studies could look to combine theories (e.g., SDT and Achievement Goal Theory) when investigating how an empowering climate impacts participants' development of life skills in sport. Given the recent critiques of the life skills development through sport literature (e.g., Coakley, 2016; Ronkainen et al., 2021), future studies could also investigate a wider range of both positive and negative learning experiences in sport. A fourth limitation of this study is its cross-sectional nature, which does not allow for causality to be determined. To address this limitation, future studies should use both experimental and longitudinal research designs when investigating participants' learning of life skills in sport. The use of longitudinal research designs is particularly warranted given that some researchers suggest that development is best studied over time (e.g., García-Bengoechea & Johnson, 2001). A fifth limitation is that this study did not consider the individual makeup of the youth sport participants. As the pre-existing makeup of an athlete is proposed to play a part in their life skills development (Camiré et al., 2012), future sports studies could assess if athletes' personality traits moderate the effect of autonomy-supportive coaching and BNS on their life skills development. A final limitation of this study was that by testing multiple models using one dataset, this increases the chance of a false-positive finding (Albers, 2019). As such, future studies should look to replicate our findings with their own sample of youth sport participants.

Conclusion

Using SDT (Ryan & Deci, 2017), the novel findings from the present study showed that autonomy-supportive coaching is positively related to participants' life skills development in youth sport through the satisfaction of the needs for relatedness, autonomy, and competence. Such results highlight that future research should further investigate sport participants' life skills development using SDT. In practice, our results showed that coaches and life skills programme instructors looking to foster participants' life skills development should aim to create an autonomy-supportive climate that satisfies participants' three basic psychological needs.

Disclosure statement

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