The Mediating Role of Mastery-Approach Goals between Coach Supports and Intrinsic Motivation among Underserved Adolescents

Jiling Liu (corresponding author)[1], Ping Xiang[2], Ron E. McBride[3]

[1]Department of Health and Kinesiology, Texas A&M University, College Station, TX 77843, dalingliu@tamu.edu

[2]Department of Health and Kinesiology, Texas A&M University, College Station, TX 77843, ping-xiang@tamu.edu

[3]Department of Health and Kinesiology, Texas A&M University, College Station, TX 77843, rmac@tamu.edu

Abstract

Guided by Self-Determination Theory (SDT; Ryan & Deci, 2000; Ryan, Williams, Patrick, & Deci, 2009) and Achievement Goals Theory (Elliot & McGregor, 2001), this study examined how coach supports affected intrinsic motivation (IM) and how mastery-approach (MAp) goals mediated the relationship between coach supports and IM among a group of underserved adolescents. Participants were 93 boys (M_{age} = 11.91 years, SD = 1.22) at a summer sports camp in the southwestern U.S. Seventeen questions from previously validated questionnaires measured participants' IM, MAp, and perceived coach supports. Three mediation models were examined to test the mediating effects of mastery-approach goals. The results of the three mediation models revealed that perceived coach supports positively predicted IM (βs > .38, *ps* < .05). MAp goals had a large medication effect on the relationship between perceived coach supports and IM (βs > .29, *ps* > .05, κ^2s > .25). The data from the study suggest that coaches provide supports for children in autonomy, competence, and relatedness based on SDT. At the same time, we recommend focusing on MAp goals in order for coach supports to generate positive influences on children's IM.

Keywords: underserved adolescents, social supports, achievement goals, mediation effects

Regular participation in physical activity is essential to children's health and well-being (Centers for Disease Control and Prevention, 2011). To promote physical activity, understanding its underlying psychological determinants (e.g., motivation, achievement goals) is critical (Ryan, Williams, Patrick, & Deci, 2009; Xiang, Liu, McBride, & Bruene, 2011). Intrinsic motivation in particular has emerged as one of the most important determinants of children's physical activity participation (Liu, Xiang, McBride, Su, & Juzaily, 2015; Xiang et al., 2011). According to Self-Determination Theory (SDT; Ryan & Deci, 2000; Ryan et al., 2009), intrinsically motivated individuals tend to sustain their interest and effort in pursuing a physical active lifestyle. Furthermore, the SDT proposes, and empirical studies evidence, that social supports can promote intrinsic motivation (Chen, 2014; Standage, Duda, & Ntoumanis, 2003; Xiang, Ağbuğa, Liu, & McBride, 2017).

While the direct causal relationship between social supports and intrinsic motivation has been extensively examined, their indirect effects/mediation effects have received less attention. Mediation effects reveal the mechanism by which causal relationships occur (Hayes & Scharkow, 2013). Exploring mediation effects has applications in physical activity settings. For example, mediation effects may inform how coach supports may facilitate motivation at sports camps. With this information, coaches can better design and deliver programs to promote physical activity and healthy lifestyles among children. The present study, therefore, seeks to examine the associations among psychological determinants such as coach supports, mastery-approach goals, and intrinsic motivation through mediation analyses.

Mediation Effects

Mediation effects refer to when a third variable "represents the generative mechanism through which the focal independent variable is able to influence the dependent variable of interest" (Baron & Kenny, 1986, p. 1173). Figure 1 illustrates a path diagram for a simple regression model (A) and a simple mediation model (B). In Model A, *c* represents the total effect of *X* on *Y* without a mediator. Model B includes a mediator *M*, and *a*, *b*, and *c*' represent the direct effect of *X* on *M*, the direct effect of *M* on *Y*, and the direct effect of *X* on *Y*, respectively. The indirect effect of *X* on *Y* (or the amount of mediation effects of *M*) = $a \times b$. The direct effect plus the indirect effect equals the total effect (i.e., $c = a \times b + c'$).

