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The Developmental Patterns of 2×2 Achievement Goals and Body Mass Index in Young Soccer Players

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ABSTRACT

The present study examined the developmental patterns of approach-avoidance goals and body mass index (BMI) in a sample of young soccer players. Participants were 652 Finnish competitive soccer players with a mean age of 11.49 in the beginning of the data collection. The data comprised four measurement phases across two full seasons for each player. The key findings were that 1) performance-avoidance goal decreased and BMI increased over time, 2) the higher perceptions of mastery-approach associated with lower BMI scores and higher mastery-avoidance goal with higher BMI scores, and 3) the level of mastery-approach goals was higher than performance-approach and mastery- and performance-avoidance goals, whereas mastery- and performance-avoidance were higher than performance-approach goals. Findings indicate that to transform players with lower perceptions of mastery-approach and higher BMI to the higher level of mastery-approach goals requires players should spend more time with a variety of soccer drills and practices. Practically, these players could be given more responsibility, for instance, through task-involving coaching methods, in which the main objective is to increase players' perceptions of physical competence through development and learning. These coaching strategies could not only increase players' positive perceptions of mastery-approach but also reduce their negative perceptions of mastery-avoidance goals.

Keywords: *Goal orientation, Approach, Avoidance, Longitudinal, Latent growth curve modelling*

INTRODUCTION

Recent technological advances have contributed to sedentary time that has changed children's lifestyle from that of 20 years ago [1]. Currently, about 50% of children and youth participate regularly in organised sports in many Western and Asian countries [2]. The participation rates are highest among children aged between 9 to 11 years, and thereafter, approximately 30% of adolescent participants drop out each year [3]. During the period of adolescence, typically extending from the age of 10 to the late teens, girls and boys undergo physical and sexual maturation and meet several cognitive, social, and emotional changes [4]. This diverse development in puberty may have negative influences on their physical competence and sport participation [5]. For instance, teenagers' body height and weight increases may affect their abilities to effectively engage in physical tasks they were able to perform at a younger age [6,7]. This process may undermine their perceived physical competence, considered to be one of the main motives behind participation in youth sport [8]. The present study examined the developmental patterns of achievement goals, as the competence-based aims used to guide behaviour within a sample of young soccer players across early adolescence.

The Achievement Goal Theory (AGT) [9,10] is one of the most widely utilised frameworks to investigate perceived physical competence within youth sports. Thus, the basic premise of the AGT is that individual's main motive in achievement settings, such as in sports, is to demonstrate their competence. Nicholls identified two distinctive achievement goals based on the definition of personal competence, mastery (task) and performance (ego) goals. Nicholls [10] and Deci and Ryan [11] defined that mastery goals reflect perceived competence in terms of comparisons with task requirements and past attainments, i.e. mastery-oriented players focus on personal improvement, learning, and effort, whereas performance goals reflect competence perceptions relative to the performance of others. Therefore, performance-oriented athletes define their competence in terms of social comparisons using normative standards. Several AGT based studies highlighted that mastery goals in the sport and exercise domains have been demonstrated to be associated with greater behavioural (e.g. choosing more challenging tasks), affective (e.g. positive attitudes toward learning), and social-cognitive outcomes (e.g. higher participation motivation), when performance goals are often linked with selection of easier tasks, surface learning, and concern for social status [12-14].

Elliot and Church [15] extended the work of Nicholls [9,10] and divided achievement goals into approach and avoidance dimensions indicating pursuit of positive judgment and attempts to avoid negative evaluation of competence. Performance-approach (positive) strives to achieve competence by performing as well as possible relative to others, i.e. normative competence, whereas performance-avoidance (negative) avoids situations where achieving competence relative to others is uncertain. In turn, mastery-approach (positive) strives to achieve competence by learning as much as possible about a topic, and finally, mastery-avoidance (negative) avoids situations where barriers to learning affect competence. There appears to be wide consensus that to optimise motivation in sport, positive mastery goals should be promoted, regardless of whether a person has high or low performance goals [16-19]. In their large review of achievement goals in competitive youth sport, Lochbaum et al. found that the interdependence of mastery and performance goals was small, with mastery dimension scores being higher than performance scores. Considering gender differences, girls tend to score higher on mastery goals, whereas boys score higher than girls on performance goals. In addition, previous research has revealed that players born earlier in each birth cohort often have physical advantages over players born later on the same year. Therefore, it is highly warranted to study the patterns of approach-avoidance goals including gender and birth month variables.

