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# The Associations And Age-Related Development of Motivational Climate, Achievement Goals, Enjoyment, Technical Skills, And Body Mass Index in Young floorball players

**Arto Gråstén*[1], Hannele Forsman[2]**
[1]Lecturer, PhD, Faculty of Education, University of Tasmania, Launceston, Tasmania, Australia
[2]Development Manager, PhD, Eerikkilä Sports Institute, Tammela, Finland

**Original Research Article**

***Corresponding author**
*Arto Gråstén*

*Email:*
*arto.grasten@utas.edu.au*

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**Abstract:** The present study examined the associations and age-related development of motivational climate, achievement goals, enjoyment, technical skills, and body mass index (BMI) in young floorball players. The sample comprised 283 Finnish competitive male floorball players with a mean age of 11.49 ± .27 years in the beginning of the data collection. Players completed floorball-specific technical skill tests and questionnaires across two time points, twelve months apart. The path model showed that perceptions of task-involving climate positively associated with mastery-approach, performance-approach, and enjoyment, whereas perceptions of ego-involving climate related with mastery- and performance-approach and mastery- and performance-avoidance. The results indicated that players with higher BMI had higher mastery-avoidance and slower dribbling skill scores. However, the findings supported previous findings, as a player can have high mastery-approach and high performance-approach or high performance-avoidance at the same time. Finally, mastery- and performance-approach, performance-avoidance, dribbling skills, and passing test scores increased over time. In contrast, perceptions of task- and ego-involving climate, mastery-avoidance, enjoyment, and BMI remained stable. The findings indicated that task-involving coaching methods could enhance approach goals and enjoyment in young floorball players. All young floorball players, especially players with higher BMI could benefit, if they were encouraged to spend more time with a wide range of fundamental skill practices on their leisure time, not only during the organized sessions. This could increase their floorball-specific skills, and in turn, decline the negative perceptions of mastery-avoidance.

**Keywords:** task- and ego-involving climate, achievement goals, dribbling, passing, path analysis, repeated measures.

## INTRODUCTION

Floorball is one of the fastest growing sport, especially in Europe, but gaining popularity in Australia, Canada, India, Japan, Singapore, and the United States [1]. This indoor team sport, played with sticks made of carbon and composite materials and a 7.2 cm diameter perforated plastic ball, is a popular form of exercise also in school physical education [2]. Floorball is played in three 20-minute periods on a 40×20 m court surrounded by a 0.5 m high rink with 1.6×1.15 m goals. Six players from each team, including the goalkeeper, participate in active play. The goalkeeper has no stick, field players handle the ball with sticks, and they are not allowed to touch the ball with the head or arms or to hit it while it is above knee height [3]. The nature of floorball is quite flexible, anyone can participate regardless of body structure or physical ability. Previously, only two floorball related research publication has been reported in the field of sport psychology [4, 3]. Furthermore, researchers in the competitive sport testing have not tested the relationships between achievement goals and game-specific technical skills, although mastery and performance goals in young athletes have been widely studied [5]. Therefore, the present study aimed to examine this aspect of achievement goals among young floorball players.

Achievement Goal Theory [6, 7] is a theoretical framework, which not only recognizes the role of social environment, but also provides a model to facilitate understanding the relationship between the psychological environment and behaviour in sport. The theory suggests that the basic motive of people is to demonstrate their competence in the achievement settings, for instance in sport. Originally, Nicholls [7] identified two distinctive achievement goals based on the definition of personal competence, *mastery* and

*performance* orientation. Elliot and Church [8] 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 [9]. In contrast, *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 [9]. Mastery goals rely on comparisons with requirements of the task and improvement, resulting in an increase in intrinsic motivation, whereas performance goals reflect competence perception relative to the performance of others [10, 7]. There appears to be consensus that to optimize motivation in sport, mastery orientation should be promoted, regardless of whether a person has high or low performance orientation [11-13]. Previous studies have shown that perceptions of mastery orientations are closely related to enjoyment, and motives of skill development in the sport domain [12, 14].