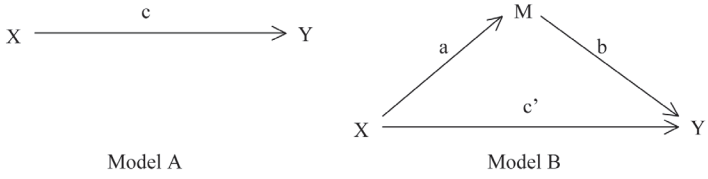

Figure 1: A simple mediation model illustrated.

Baron and Kenny (1986) described causal conditions for mediation effects to occur: Individual path *a*, *b*, *c* should all be statistically significant from zero, and *c*' should be smaller than *c*. When *c*' becomes zero, the mediation effect of *M* reaches a maximum value, and the relationship between *X* and *Y* is fully/completely mediated. If *c*' is smaller than *c* and still statistically significant from zero, the relationship between *X* and *Y* is partially mediated by *M*.

Mediation effects can be estimated through ordinary least squares (OLS) regression analyses or structural equation modeling (SEM). One advantage of SEM over OLS regression is that it handles measurement errors more effectively and thus increases a mediation model's power. However, SEM usually demands a large sample size to ensure the precision of estimation. If a sample size is smaller than 100, the SEM estimation can be problematic. For studies with small samples like the present one, the OLS regression analysis is preferred (Hoyle & Kennedy, 1999).

There are a variety of effect sizes used to quantify mediation effects. MacKinnon (2008) outlined traditionally used indices such as verbal description, ratio of relative magnitude, and R^2 estimates.

These indices have limitations such as their estimations rely on sample sizes and their values can be negative. For this reason, Preacher and Kelly (2011) proposed a new index, Kappa-squared (κ^2), which refers to the ratio between the obtained indirect effect and its possible maximum value. Kappa-squared is independent of sample size, and its value ranges from zero and one, inclusively. Thus, it represents an update from traditional effect size indices. Preacher and Kelly recommended to use Cohen's (1988) standards determine the magnitude of κ^2 (i.e., .01 for small, .09 for medium, and .25 for large). Kappa-squared works well for single level models with a single mediator (Stapleton, Pituch, & Dion, 2015).

Intrinsic Motivation, Coach Supports, and Mastery-Approach Goals

In order to help readers fully understand intrinsic motivation, it is important to address SDT, which might be the most widely used theory to understand participants' motivation toward physical activity (SDT; Ryan & Deci, 2000; Ryan et al., 2009). The SDT groups motivation into three major categories: amotivation, extrinsic motivation, and intrinsic motivation, based on the degree of self-determination. Amotivation means that individuals have no desire, thus zero self-determination to participate in physical activity. Extrinsic motivation occurs when individuals participate in physical activity due to external pressure (e.g., punishment, reward) or internal pressure (e.g., feeling guilty or ashamed). With extrinsic motivation, participation is determined by others and/or patricianly by self.

Intrinsic motivation (IM) refers to when individuals feel fun and interested during participation in an activity and enjoy the challenges and satisfaction within the activity (Ryan et al., 2009). IM is determined completely by self, and it drives individuals to initiate and maintain effort during participation. Ryan and associates (2009) posit that intrinsically motivated individuals are more likely to exercise and pursue a physically active lifestyle. IM has emerged as one of the most influential psychological determinants of physical activity, as evidenced in numerous empirical studies (Fenton, Duda, & Barrett, 2016; Xiang et al., 2011). Therefore, fostering IM is critical for children's lifelong participation in physical activity.