Although the AGT has been widely used in youth sports, it is a shortcoming that longitudinal studies investigating the developmental trajectories of approach and avoidance goals are missing. Knowing that adolescent athletes go through many physical, psychological, and social changes, it is particularly important to investigate the development of their achievement goals during their teenager years. Since the perceptions of achievement goals in sport are purported to be strongly based on the individual experiences [20-25], it is important that the statistical method used to analyse longitudinal data obtains individual differences in the development process. The latent growth curve models used in this study are considered to serve as a good method to capture individual differences in development over time [26]. Previous cross-sectional studies in youth sport have also found negative associations among higher BMI scores and perceptions of competence [6,7]. These studies demonstrate that BMI is a crucial physical factor associated with the perception young athletes has about their competence. However, the parallel development of their BMI and competence were not examined in these studies. Longitudinal design is needed to better understand the simultaneous development of BMI and competence-related structures over time. Based on the current literature review, this study is the first attempt to analyse parallel development of BMI and approach-avoidance achievement goals in longitudinal design within youth sports.

The aims of this two-year follow-up study were to 1) examine the development of adolescent soccer players' approach-avoidance goals from 12 to 14 years of age, and 2) to analyse longitudinal associations between approach-avoidance goals and BMI during these two years of the study (Figure 1). Gender and birth month differences were added into the model as covariates, as gender differences in achievement goals [21] and relative age effects on soccer performance through physical advantages in young players [22,23] have been demonstrated. Due to developmental patterns of approach-avoidance goals not being previously been reported, a hypothesis was not stated. In turn, higher BMI scores were expected to relate with lower mastery- and performance-approach and higher mastery- and performance-avoidance [6,7].

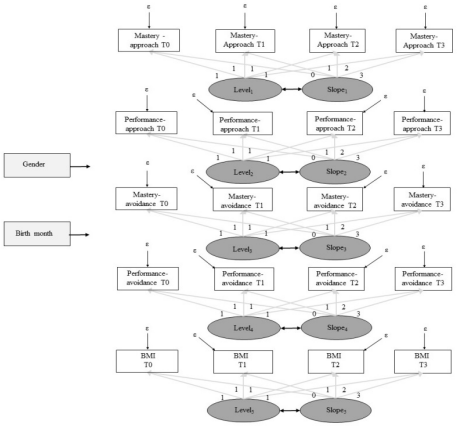

Figure 1: The theorised parallel latent growth curve models including the associations with gender and birth month. For the sake of clarity, not all links between latent variables are illustrated.

Participants

A total of 652 (237 girls, 415 boys) competitive soccer players with a mean age of 11.49 (± .28) years in the beginning of the data collection were followed from the age of 12 years continuing until turning 14 years. Players were born in 2003-2004 and represented 16 clubs, which were selected for the player development program organised by the Training and Research Centre for Finnish Soccer. Each player typically received 5 to 8 hours of organised soccer practices and game involvement per week (approximately 200 to 300 hours per year), focusing on technical (dribbling, passing, shooting) and tactical skills (offensive skills, 1 vs. 1 skills, defensive skills). The total number and distribution of girls (in parentheses) and boys at different measurement points were T0: 652 (36% of girls), T1: 264 (33% of girls), T2: 228 (39% of girls), and T3: 226 (35% of girls).

MEASURES

Approach-avoidance Goals

To assess approach-avoidance achievement goals, the 2×2 Achievement Goal Questionnaire was used [27]. The questionnaire used in the current study had the individual item stem of "When I play floorball, I feel that the most important…" The scale consisted of twelve items measuring four dimensions of achievement goals. The dimensions were performance-approach (e.g. It is important for me to do better than other players), mastery-approach (e.g. I want to perform my floorball skills as well as possible), performance-avoidance (e.g. I want to avoid performing poorly), and mastery-avoidance (e.g. Sometimes I am afraid that I may not perform my skills as thoroughly as I would like). Items were rated on a five-point Likert-scale ranging from strongly disagree (1) to strongly agree (5). Mean scores were calculated and used as goal orientation values for the subscales. Based on the data of 12-years-old Finnish floorball players, the model supported the construct validity (TLI = .95, CFI = .97, RMSEA = .044) and internal consistency (CR > .70) of the scale [28].