Another essential element of the theory is *motivational climate*, which refers to the psychological environment that the coach creates by designing sessions [15]. Motivational climate can occur in two different forms, task- and ego-involving climate [7]. *Task-involving climate* reflects the structures that support effort, cooperation, learning, and feedback on the basis of self-referenced criteria [15]. Previous studies have shown that higher perceptions of task-involving climate are positively associated with higher mastery orientation [16, 17], enjoyment in sport [12, 18], and levels of fundamental movement skills [19]. In turn, *ego-involving motivational climate* refers to situations that foster normative comparisons, competition, and evaluation on the basis of normative competence criteria [15, 20]. Perceptions of ego climate have been shown to be linked to performance orientation [21, 17] and lower enjoyment in school physical education [22, 18]. Both task- and ego-involving climate coexist together during sport sessions, i.e. the session is never just task or ego-involved but a combination of these two forms [23]. By creating a task-involving climate the young athletes are more likely to continue playing sport through their lives, which is closely related to individual and social factors such as enjoyment [24].

*Enjoyment* is described as a positive affect that reflects generalized feelings such as pleasure, liking, and fun [24]. Previous research has consistently shown that enjoyment is an essential element underlying sport motivation for youth so as to maintain positive engagement in sport [25, 26]. However, many young athletes are choosing a single sport to participate in all year round at younger ages, with infrequent breaks and rest [27]. This continued participation concentrated on one sport is believed to increase the risk of sport-related psychosocial problems such as lack of motivation or enjoyment [28]. On this basis, it is important to investigate the age-related changes in perceptions of enjoyment in young athletes in addition to floorball-specific skills.

Skill development in team sports is a complex process, which makes it difficult to predict long-term success in young players [29, 30]. *Dribbling* is running with the ball while keeping it under control and a characteristic of a skilled player, and therefore, an often-measured element of technical skills in previous soccer related studies [31, 32]. *Passing* skills require players to demonstrate ability under constraints of time and opposing defenders, decisions of who to pass to, and not only the accuracy but also the strength of the pass [29]. Several previous studies in young soccer players have consistently shown that game-specific dribbling [31, 33-35] and passing skills [31, 35] appear to improve with age. In addition, overweight boys and girls have been shown less likely to possess high levels of fundamental movement skills than those who were not overweight in school physical education [36]. As players in this age group are potentially sensitive to motivational loss emanating from a lowering in perceived physical and motor competence [37, 38], it is important to examine the relationships between motivational factors, body structure (BMI), and floorball-specific skill levels in youth sport. Since floorball is a relatively new sport [3], this has not yet been empirically tested among young floorball players.

The review of previous achievement goal research in youth sport revealed that studies have been invariably cross-sectional [14]. Scholars in the competitive sport testing have not tested the relationships between achievement goals and technical skills and the lack of and floorball-specific studies in the field of sport psychology is evident [3]. Considering the multidimensional nature of ball games including physical (BMI), psychological (motivational climate), physiological and psychomotor (technical skills), social-cognitive (achievement goals), and affective (enjoyment) aspects [31, 39], the links between motivational climate, achievement goals, floorball-specific skills, and BMI warrant further studies. The present study extends the previous findings by examining the associations and age-related changes in task- and ego-involving climate, achievement goals, enjoyment, dribbling and passing skills, and BMI from the age of 12 years until turning 13 years in young floorball players (Fig-1).

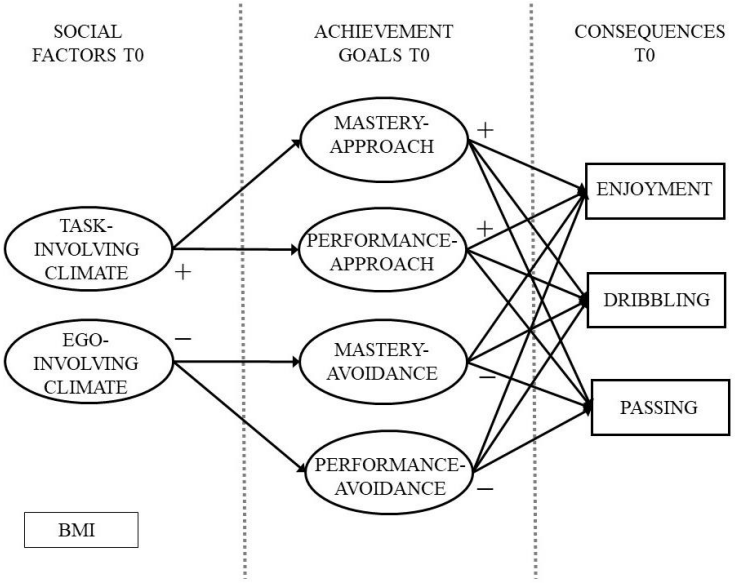


**Fig-1**: **The theorized model of motivational climate, achievement goals, floorball-specific dribbling and passing skills, and enjoyment including covariate effects of BMI.**