In physical activity settings, IM can be facilitated when coaches provide supports for autonomy, competence, and relatedness (Ryan & Deci, 2000; Ryan et al., 2009). Autonomy support refers to how coaches allow participants to make their own decisions about what to do. Competence support means coaches make individuals believe in their learning capabilities. Relatedness support involves a good interpersonal relationship between children and coaches. Empirical evidence shows a positive relationship between coach supports and children's IM (Chen, 2014; Standage et al., 2003; Xiang et al., 2017). For example, Standage and associates (2003) found that coach supports positively predicted IM among secondary school students. Similarly, Chen (2014) reported that IM was positively predicted by coach supports for autonomy, competence, and relatedness among elementary school students.

These studies, however, only focused on the direct effect of coach supports on IM without exploring the mechanism whereby the effect occurred. It is possible that a third variable acting as a mediator that channels the effect of coach supports onto IM. Mastery-approach (MAp) goals might be such a mediator. According to Achievement Goals Theory (Elliot & McGregor, 2001) and a recent review study (Liu, Xiang, Lee, & Li, 2017), individuals with MAp goals focus on the acquisition and improvement of knowledge and skills. MAp goals aim at the development of competence based on intrapersonal standards and tend to generate adaptive consequences such as IM (Ntoumanis, 2001; Xiang, Bruene, & McBride, 2004). Zhang, Solmon, and Gu (2012) proposed that when students perceived coach supports for autonomy, competence, and relatedness, they were more likely to adopt MAp goals which, in turn, led to increased IM. Studies on antecedents and consequences of MAp goals also found that students with positive perceptions of coach supports tend to endorse MAp and became more interested and engaged in their tasks (Adie & Jowett, 2010; Moreno, González-Cutre, Sicilia, & Spray, 2010). Together, these findings support MAp goals as a mediator in the relationship between coach supports and IM.

Although a large volume of motivation literature exists, little research attention has been paid to underserved children. In the current context, underserved children are those who come from low socioeconomic status (SES) families and who are prone to academic failure and behavioral problems. Due to the paucity of literature, it is unclear how underserved children's perceived coach supports affect their IM and whether MAp goals mediate the relationship between the two variables. Therefore, a research inquiry in this area can contribute to the body of knowledge about the associations among the psychological determinants of physical activity (i.e.t, coach supports for autonomy, competence, and relatedness, MAp goals, and IM).

Purposes of Study

The purposes of the present study are twofold. First, we aim to examine the relationship between perceived coach supports and IM. And second, we focus on identifying the role that MAp goals play in the relationship between perceived coach supports and IM. Based on the literature, we hypothesize: (a) perceived coach supports would positively predict IM, and (b) MAp goals would mediate the relationship between perceived coach supports and IM. As illustrated in Figure 2, we expect the indirect effect ($a \times b$) and the total effect ($a \times b + c'$) to be statistically significant but the direct effect (c') not to be statistically significant.

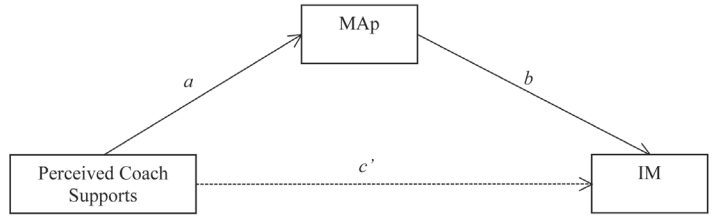

Figure 2: A proposed mediation model. Perceived coach supports consist of perceived supports for autonomy, competence, and relatedness. MAp = Mastery-approach goals. IM = Intrinsic motivation. The sold lines represent statistically significant paths, and the dashed line is not significant.