Body Mass Index

Height and weight were measured using digital equipment by the coaches. BMI was calculated using weight and height formula (kg/m2), based on the cut-off points for 12- to 14-year-old girls (21.68 to 23.34) and boys (21.22 to 22.62) [29].

METHODS

The data were collected from teams participating in the player monitoring event organised by the Training and Research Centre of Finnish Soccer twice a year; at the beginning of the competitive season (February to April) and near the end of the competitive season (October to December) in 2009-2017. The data collection comprised four measurement phases across two full seasons for each player. Players responded to questionnaires under the supervision of the coaches during test sessions. The participants were advised to ask for help if needed. To minimise tendency to give socially desirable responses, players were encouraged to answer honestly and were assured that

their responses were confidential. Participants were told that their involvement was voluntary and they were allowed to terminate their participation at any time. The written approvals of the study protocols were obtained from players, their parents, and the Human Research Ethics Committee of the local university.

Data analysis

Prior to main analyses, normal distribution, outliers, and missing values were analysed. Observed variables were normally distributed. However, standardised values (± 3.0) and Mahalanobis distance -test ($p < .001$) revealed that the data included 19 significant outliers. The closer analysis revealed that some players did not provide congruent responses to all three items of mastery-approach, and thus, the outliers were removed. The number of players ranged between 652 (T0) and 226 (T3) over time, as 226 players agreed to participate in the follow-up measures. The Missing Completely at Random (MCAR) test ($\chi2 = 190.394$, $df = 183$, $p = .339$) indicated no differences between data with and without missing values. Missing values were not imputed, but estimated using full information maximum likelihood, which has been shown to produce unbiased parameter estimates and standard errors under MCAR conditions [30-32].

Descriptive statistics including correlations, means, and standard deviations, and Cronbach alphas for observed variables were determined. Confirmatory factor analyses were implemented to test the construct validity of the scales T0 to T3. To answer to the research questions, a parallel latent growth curve model was implemented. The latent variables (Level, Slope) based on the observed variables with residuals (ε) were estimated. Levels refer to the initial points at the baseline. Slopes referred to the growth pattern when the initial levels were accounted for. The default models for longitudinal development were constructed by fixing the loadings of latent variables to 1 on the initial level, and 0 to 3 (T0-T3) on the growth variables. In case of poor data fit, alternative non-linear models were proposed. To examine the preliminary gender and age-related differences, gender and birth month were added into the models as covariates. The differences observed were confirmed using two-group tests, in which two nested models, can be tested by constraining subsequent parameters to be equal [33].

The Chi-square test ($\chi2$) was used to evaluate the model's overall goodness-of-fit to the data. A non-significant difference between observed and theoretical distribution had an acceptable fit to the data. To determine the appropriateness of the model the standardised root mean square residual (SRMR) and the root mean square error of approximation (RMSEA), the comparative fit index (CFI), the Tucker-Lewis index (TLI) were examined [34]. A value of .05 or less for SRMR indicate excellent and .10 or less adequate magnitude of a varying quantity, and a value of .08 or less for the RMSEA indicate an acceptable fit of the model in the relations to the degrees of freedom. The CFI and TLI indices greater than .95 are indicative for an excellent model fit. The MCAR test for missing values was performed using SPSS Version 22.0 and all subsequent analyses using Mplus Version 8.0.

RESULTS

Descriptive statistics

Correlations, means, standard deviations, and Cronbach alphas of the observed variables were determined (Table 1). The correlations between variables ranged from weak to strong. The strongest positive correlations were found between performance-approach and performance-avoidance in both girls and boys. Correlations between BMI, birth month, and goal orientations were relatively weak. Nearly 55% of girls and 60% of boys were born in January to June and the rest later on same year. BMI ranged from 14.58 to 26.25 in girls and from 14.63 to 26.59 in boys at T0 (90.5% of girls had BMI equal or less than 21.68 and 96.6% sof boys had BMI equal or less than 21.22).