The aims of the study were to examine 1) the direct and indirect relationships between task- and ego-involving motivational climate, approach and avoidance goals, enjoyment, floorball-specific technical skills, and BMI, and 2) age-related development in perceptions of motivational climate, achievement goals, enjoyment, floorball-specific technical skills, and BMI over time in a sample of young floorball players. It was expected that higher perceptions of task-involving climate would be linked to higher mastery- and performance-approach goals [16, 17], enjoyment [12, 18], and technical skills [19], whereas ego-involving climate would associate negatively with such outcomes. Higher BMI scores were expected to relate with lower approach and higher avoidance goals [40] and lower technical skill scores [36]. Finally, it was expected that dribbling and passing skills would improve over time [31, 33-35].

## METHOD

### Participants

The current sample comprised 283 competitive male floorball players ($M_{age}$ = 11.49 ± .27 years) who were born in 2003−2004. Players represented floorball clubs, which participated in the player monitoring events organized by the Finnish Floorball Academy. The number of players participating in the measurement phases was 283 (T0) and 253 (T1). Players typically received 5 to 8 hours of organized practices with focusing on ball handling skills (passing, dribbling, shooting), and games on a weekly basis. The written approvals of the study protocols were obtained from players, their legal guardiands, and the Human Research Ethics Committee of the local university.

### INSTRUMENT

### Motivational Climate

Perceptions of task- and ego-involving motivational climate were measured using the Motivation Climate in Physical Education Scale [41], which was modified for the context of floorball. The individual item stem was "*When playing floorball…*" The task-involving climate dimension consisted of five items (e.g. *It is important for players to try their best when playing floorball*), and the ego-involving climate dimension included four items (e.g. *It is important for players to perform better than others when playing floorball*). Responses were indicated on a five-point Likert-scale ranging from strongly disagree (1) to strongly agree (5). The confirmatory factor analysis (*TLI* = .96, *CFI* = .98, *RMSEA* = .059) and composite reliability (.86) supported the construct validity of the scale for Finnish secondary school students in school physical education [42].

### Achievement goals

To assess achievement goals, the 2x2 Achievement Goal Questionnaire was used [43]. 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 achievement goal values for the subscales. The construct validity (*TLI* = .94, *CFI* = .95, *RMSEA* = .073) and composite reliability (.93) of the two-dimensional scale were supported by results achieved using a sample of Finnish secondary school students in the physical education context [42].

**Enjoyment**

Perceptions of enjoyment was assessed using the Sport Enjoyment Scale [24], which was modified for the context of floorball. The item stem was "*When playing floorball*..." The subscale consists of four items (e.g. *I enjoy floorball*) and the responses were indicated on a five-point Likert-scale ranging from strongly disagree (1) to strongly agree (5). Recently, the construct validity (*TLI* = 1.00, *CFI* = 1.00, *RMSEA* = .031) and composite reliability (.93) of the scale were supported by results achieved using a sample of Finnish secondary school students in physical education [42].

**Floorball-specific technical skills**

Dribbling and passing skills were measured using the floorball-specific tests, which were adapted from identical soccer-specific dribbling and passing tests (See video at https://vimeo.com/user37269379/review/127591813/62ab882115). The target was to complete the test tracks as quickly as possible (max. 60 seconds). The dribbling test started when a player crossed the electric timing gate and the passing test when the player touched the ball. The best out of two attempts represented player's skill level. Vänttinen [35] reported that for a sample of 87 Finnish young soccer players with one month interval test-retest correlation coefficients for dribbling ($r$ = .82) and passing ($r$ = .81) were relatively strong.