Method

Participants

Participants were 93 boys (Mean = 11.91 years, SD = 1.22) enrolled in a summer sports camp in the southwestern U.S. The participants consisted of African-American (20.4%), Caucasian (24.7%), Hispanic (50.5%), Asian-American (1.1%), and others (3.2%). The summer sports camp is cost-free, and it only accepts

boys who meet risk indicators such as low SES families. At the camp, boys are lodged in eight cabins, and each cabin has a supervising coach residing inside. The coaches are all males and have at least one-year of coaching experience in sports. Boys are organized into groups to experience various physical activities such as basketball, soccer, archery, canoeing, and orienteering in the daytime. In the afternoon, they can have a free-play time when they can choose what activities to do. Competitions between cabins hold at night. Discipline, honesty, respect, and integrity are emphasized throughout camp activities.

Variables and Measures

Besides a personal data sheet used to collect participants' demographic information such as age and ethnicity, 17 items adopted from previous studies (Guan, McBride, & Xiang, 2007; Markland & Tobin, 2004; Shen, Li, Sun, & Rukavina, 2010) assessed intrinsic motivation, mastery-approach goals, and perceived coach supports for autonomy, competence, and relatedness. Following the stem "In my physical activity sessions at the camp," participants responded to each item on a 5-point Likert scale ranging from 1 "*not true for me*" to 5 "*very true for me*."

Intrinsic motivation. Four items from the Behavioral Regulation in Exercise Questionnaire (BREQ-2; Markland & Tobin, 2004) measured intrinsic motivation. The four items were: (1) It's fun; (2) I enjoy my physical activity sessions; (3) I find the physical activity sessions to be pleasurable; and (4) I get pleasure and satisfaction from participating in these physical activity sessions. The measure had an acceptable construct validity in this study [$\chi^2_{(2)} = 1.791$, $p = .409$; RMSEA = .000; CFI = 1.000; SRMR = .024]. Factor loadings of the four items ranged from .483 to .759. Cronbach's $\alpha = .713$.

Mastery-approach goals. Three items from the Achievement Goal Questionnaire-Physical Education (AGQ-PE; Guan et al., 2007) examined mastery-approach goals. The three items were: (1) I want to participate as much as possible; (2) It is important for me to do activities/games as well as possible; and (3) I want to participate as much as I can. The three-item construct was just identified ($\chi^2 = .000$; RMSEA = .000; CFI = 1.000; SRMR = .000) since the degree of freedom was zero. Factor loadings for the three items were .615-.814. Cronbach's $\alpha = .718$.

Perceived coach supports. Ten items from the adapted Interpersonal Behavior Scale (IBS; Shen et al., 2010) assessed perceived coach supports. Four items assessed perceived autonomy support (PAS). One example was, "My coach provides me with lots of chances to make choices in what we do." Three items assessed perceived competence support (PCS) such as, "The comments I get from my coach makes me feel confident in my ability to learn." One of three items assessing perceived relatedness support (PRS) was, "I feel my coach sincerely cares about me." The measures had an acceptable construct validity in this study [$\chi^2_{(26)} = 31.571$, $p = .208$; RMSEA = .048; CFI = .981; SRMR = .048]. Factor loadings ranged from .428 to .808. Cronbach's αs = .603-712.

Data Collection and Analysis

This study was a part of a large research project to understand underserved adolescents' motivation from multiple theoretical perspectives. Prior to data collection, university Institutional Review Board approval, parent consent, coach permission, and minor assent were obtained. Researchers administered the measures, together with other questionnaires, during lunchtime. The questions took about 25 minutes to complete.

Data analyses consisted of four major steps. First, we calculated descriptive statistics to identify univariate characteristics. Second, we computed Cronbach's alphas to demonstrate the measures' internal consistency. Third, we calculated Pearson correlations to reveal bivariate relationships. Finally, we tested three simple mediation models using the PROCESS macro for SPSS (Hayes, 2013). Bias-corrected bootstrap ($n = 5000$) confidence intervals, "the most trustworthy" approach for significant testing (Hayes & Scharkow, 2013, p. 1918), were employed to establish the power of estimation. All data analyses were conducted using SPSS 23.0 (IBM Corp., 2014).