Table 1: Correlations, means, standard deviations, and Cronbach alphas of the study variables.

	1	2	3	4	5	6	M (SD)	α
1 Mastery-approach	-	.21*** .32*** .13 -.08	.19** .27** .04 -.06	.17* .18 .12 -.03	-.10 .06 -.07 -.07	-.10 .08 .02 .05	4.34 (.57) 4.34 (.50) 4.38 (.51) 4.46 (.43)	.63 .67 .66 .63

2 Performance approach	.40*** .31*** .45*** .50***	-	.22*** .14 .11 .04	.66*** .58*** .59*** .63***	.01 .00 .04 .14	-.10 -.10 .17 .04	2.96 (.90) 2.79 (.87) 3.20 (.89) 3.32 (.74)	.83 .81 .86 .76
3 Mastery-avoidance	-.10* .03 -.04 -.09	.05 .10 -.13 -.01	-	.34*** .32*** .21 .13	.14* .18 .24* .26*	.00 .03 -.06 .05	3.23 (.89) 3.14 (.77) 3.16 (.85) 3.52 (.82)	.82 .78 .81 .77
4 Performance avoidance	.16*** .17* .18* .19*	.49*** .63*** .39*** .55***	.20*** .27*** .07 .22**	-	.00 -.07 .16 .17	.01 -.07 -.05 -.11	3.05 (.90) 2.76 (.91) 2.97 (1.04) 2.83 (.82)	.74 .83 .80 .74
5 BMI	-.08 -.01 .04 -.01	-.02 -.13 -.08 -.06	.06 .08 -.07 -.04	.00 .05 -.10 -.04	-	-.03 -.05 .03 .15	18.72 (2.06) 19.16 (2.24) 19.43 (2.02) 19.85 (2.08)	-
6 Birth month	-.11* .09 -.03 -.08	-.06 .16* -.05 .00	.03 .08 .12 .12	.00 .12 .13 .11	-.03 -.01 -.02 .03	-	-	-
M (SD)	4.59 (.41) 4.57 (.40) 4.61 (.45) 4.58 (.46)	3.77 (.89) 3.66 (.86) 3.91 (.80) 3.89 (.82)	2.78 (.88) 3.02 (.89) 2.60 (.96) 2.68 (.90)	3.42 (1.00) 3.31 (1.01) 3.22 (1.02) 3.14 (1.06)	17.87 (1.76) 18.26 (1.76) 18.48 (1.91) 19.20 (1.80)	-		
α	.57 .50 .67 .70	.82 .85 .76 .80	.78 .77 .81 .80	.72 .81 .73 .83	-	-		

Notes. Correlations, means, standard deviations, and Cronbach alphas for girls are presented above and for boys below the diagonal (T0-T3). Girls (%) with BMI below overweight cut-point 90.5, 91.6, 94.3, 93.5 and boys (%) 96.6, 96.0, 97.1, 96.6 (T0-T3). ***p < .001, **p < .01, *p < .05.

Confirmatory Factor Analyses

To test factor structures of the scales T0 to T3, a series of confirmatory factors analyses were implemented. The construct validity of the achievement goal scale at T0 ($\chi2(47) = 71.285$, p = .013, CFI = .99, TLI = .98, RMSEA = .028, SRMR = .028), T1 ($\chi2(48) = 85.321$, p = .001, CFI = .97, TLI = .95, RMSEA = .054, SRMR = .049), T2 ($\chi2(47) = 72.828$, p = .009, CFI = .97, TLI = .96, RMSEA = .049, SRMR = .059), and T3 ($\chi2(47) = 77.414$, p = .003, CFI = .96, TLI = .95, RMSEA = .054, SRMR = .055) were confirmed, as all scales had acceptable fit indices. In addition, Cronbach alphas were acceptable (Table 1). Based on this, the scales provided reliable results for the growth curve model development.