**Procedure**

The data were collected in the beginning of the competitive season (September) across two measurement phases, twelve months apart, in 2015−2017. Players completed floorball-specific technical skill tests, and responded to questionnaires under the supervision of the coaches during test sessions. The participants were advised to ask for help if needed. To minimize 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. Technical skill tests were executed in the indoor gym on a rubber mat flooring under equal conditions at T0 and T1. To avoid injuries participants were given an adequate warm-up and practice before testing. Height and weight were measured using digital equipment by the coaches. BMI was calculated using height and weight formula (kg/m$^2$) [44].

**Data analysis**

Prior to main analyses, normal distribution, outliers, and missing values were analyzed. The data was normally distributed and significant outliers were not detected [45]. Missing values occurred, because 30 players missed follow-up tests due to injuries, illnesses, school exams, or dropouts. Little's MCAR -test ($\chi^2$ = 155.648, $df$ = 137, $p$ = .132) indicated that the missing values did not represent any particular group. Hence, the missing values were assumed to be missing completely at random (MCAR) [46]. Missing values were not imputed but estimated using full information maximum likelihood [47].

Descriptive statistics including correlations, means, and standard deviations, and Cronbach alphas for study variables were determined. Because the Finnish versions of scales have not been used in the context of floorball, a construct validity of the scales was tested using appropriate confirmatory factor analyses. Next, to examine the relationships of motivational climate, achievement goals, enjoyment, floorball-specific dribbling and passing skills, and covariate effects of BMI, a path model model was implemented. The Wald test was used to the parameters of repeated measures between T0 and T1 [47].

Chi-square test ($\chi$2) was used as a test of 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 [48]. To determine the appropriateness of the model the standardized 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 [48]. A value of .06 or less for SRMR indicate the reasonable magnitude of a varying quantity, 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 exellent model fit. Finally, the equality of means and variances between measurement phases T0 and T1 were tested using Wald test of maximum likelihood repeated measures analysis. Little's MCAR -test for missing values was performed using SPSS Version 22.0 and subsequent analyses using Mplus Version 7.4.

**RESULTS**

**Descriptive statistics**

Correlation coefficients, means, standard deviations, and Cronbach alphas of the study variables were determined (Table-1). The correlations between variables ranged from weak to strong. The strongest positive correlation was found between performance-

approach and performance-avoidance at T1. Correlations between BMI, goal orientations, and floorball-specific technical skills were relatively weak. BMI ranged from 14.50 to 27.53 (90.8% of players had BMI equal or less than 21.22 at T0 and 87.5% at T1).

**Confirmatory factor analyses**

To test factor structures of the scales, a series of confirmatory factors analyses were implemented. The construct validity of MCPES ($\chi^2(25) = 36.788$, $p = .061$, *CFI* = .96, *TLI* = .94, *RMSEA* = .052, *SRMR* = .049), Achievement Goal Scale ($\chi^2(48) = 63.875$, $p = .062$, *CFI* = .97, *TLI* = .95, *RMSEA* = .044, *SRMR* = .056), and Sport Enjoyment Scale ($\chi^2(2) = 4.168$, $p = .124$, *CFI* = .97, *TLI* = .91, *RMSEA* = .079, *SRMR* = .032) were confirmed, as all scales had acceptable fit indices. In addition, Cronbach alphas were acceptale (Table 1). Based on this, the subscales provided reliable results for the current path model development.

**Path analysis**

In order to test the direct and indirect associations between task- and ego-involving climate, approach and avoidance achievement goals, enjoyment, and floorball-specific technical skills at T0, a path model including covariate effects of BMI was implemented. The model presented excellent model fit indices for the present data (Table-2).

The path model showed that the perceptions of task-involving climate positively associated with mastery-approach, performance-approach, and enjoyment, whereas the perceptions of ego-involving climate related with perceived mastery- and performance-approach in addition to mastery- and performance-avoidance. The results indicated that players with higher BMI had higher perceptions of mastery-avoidance and slower dribbling skill scores. Finally, the model showed that perceptions of mastery-approach related positively with performance-approach and performance-avoidance, whereas both performance-approach and mastery-avoidance were positively linked with perceptions of performance-avoidance. Dribbling skill scores were moderately linked to present passing skill scores. No significant indirect paths were found from task- and ego-involving climate to enjoyment or technical skills via achievement goals. Squared multiple correlations revealed that the model explained 3% to 23% of the variability of the study variables.