Results

Descriptive Statistics and Scale Reliability

Table 1 showed descriptive statistics and scale reliability for each variable. Mean scores for all variables were above the scales' mid-point 3.0, implying that participants were generally intrinsically motivated, orientated to MAp goals, and they had positive perceptions of coach supports. Skewness and Kurtosis ranged from -.1.023 to .893, indicating that the data were approximately normally distributed (Thompson, 2006). Cronbach's α values were greater than .60, meaning the measures had acceptable scale reliability (Sekaran, 1992). Although Nunnally (1978) recommended $\alpha = .70$ as a cut-off value for basic research, he also indicated above .60 is sufficient, especially at the early stage of research. Contemporary studies (e.g., Ary, Jacobs, Sorensen, & Razavieh, 2010; Bhatnagar, Kim, & Many, 2014) also adopted this cut-off value.

Table 1
Descriptive Statistics and Scale Reliability ($N = 93$)

	Mean	SD	Skewness	Kurtosis	Cronbach's α
IM	4.107	.716	-.518	-.820	.713
MAp	4.361	.613	-1.023	.893	.718
PAS	3.748	.695	-.423	.534	.603
PCS	4.021	.686	-.371	-.365	.712
PRS	3.763	.632	.395	-.825	.683

Note: IM = intrinsic motivation, MAp = mastery approach goals, PAS = perceived autonomy support, PCS = perceived competence support, PRS = perceived relatedness support.

Bivariate Correlations

Table 2 showed all the measured variables were significantly correlated with each other. Among the criterion variable IM and other predictors, the highest correlation was between IM and MAp goals, and the lowest was between IM and PRS.

Table 2
Correlations between Variables ($N = 93$)

	IM	MAp	PAS	PCS	PRS
IM	1				
MAP	.611**	1			
PAS	.377**	.544**	1		
PCS	.430**	.578**	.673**	1	
PRS	.374**	.465**	.656**	.637**	1

**$p < .001$.

Mediation Analyses

Three simple mediation models were tested, and results displayed in Table 3. The total effects of PAS, PCS, and PRS on IM were all statistically significant, meaning that each support positively predicted IM. Specifically, one unit of increase in PAS, PCS, and PRS would result in .288, .449, and .423 units of increase in IM, respectively.

Table 3

Total, Direct, and Indirect Effects of Perceived coach supports on IM (Bootstrap = 5000)

	b (β)	*SE*	*t*	*p*	LBCI	UBCI
Model 1: Effects from PAS to IM						
Total	.388 (.377)	.100	3.881	.000	.190	. 587
Direct	.065 (.063)	.102	.633	.528	-.138	.268
Indirect	.324 (.314)	.076			.192	.493
Effect Size ($\kappa 2$)	.295	.058			.191	.420
Model 2: Effects from PCS to IM						
Total	.449 (.430)	.099	4.543	.000	.253	.645
Direct	.120 (.115)	.106	1.134	.260	-.090	.331
Indirect	.329 (.315)	.081			.195	.523
Effect Size (κ^2)	.291	.065			.174	.430
Model 3: Effects from PRS to IM						
Total	.423 (.374)	.110	3.843	.000	.204	.642
Direct	.130 (.114)	.106	1.224	.224	-.081	.340
Indirect	.294 (.259)	.072			.166	.441
Effect Size (κ^2)	.257	.057			.152	.370

Note: Estimates in the parentheses were standardized values. LBCI = Lower bound of confidence interval; UBCI = Upper bound of confidence interval.

While all direct effects were statistically non-significant, all indirect effects of the three supports on IM were statistically significant (zero did not fall between LBCI and UBCI). This meant MAp goals fully mediated the relationship between each support and IM (Baron & Kenny, 1986). All mediation effects were statistically significant (zero did not fall between LBCI and UBCI). As shown in Table 3, one unit of change in PAS, PCS, and PRS would respectively lead to .324, .329, and .294 units of change in IM via MAp goals.