Parallel Latent Growth Curve Models

The parallel latent growth curve models of achievement goals and BMI including gender and birth month was estimated to detect reciprocal relationships between levels and changes over time T0 to T3. First, the theorised model presented unacceptable model fit for the present data ($\chi2(123) = 268.636$, p < .001, CFI = .97, TLI = .95, RMSEA = .043, 90% CI [.04, .05], SRMR = .108). Based on the model fit indices, performance-approach and performance-avoidance models were established as non-linear models by allowing the parameters of slope at T3 to be freely estimated. The residuals of performance-approach T0 and performance-avoidance T2, performance-approach T1 and performance-avoidance T1, and performance-approach T2 and performance-avoidance T2 were allowed to correlate. The modified parallel model showed an acceptable model fit for the data (Table 2). The standardised model results showed that initial level of mastery-approach was higher than performance-approach, and both avoidance goals,

when in turn, task and performance-avoidance were higher than performance-approach. Performance-avoidance decreased and BMI increased over time and the development was similar in both girls and boys. The two-group tests confirmed that girls had higher mastery-avoidance and BMI scores than boys, whereas boys reported higher mastery-approach, performance-approach, and performance-avoidance levels than girls did at $p < .05$ level. No statistically significant associations between achievement goal variables and birth month were found.

Table 2: The standardised parameter estimates for parallel latent growth curve models.

		b	R2	1 Level1 Slope1		2 Level2 Slope2		3 Level3 Slope3		4 Level4 Slope4		5 Level 5	Cov1	Cov2
Estimates				With									On	
1 Mastery-approach	Level 1 Slope1	14.22(1.20)*** .05(.45)	.14(.04)*** .04(.05)	-.01(.31)		-.29(.15)*		-.04(.15)		-.18(.14)		.24(.13)	.35(.06)*** -.11(.11)	-.09(.05) .16(.11)
2 Performance-approach	Level 2 Slope2	2.45(.21)*** .18(.27)	.18(.03)*** .02(.02)	.47(.07)*** -.12(.10)	.62(.21)**	-.55(.08)***		-.16(.09)		-.45(.08)***		.00(.07)	.42(.04)*** -.07(.07)	-.04(.04) .12(.06)
3 Mastery-avoidance	Level 3 Slope3	5.23(.38)*** .47(.35)	.08(.03)** .03(.03)	.01(.08) -.03(.13)	-.03(.19)	.17(.06)** -.34(.10)***	.42(.12)***	-.24(.16)		-.30(.11)**		.02(.09)	-.28(.05)*** -.15(.09)	.03(.05) .08(.08)
4 Performance-avoidance	Level 4 Slope4	3.46(.30)*** -.83(.34)*	.05(.02)* .01(.02)	.25(.07)*** .02(.12)	.28(.19)	.73(.05)*** -.34(.09)***	.85(.13)***	.41(.07)*** -.17(.11)	.45(.14)**	-.25(.13)		.05(.08)	.22(.05)*** .06(.08)	.00(.05) .10(.08)
5 BMI	Level 5 Slope5	10.28(.29)*** 1.99(.26)***	.05(.02)** .01(.01)	-.15(.06)* .12(.09)	-.13(.14)	-.02(.04) .04(.07)	-.02(.08)	.12(.05)* -.06(.08)	.02(.10)	.00(.05) -.03(.07)	.01(.09)	-.01(.07)	-.21(.04)*** -.09(.06)	-.03(.04) -.06(.06)
Model fit														
$\chi 2$ (120) = 210.10, $p < .001$, CFI = .98, TLI = .97, RMSEA = .034, 90% CI [.03, .04], SRMR = .088														
Notes. ***$p < .001$, **$p < .01$, *$p < .05$. Standard errors in parentheses. Cov1 = gender, Cov2 = birth month.														

The initial level of mastery-approach (Level1) was positively related with the initial levels of performance-approach (Level2) and performance-avoidance (Level4), and negatively with the initial level of BMI (Level5). The initial level of performance-approach (Level2) positively correlated with the levels of mastery-avoidance (Level3) and performance-avoidance (Level4) and with the negatively with the change over time in mastery-approach (Slope1), performance-approach (Slope2), mastery-avoidance (Slope3), and performance-avoidance (Slope4). The level of mastery-avoidance (Level3) was positively linked with the level of performance-avoidance (Level4) and BMI level (Level5). The initial level of performance-avoidance (Level4) negatively correlated with the change in performance-approach (Slope2) and mastery-avoidance (Slope3). Finally, the change over time in mastery-approach (Slope1) related with the change in performance-approach (Slope2), and the developmental trend in performance-approach (Slope2) with mastery-avoidance (Slope3) and performance-avoidance (Slope4), and mastery-avoidance (Slope3) with performance-avoidance (Slope4). Squared multiple correlations revealed that the model explained 1% to 18% of the variability of the latent variables.