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

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | M | SD | α |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Task climate | - | | | | | | | | | 4.53<br>4.58 | .40<br>.40 | .63<br>.67 |
| 2 Ego climate | -.09<br>-.06 | - | | | | | | | | 2.57<br>2.71 | .86<br>.99 | .77<br>.88 |
| 3 Mastery-approach | .34$^{***}$<br>.31$^{**}$ | .12<br>.17 | - | | | | | | | 4.41<br>4.57 | .61<br>.49 | .73<br>.58 |
| 4 Performance-approach | .13<br>.19 | .45$^{***}$<br>.54$^{***}$ | .30$^{***}$<br>.47$^{***}$ | - | | | | | | 3.22<br>3.71 | .97<br>.91 | .81<br>.79 |
| 5 Mastery-avoidance | .03<br>.09 | .20$^{**}$<br>.30$^{**}$ | -.08<br>.20 | .21$^{**}$<br>.31$^{**}$ | - | | | | | 2.79<br>2.95 | .87<br>.85 | .66<br>.76 |
| 6 Performance-avoidance | .10<br>.13 | .34$^{***}$<br>.42$^{***}$ | .22$^{**}$<br>.37$^{**}$ | .57$^{***}$<br>.65$^{***}$ | .26$^{***}$<br>.12 | - | | | | 3.25<br>3.56 | 1.13<br>.94 | .74<br>.73 |
| 7 Enjoyment | .40$^{***}$<br>.42$^{***}$ | .02<br>-.03 | .20$^{**}$<br>.23$^{*}$ | .06<br>.16 | .01<br>-.06 | -.03<br>.15 | - | | | 4.55<br>4.64 | .53<br>.51 | .88<br>.88 |
| 8 Dribbling (s) | -.09<br>.00 | -.01<br>-.09 | -.04<br>-.12 | -.06<br>-.14 | .04<br>-.23 | .04<br>-.18 | -.11<br>.16 | - | | 19.87<br>18.63 | 1.31<br>.95 | - |
| 9 Passing (s) | -.01<br>.20 | -.04<br>-.11 | .00<br>.04 | -.10<br>.03 | -.08<br>-.07 | -.01<br>.06 | .03<br>.07 | .43$^{***}$<br>.28$^{*}$ | - | 38.24<br>33.02 | 6.93<br>4.44 | - |
| 10 BMI | .02<br>-.19 | .07<br>-.06 | -.03<br>.01 | .04<br>-.08 | .19$^{*}$<br>.10 | .07<br>-.08 | .04<br>.07 | .32$^{***}$<br>.11 | .09<br>-.05 | 18.28<br>18.65 | 2.14<br>2.21 | - |

Note 1. Means, standard deviations, and Cronbach alphas for study variables at T0 are presented above and at T1 below.
Note 2. BMI scores above 21.22 considered overweight and scores above 26.02 obese (Cole et al. 2000).
Note 3. $^{***}p < .001$, $^{**}p < .01$, $^{*}p < .05$.

**Table-2: The direct parameter estimates for the path model**

| **Regression coefficients** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Ego climate | Mastery-approach | Performance-approach | Mastery-avoidance | Performance-avoidance | Enjoyment | Dribbling | Passing |
| **On** | | | | | | | | |
| Task climate → | | .35(.07)$^{***}$ | .17(.07)$^{**}$ | .05(.07) | .13(.07) | .39(.07)$^{***}$ | -.09(.07) | -.01(.08) |
| Ego climate → | | .15(.07)$^{*}$ | .47(.05)$^{***}$ | .19(.08)$^{*}$ | .35(.07)$^{***}$ | .07(.08) | -.03(.08) | .01(.09) |
| Mastery-approach → | | | | | | .08(.08) | .03(.08) | .01(.08) |
| Performance-approach → | | | | | | .02(.11) | -.12(.11) | -.15(.12) |
| Mastery-avoidance → | | | | | | .02(.09) | -.02(.08) | -.06(.08) |
| Performance-avoidance → | | | | | | -.13(.09) | .10(.10) | .09(.12) |
| BMI → | | -.05(.08) | -.00(.06) | .17(.07)$^{*}$ | .04(.07) | .03(.06) | .33(.07)$^{***}$ | .12(.07) |
| **With** | | | | | | | | |
| Task climate ↔ | -.09(.08) | | | | | | | |
| Mastery-approach ↔ | | | .23(.09)$^{*}$ | -.12(.07) | .16(.06)$^{*}$ | | | |
| Performance-approach ↔ | | | | .13(.08) | .48(.06)$^{***}$ | | | |
| Mastery-avoidance ↔ | | | | | .21(.08)$^{**}$ | | | |
| Enjoyment ↔ | | | | | | | -.06(.09) | .06(.08) |
| Dribbling ↔ | | | | | | | | .43(.05)$^{***}$ |
| **Squared multiple correlations** | | | | | | | | |
| $R^2$ | | .14(.05)$^{**}$ | .23(.05)$^{***}$ | .07(.04) | .13(.05)$^{**}$ | .18(.06)$^{***}$ | .13(.05)$^{*}$ | .03(.03) |
| **Model fit** | | | | | | | | |
| $\chi^2(2) = 1.193$, p = .551, CFI = 1.00, TLI = 1.00, RMSEA = .000, SRMR = .012 | | | | | | | | |
| $^{***}$ p < .001, $^{**}$ p < .01, $^{*}$ p < .05. Standard errors in parentheses. | | | | | | | | |