The effect size (κ^2) of each mediation effect was greater than .257, meaning that for each mediation model, the obtained indirect effects were at least 25.7% of the maximum possible indirect effects. According to Cohen (1988), the effect sizes were large for this set of data. The lowest bound of the 95% CI (.152 in Model 3) indicated the indirect effect size was at least moderate. Figure 3 illustrated the three mediation models with a regression coefficient (beta weight) on each path.

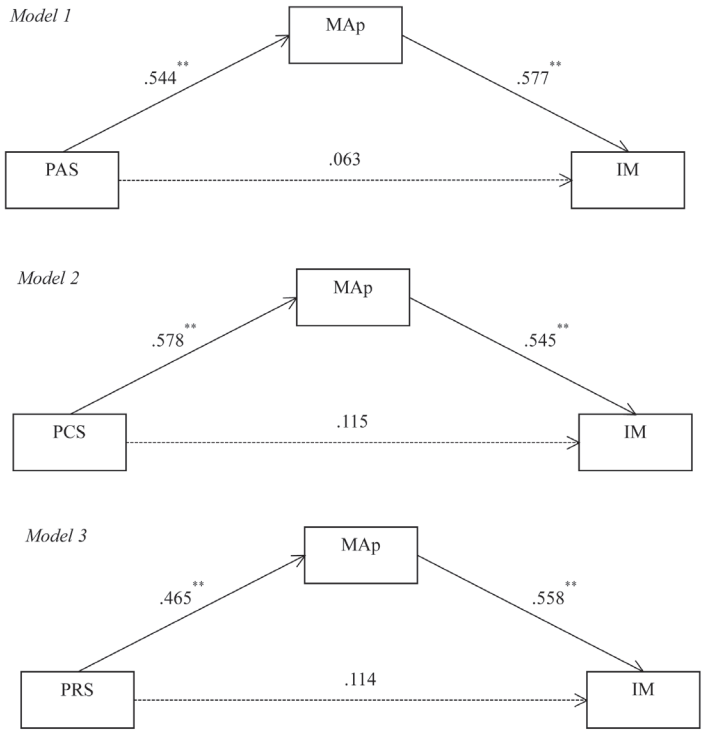

Figure 3. Three tested mediation models. All values are direct effect. Indirect effects are the product of the values on two solid lines. ***p*<.001.

Discussion

Understanding the associations among psychological determinants is important to develop physically active lifestyles in children (Ryan et al., 2009; Xiang et al., 2017; Xiang et al., 2011). Although previous studies suggested that individuals tended to endorse mastery-approach goals in a supportive environment and consequently became intrinsically motivated in physical activity, they did not specifically examine how mastery-approach goals might mediate the relationship between perceived coach supports and intrinsic motivation. Our study focused on the mediating role of mastery-approach goals among a group of underserved adolescents at a summer sports camp, and confirmed the two hypotheses: (a) perceived coach supports positively predicted intrinsic motivation, and (b) mastery-approach goals fully mediated the relationship between each coach supports and intrinsic motivation.

In agreement with the first hypothesis, our results showed that perceived coach supports positively predicted intrinsic motivation. The results attest to Self-Determination Theory (SDT; Ryan & Deci, 2000; Ryan et al., 2009) as well as previous studies (Chen, 2014; Zhang & Solmon, 2012) that perceptions of social supports are the key to facilitating participants' genuine interests in physical activity. According to the SDT, social supports for autonomy, competence, and relatedness are all important to participation in physical activity-autonomy support allows participants to regulate their own behavior, competence support makes individuals feel confident in their capability, and relatedness support brings about a sense of connectedness and belongingness. Although highly disciplined at this particular summer sports camp, the boys were able to make their own decisions regarding what activities to do

during free-play time. During skill practices and competitions with other groups, encouragement from coaches could have provoked feelings of competency and effectiveness among the boys. Moreover, living together with a coach may have brought the boys a sense of belongingness and connectedness. Perhaps perceptions of these supports have led the boys to report high enjoyment and display positive attitudes at this camp. Follow-up studies can utilize qualitative data to test our assumption.