DISCUSSION

The aims of the present study were to examine the development of adolescent soccer players' approach-avoidance goals from 12 to 14 years of age, and to analyse longitudinal associations between approach-avoidance goals and BMI during these two years of the study. The key findings of this study were; 1) performance-avoidance goal decreased and BMI increased over time, 2) higher perceptions of mastery-approach associated with lower BMI

scores and higher mastery-avoidance goal with higher BMI scores, and 3) the level of mastery-approach goal was higher than performance-approach and mastery- and performance-avoidance goals, whereas mastery- and performance-avoidance goals were higher than performance-approach goal.

First, the findings revealed that BMI increased over time, and the development was similar in both girls and boys. An increase in BMI across a two-year period can be considered natural, since biological changes occur during puberty including increases in height and weight, completion of skeletal growth accompanied by an increase in skeletal mass, and changes in body composition [4]. However, previous physical activity studies in children and adolescents have found that even those meeting the guidelines of 60 minutes of moderate-to vigorous physical activity on a daily basis [35] can still be sedentary for many hours per day [36]. This may explain, at least in part, why some players in the current sample were overweight regardless of regular organised soccer activities. A cohort of 13% of the players was overweight or obese in the beginning of the data collection based on the classification provided by Cole et al. [29]. The proportion of overweight players was still less than in the normal adolescent population (19%), as the prevalence of overweight and obesity among children and adolescents has risen dramatically [37]. Current results, however, also revealed the proportion of overweight and obese players was about 10% in the end of the data collection, which may indicate that the current BMI increase was related with their physical development, as teenagers' body height and weight typically increases during puberty [6,7].

Furthermore, a decrease in performance-avoidance goals could be considered as positive, since performance-avoidance represented negative behavioural outcomes in achievement goals [16]. Additionally, the initial level of performance-avoidance was negatively associated with a developmental trend in mastery-avoidance and performance-avoidance. This means that players with higher perceptions of performance-avoidance had greater decreases in mastery-and performance-avoidance. This could also be considered as positive outcome over time in the current sample, as negative mastery- and performance-avoidance comprise barriers to learning and perceptions of competence relative to other players [16]. Although the coach-athlete interactions and peer relationships were not examined in the current study, apparently, coaches and teammates in youth sport play significant roles concerning players' involvement and beliefs about ability [38]. All of these are important aspects of social-cognitive outcomes, representative of the proposition that achievement goals in team sports can be mediated by the connection between feelings, thoughts, and behaviours [39]. Based on the current data, however, it is difficult to draw rigorous conclusions, why perceptions of performance-avoidance reduced over time. A methodological explanation could be that the present study examined achievement goals at the contextual level (in soccer), although it should be noted that situational perceptions of achievement goals may vary widely between certain practice sessions and individual drills [40]. Overall, the results indicated that approach and avoidance goals were relatively stable across the years of early adolescence, as only performance-avoidance changed over time.

In addition, the results showed that the initial level of mastery-approach were higher than performance-approach, mastery-avoidance, and performance-avoidance goals. Task and performance-avoidance were, in turn, higher than performance-approach. This finding was in line with previous review findings of Lochbaum et al. [20], as they revealed that perceptions of mastery goals were generally higher than performance goals. The difference between the present and previous studies was that past research has mainly examined mean values of dichotomous mastery and performance variables, whereas the present study tested four dimensions of approach-avoidance goals using latent variables. Despite this, the current findings indicated that players mainly participated in soccer related activities, because of the development and learning new skills. On this basis, it seems that individual player development was prominently considered in soccer coaching over normative comparisons. This finding can be seen as a positive outcome, perhaps even preventing possible dropouts, when players grow older. For instance, Balish et al. [3] showed that coaching strategies that foster effort, cooperation, learning, and self-referenced feedback correlated positively with continued sport engagement. Several scholars [41-43] have suggested task-involving coaching methods to promote motivation and sport participation through the critical years in early adolescence, when the main objective is to increase players' perceptions of physical competence through development and learning over high level of competition and normative comparisons with teammates.