**Table-3**: **Results for the repeated measures analysis T0 to T1**

| | r | $\chi^2$ | df | p | Change % |
|---|---|---|---|---|---|
| Task climate | -.03 | .66<br>.01 | 1<br>1 | .414<br>.924 | - |
| Ego climate | -.04 | 1.15<br>1.67 | 1<br>1 | .284<br>.196 | - |
| Mastery-approach | -.04 | 4.88<br>5.81 | 1<br>1 | .027*<br>.016* | + 3.6 |
| Performance-approach | .05 | 14.95<br>.49 | 1<br>1 | .001***<br>.482 | + 15.2 |
| Mastery-avoidance | .08 | 2.00<br>.07 | 1<br>1 | .157<br>.793 | - |
| Performance-avoidance | -.03 | 5.05<br>3.82 | 1<br>1 | .025*<br>.051 | + 9.5 |
| Enjoyment | -.15** | 1.75<br>.34 | 1<br>1 | .186<br>.560 | - |
| Dribbling (s) | .74*** | 82.72<br>15.60 | 1<br>1 | .001***<br>.001*** | - 6.6 |
| Passing (s) | .33** | 60.59<br>28.76 | 1<br>1 | .001***<br>.001*** | - 15.8 |
| BMI | .93*** | 1.82<br>.92 | 1<br>1 | .177<br>.762 | - |

Note 1. The upper values present the equality of means, the lower the equality of variances.
Note 2. *** p < .001, ** p < .01, * p < .05, r = T0/T1.

**Repeated measures analysis**

The equality of means and variances between measurement phases T0 and T1 was tested using Wald test of maximum likelihood repeated measures analysis (Table-3). The correlations between motivational variables at T0 and T1 were relatively weak, indicating that higher perceptions at baseline measures did not systematically lead to higher perceptions at follow-up measures. The model revealed that mastery- and performance-approach, and performance-avoidance increased over time. In addition, both dribbling and passing test scores improved across the measurements. A greatest improvement was found in passing skills scores, an average of -5.22 seconds over a period of one year. In contrast, perceptions of task- and ego-involving climate, mastery-avoidance, enjoyment, and BMI remained stable over time. The equality of variances revealed a significant variation between players' test scores in perceptions of mastery-approach, passing skills, and dribbling skills.