Supporting the second hypothesis, mastery-approach goals fully mediated the relationship between perceived coach supports and intrinsic motivation, and the mediation effect sizes were large. Completely mediated by mastery-approach goals, all three supports had no direct effects on intrinsic motivation anymore. This shows that perceived coach supports generated effects on intrinsic motivation mainly through mastery-approach goals. The mediation effects in this study support previous research (Adie & Jowett, 2010; Moreno et al., 2010; Zhang et al., 2012), showing that positive perceptions of coach supports lead to the adoption of mastery-approach goals that, in turn, stimulate intrinsic motivation. As mentioned earlier, at this camp coaches allowed the boys to make choices about what to do, encouraged them to participate, and cared about them on a daily basis. These supports may have motivated the boys to focus on their performance based on intrapersonal standards-setting mastery-approach goals. When aiming at the development of self-referenced competence, the boys felt enjoyment and satisfaction during their participation. Again, further qualitative evidence would solidify our interpretations.

Limitations and Implications

There are a few limitations that need to be addressed in future research. First, our study had a small sample size, and all participants were male adolescents from low SES families and at risk of academic failure and behavioral problems. These characteristics limit our study's generalizability to other groups with different age, gender, and socioeconomic background. Future research should address these limitations by increasing sample size and including both sexes with more diverse backgrounds. Also, the current study took place in a summer sports camp, whereas many previous studies occurred in school physical education classes. The different settings might have an impact on the relationship between the examined variables. Future research can further explore this area. In addition, this study only examined the mediating role of mastery-approach goals because they have consistently demonstrated adaptive effects on intrinsic motivation. Another type of approach goals, performance-approach goals, which involve evaluating one's performance based on interpersonal standards, is also worth examining. We did not include performance-approach goals because it is not clear whether children would endorse goals of this type when sensing coach supports, and it is also inconclusive if performance-approach goals lead to adaptive consequences. Future research, therefore, is encouraged to follow up this line of inquiry. More studies can examine how performance-approach goals and mastery-approach goals compete with each other as mediators.

The positive relationship between perceived coach supports and intrinsic motivation suggests that for boys to enjoy their participation at the camp, coach support for autonomy, competence, and relatedness is important. As mentioned before, social supports were present during the boys' participation and stay at the camp. To provide more autonomy support, coaches can involve the boys in more decision making processes, such as letting them design games and decide rules for winning or losing a game. For competence support, once the boys are used to an activity, coaches can make it more challenging to elicit their best effort and interest. To support relatedness, coaches can be more attentive by asking what the boys think during their participation and what coaches can do to help them feel better.

The mediating role of mastery-approach goals in the relationship between perceived coach supports and intrinsic motivation has theoretical implications. It provides evidence for the association between SDT and Achievement Goals Theory additional to previous studies (Ntoumanis, 2001; Xiang et al., 2004). Future research can examine whether other achievement goals (e.g., performance-approach goals) also mediate the relationship between social supports and intrinsic motivation. The result also has practical implications. For this summer sports camp, we suggest coaches focus on setting and emphasizing mastery-approach goals so that their supports can better generate positive effects on participants' intrinsic motivation. Particularly, in the study of Liu and associates (2017), coaches can direct the boys to focus on the completion of tasks and personal improvement. They can constantly check the boys' understanding of the task, provide positive feedback, and acknowledge their progression in skill learning and participation based on intrapersonal standards. Comparing one's ability, effort, or performance to others' should always be avoided. With these instructional approaches, the boys may care less about the external outcomes and sincerely enjoy their participation at the camp.

Funding

This study was supported by the Sydney & J.L. Huffines Institute for Sports Medicine & Human Performance.

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