Although the inverse relationships between BMI and physical competence in young athletes have been previously studied [6,7], this was the first study to examine the reciprocal developmental patterns of approach-avoidance goals and BMI. Specifically, the present findings contribute to existing evidence that the higher perceptions of mastery-approach associated with lower BMI scores and higher mastery-avoidance with higher BMI scores. This is concerning, especially among players with higher BMI, as it has been shown that children who are not equipped with the necessary skills to engage in activities that requires high levels of competence may not want to display motor and physical capacities publicly [5]. Transitioning players with lower perceptions of mastery-approach and higher BMI to

a higher level of mastery-approach requires that players spend more time with a variety of soccer drills and practices. For instance, based on the suggestions of Wallhead and Ntoumanis [43], coaches could provide a variety of soccer skill drills that players could practice on their leisure time, not only during the organised sessions, players could be involved in the practice session planning when appropriate, recognition and feedback about improvement could be based on individual progress and development rather than social comparison, small group practices and drills could be emphasised, and other players could be used as assistant coaches dictating the rate of progression through specific skill practices. These coaching strategies could not only increase players' positive perceptions of mastery-approach but also reduce their negative perceptions of mastery-avoidance goals [44].

Considering the gender differences, girls had higher perceptions of mastery-avoidance and BMI scores than boys did, whereas boys reported higher mastery-approach, performance-approach, and performance-avoidance levels than girls did. A previous study of Hanrahan and Cerin [45] incorporating dichotomous orientations in young athletes showed that girls scored higher in mastery goals than boys. In turn, Grasten and Watt [46] revealed a significant gender difference in performance goals with boys scoring higher, but no differences between girls and boys in mastery goals in a sample of Finnish school students at the age of 11 to 16 years (as in the current study). The previous and present findings may differ because of the scale and items used or the sample selection [47]. However, the higher BMI levels of girls was expected as girls generally have a higher percentage of body fat than boys do, especially when the biological maturation causes increased deposition of fat through estrogen hormone production [4]. In turn, an unexpected finding was that significant associations between birth month and achievement goals over time were not found. An explanation to this may be that the proportions of players born January to June and July to December were similar in the current sample. Based on this, it seems that players born earlier in the calendar year were not "over" represented in the present sample [48] but the sample was relatively homogenous.

Strengths, Limitations, and Future Studies

A strength of the present study was the longitudinal study design involving a sample of young girls and boys across several measurement points. As previous achievement goal studies incorporating mean differences of observed variables [20], the use of latent variables provided an important efficiency and power advantage within the structural equation modelling process [32]. However, the study was limited in several areas of data sourcing. Longitudinal studies are always vulnerable for missing values. The current sample size varied between the time points, although the overall sample size was quite acceptable across the study. The study would have benefitted from the detailed information about quantity and time of free practice sessions outside organised events for each participant. However, this would have required more resources, which were not available for the current data collection. Future studies could examine the quality and quantity of skill practice sessions with more details. There is a need for a greater number of studies using longitudinal study designs and coaching interventions, in order to understand motivational processes behind player development using specific coaching methods and programs in youth soccer.

CONCLUSION

The key findings of the study were that 1) performance-avoidance goal decreased and BMI increased over time, 2) the higher perceptions of mastery-approach associated with lower BMI scores and higher mastery-avoidance goal with higher BMI scores, and 3) the level of mastery-approach goals was higher than performance-approach and mastery- and performance-avoidance goals, whereas mastery- and performance-avoidance were higher than performance-approach goals. Based on previous and current findings, a transition of players with lower perceptions of mastery-approach and higher BMI to the higher level of mastery-approach goals requires players should spend more time with a variety of soccer drills and practices. Practically, these players could be given more responsibility, for instance, through task-involving coaching methods, in which the main objective is to increase players' perceptions of physical competence through development and learning. These coaching strategies could not only increase players' positive perceptions of mastery-approach but also reduce their negative perceptions of mastery-avoidance goals.

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