**DISCUSSION**

The present study examined the associations and age-related development of motivational climate, achievement goals, enjoyment, technical skills, and BMI in young floorball players. The results showed that the perceptions of task-involving climate positively associated with mastery-approach and enjoyment. This finding was in line with previous studies, as task-involving climate was related with higher mastery orientation [16, 17] and enjoyment in sport [12, 18]. In contrast, an interesting finding was that task climate also had a positive relationship with performance-approach. Previously, the relationships between motivatinal climate and dichotomical goal orientations have been widely studied [21, 16, 17]. The present study used both mastery- and performance-approach and avoidance goals in order to examine previously established relationships with more details. An explanation behind the positive path between task climate and performance-approach may be that achievement goals are orthogonal, which means that a player can have high or low mastery or high or low performance goals [13]. However, both mastery- and performance-approach are defined as positive achievement goals [8]. Previous findings, derived using two-dimensional scales, suggested that mastery orientation should be promoted in order to optimize motivation in sport [11, 12]. Perhaps, both mastery and performance-approach dimensions are important, when promoting different motivational outcomes in youth sport. Furthermore, the perceptions of ego-involving climate related with perceived mastery- and performance-approach and -avoidance. The links between ego climate and avoidance goals were similar as in previous studies [21, 17] but the positive association with mastery-approach was unexpected. This finding indicated that both task-involving and ego-involving motivational climates may be needed in order to achieve the different objectives in floorball coaching. Perhaps, task- and ego-involving dimensions are crucial for a range of personality types, in other words, different players depend on a variety of coaching methods [49]. Thus, the present findings support task-involving coaching methods to promote approach goals and enjoyment in young floorball players.

A cause of concern arising from the current results was that players with higher BMI had higher perceptions of mastery-avoidance and slower dribbling skill scores. The relationships between BMI and physical competence have been widely studied earlier [49, 40], but studies incorporating BMI and achievement goals have not been reported. However, in the current study, higher BMI was linked with negative motivational outcomes in floorball. Following the suggestions of Barnett *et al*., [37] and Stodden *et al*., [38], this should be widely considered in youth sport, not only in the floorball context, since players in this age group are potentially sensitive to motivational loss emanating from a lowering in perceived physical competence. In addition, slower dribbling skill scores were in line with previous findings. For instance, Okely, Booth, & Chey [36] found that overweight school students were less likely to possess high levels of fundamental movement skills. It has been shown that children and youth meeting the physical activity guidelines of at least 60 minutes of MVPA daily can still be sedentary for many hours per day [49]. Based on this, if children and youth accumulate physical activities in organized activities such as floorball, they may reduce their active play or participation in physical activity elsewhere in their leisure time. Not only increased sedentary time but a combination of the imbalance of calories consumed and energy expenditure has contributed to an increased overweight and obesity in modern societies including young athletes [50]. Therefore, all young floorball players but especially players with higher BMI could be provided education and awareness of healthy lifestyle and encouraged to spend more time with a wide range of fundamental skill practices on their leisure time, not only during the organized sessions. This could increase their total physical activity and fundamental skills, and prevent early dropouts among late-developing players who could have the potential to attain excellence in the future [51]. Hence, it would be necessary to ensure that such encouragement is carried out carefully and prudently, without stigmatizing young players with higher BMI scores.

An examination of interdependence in achievement goals and technical skills showed that dribbling test scores were linked with passing skill test scores. This was expected, as both dribbling and passing require similar open skills and abilities [52]. The findings also indicated that perceptions of mastery-approach were linked with performance-approach and performance-avoidance, whereas performance-approach and mastery-avoidance were related with perceptions of performance-avoidance. Previously, it has been shown that achievement goal are orthogonal, a person can be high or low either one or both dimensions when engaged in achievement related activities [13]. However, past findings were derived from studies incorporating two-dimensional achievement goals [53], when the present study examined the interdependence of approach and avoidance goals. It must be noted that this study examined achievement goals at the contextual level, which means that situational orientations in certain practice sessions and drills may vary [54].

Additinally, the path model revealed no significant indirect paths from task- and ego-involving climate to enjoyment or technical skills via achievement goals. This was not expected, since task-involving climate have previously been associated with higher mastery orientation [16, 17], and mastery orientation with enjoyment [12, 18] and motives for skill development [14]. However, the current finding was similar to a physical activity study in school physical education [55], as mastery and performance goals as mediators were not linked with behavioral outcomes. Although, achievement goals based on the definition of personal competence in the achievement settings, both mastery and performance goals refer to the way a player construes his level of competence and consequently defines success in specific settings [7]. Floorball practice sessions and games are not limited to training physical skills, because participation also generates knowledge and understanding of rules, fair play, respect, tactics, bodily and social awareness, and personal interaction linked to team effort [56]. This means that all variations of approach and avoidance goals may lead to either positive or negative outcomes in different aspects of floorball regardless of motivational climate [13]. It may be that present cross-sectional model did not produce such indirect paths, as it mainly reflected contextual motivation, not situational (i.e. skill-specific motivation). Perhaps, the theorized model needs to be extended by adding situational motivation into the model following the procedures of Vallerand and Lalande [54].

The findings of repeteated measures revealed that mastery- and performance-approach, and performance-avoidance increased over time. In addition, both dribbling and passing test scores improved across the measurements. First, age-related improvement in technical skills have been evident in young soccer players [31, 33-35] and floorball-specific skill development seems to follow similar patterns. Considering increases in mastery- and performance-approach, an introduction to a variety of activities has been shown to be both physically and psychologically beneficial for the young people [57]. Although floorball is a relatively easy and simple game, it requires a range of physical, psychological, physiological and psychomotor, and social-cognitive skills [31, 39]. Therefore, an increase in mastery- and performance-approach indicates that floorball practice sessions and games may provide a variety of activities, something for everyone. This may also explain why floorball is

rapidly gaining popularity in different countries [1]. In contrast, an explanation behind an increase in performance-avoidance may be that, players undergo remarkable physical and physiological changes at this age, for instance a growth spurt, and the timing and speed of maturation varies greatly even between players of the same chronological age [51]. Matured players often have physical and physiological advantages, such as body structure, strength, power, speed, and endurance to repeat high-intensity running over players born later on the same year [58-60]. Thus, physical and physiological changes and differences may cause avoidance related behavior among young players. However, it is difficult to make clear conclusions based on the current data without additional information.

Finally, perceptions of task- and ego-involving climate, mastery-avoidance, enjoyment, and BMI remained stable over time. Longitudinal changes in task- and ego-involving climate in sport have not been previously reported, since the follow-up results could be meaningless, if team coaches changed during the follow-up period. In the current study, the coaches were the same across the competitive season. Probably, neither coaching styles nor methods greatly changed across the measurements, which may be the reason for the stability in perceptions of task- and ego-involving climate, mastery-avoidance, and enjoyment. BMI scores indicated that an average body structure in the current sample followed normal height and weight patterns of young adolescents [44]. Despite, players with the higher BMI scores and mastery-avoidance should be considered by providing education and awareness of healthy lifestyle and encouraged to spend more time with a wide range of activities on their leisure time.

The analyses comprised of the path model and repeated measures analysis of mean differences in study variables at different time points, which can be considered as a key strenght of the study. From this perspective, the present study provided important insights into the development of achievement goals and floorball-specific skills in young floorball players. However, the study was not free of limitations. In order to monitor developmental growth in motivational and skill development over a prolonged period, multiple measurement points would have been an improvement. Second, the study comprised only male players, missing female players and information about biological maturation of the players. This would be interesting to study, as the timing and speed of maturation may vary between players of the same chronological age [51]. Finally, the study would have benefitted from the detailed data of quantity of practice sessions for each participant, as the equality of variance tests revealed a significant variation between players' test scores in passing and dribbling skills.

Future studies could examine the quality and quantity of skill practice sessions, and details about physical maturation in addition to body structure indicators. As floorball related psychological studies in the field of sport psychology are rare, there is still a need for a greater number of studies using longitudinal study designs and interventions to reveal causal interrelations between psychological aspects and floorball-specific skills. Since the present study sample consisted of Finnish male players, a larger international sample with female and male players could provide interesting cross-cultural results about floorball-specific skill development and psychological processes.

## CONCLUSION

This was the first study investigating the relationships between motivational climate, achievement goals, enjoyment, floorball-specific technical skills, and BMI covariates in young floorball players. The study added into the growing body of evidence that a player can have high mastery-approach and high performance-approach or high performance avoidance at the same time. In addition, both task-involving and ego-involving motivational climates may be needed in order to achieve the different motivational objectives in floorball. Task- and ego-involving dimensions may be crucial for a range of personality types, in other words, different players depend on a variety of coaching methods. The present and past practical findings support task-involving coaching methods to promote approach goals and enjoyment in young floorball players. Furthermore, all young floorball players but especially players with higher BMI could benefit if they were provided education and awareness of healthy lifestyly and encouraged to spend more time with a wide range of fundamental skill practices on their leisure time, not only during the organized sessions. This could increase their floorball-specific skills, and in turn, decline negative perceptions of mastery-avoidance.

**Declaration of Conflicting Interests**

The authors declare no potential conflicts of interests.

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