

Review

Drop-out from team sport among adolescents: A systematic review and meta-analysis of prospective studies

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ABSTRACT

During the last decades, an increased drop-out rate in adolescents' team sport participation is observed. Given the potential adverse consequences of drop-out from team sport more information about risk factors for drop-out is warranted. The objectives of this systematic review were to (1) synthesise the literature on factors associated with future drop-out from team sport among adolescents and (2) investigate the strength of associations between drop-out and related factors with meta-analysis. The databases Academic Search Elite, ERIC, PsycINFO, PubMed and SPORTDiscus were searched for relevant publications from the earliest reported date until October 8, 2021. Articles were included if: (1) data about drop-out was collected; (2) the focus was on adolescents; (3) the context was team sport and (4) studies were of prospective design. We used the Risk of Bias Assessment Tool for Non-randomized Studies (RoBANS) to assess the risk of bias in included studies. A narrative synthesis was conducted according to the reporting guideline of synthesis without meta-analysis. Studies that presented statistical data necessary for the calculation of Hedge's *g* effect sizes were included in the meta-analysis. In total, 16 studies met the inclusion criteria and were included in the narrative synthesis. The meta-analysis included 12 of the studies. Altogether, 6304 adolescent team sport players participated in the selected studies. Of those studies, most had a focus on intrapersonal factors relationship with drop-out. The results showed that constructs related to motivation as well as sport experience had the strongest relationships with drop-out. To prevent drop-out from adolescents' team sport, organisations and clubs are recommended to focus on developing a high-quality motivation climate that facilitates motivation and enjoyment.

1. Introduction

Participation in organised sport from an early age and staying active through adolescence may promote physical, psychological and social health benefits as well as the development of physical-, academic-, self-regulatory- and general life skills (Keegan et al., 2009; Kirk, 2005; Logan et al., 2019; Snyder et al., 2010). Due to its social nature, team sport participation (e.g., soccer) is particularly associated with positive outcomes (Eime et al., 2013). Team sport participation can, in comparison to participation in individual sports, be associated with additional psychological and social benefits such as lower levels of anxiety and depression and improved emotional/social support, a sense of belonging, self-esteem, and social interaction (Breistøl, Clench-Aas, van Roy, & Kjærsti Raanaas, 2017; Pluhar et al., 2019; Zuckerman et al., 2021).

Different team sport contexts may be associated with various

experiences and outcomes. While recreational sports are mainly undertaken for leisure and enjoyment, competitive sports tend to focus on the performance of participants who are often selected to play games and tournaments based on their skills (Bean et al., 2021). Although recreational and competitive sports contexts are different, both may be related to positive health outcomes. For instance, participation in non-competitive and competitive sports is associated with significantly fewer symptoms of mental health problems, healthier eating habits, and more friends and peer support (Breistøl et al., 2017).

Despite the many potential benefits of team sport participation, there is a negative trend in adolescent sports participation, with increasing numbers dropping out (Keathley et al., 2013; Riksidrottsförbundet, 2019). Previous research indicates that team sport participation tends to decline during adolescence and that the proportion that drops out increases from 12 years of age, with girls exceeding boys in rates of attrition (Eime et al., 2016). To some extent, these figures may be

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explained by adolescents sampling different activities, but they may also reflect dissatisfaction or negative experiences within sports (Temple & Crane, 2016). In comparison, the participation rates in recreational sports and physical activities seem to be more consistent. Eime et al. (2016) found, for example, an increase in participation rates for non-competitive forms of sports and physical activity during adolescence while there was a decrease in competitive sports participation during the same time period.

Given that participation in a team sport may represent an important part of adolescents' physical activity, health and well-being, programmes designed to create team sport environments that promote adolescents' continued sports participation are of great importance. To develop effective preventive programmes and initiatives, those factors that increase the risk of drop-out in adolescent team sports need to be identified. As drop-out appears to occur more often in competitive sports contexts (e.g., Eime et al., 2016), focusing on these seems particularly relevant.

Despite more than 30 years of research on the subject, the reasons why adolescent athletes drop out of team sports is still an important question from an applied perspective (Eliasson & Johansson, 2021). Several systematic reviews, aiming to synthesise the research on factors associated with drop-out from organised sport, have been published. The results from a review by Balish et al. (2014), which included 23 quantitative studies, showed, for example, that most of the correlates of sport attrition could be classified as intrapersonal (e.g., low levels of basic psychological needs, low levels of intrinsic motivation, high levels of amotivation, injuries, time, costs, lack of enjoyment). Several interpersonal (e.g., low level of task climate, poor coach relationship, lack of close friendship in sport) were also found to be associated with the likelihood of sport attrition. For the institutional, community, and policy levels there were too few studies to provide sufficient evidence (e.g., Balish et al., 2014; Crane & Temple, 2015; Moulds, Galloway, Abbott, & Copley, 2022).

While the aforementioned reviews provide a useful summary of the studies conducted until the date when they were published, there remain some potential limitations that are important to address.

First, the results from prospective, cross-sectional, and retrospective studies are collapsed together without any separation in previous reviews. The use of cross-sectional or retrospective design is problematic when investigating temporal relationships because the potential predictors are not measured prior to the outcome (Antonakis et al., 2010). To address this limitation, an update using only prospective designs is necessary.

Second, only one of the studies has included objectively measured technical skills (e.g., dribble performance, speed). Because these factors are relevant in talent identification within youth sport (e.g., Murr et al., 2018), as well as for the development of perceived competence and self-confidence (e.g., Vierimaa et al., 2012), it is important to also consider this category of intrapersonal variables in relation to drop-out from competitive sport.

Third, previous reviews have included studies of many different competitive sports (i.e., both team- and individual sports), without any separation in their analysis. As participants in individual sports are, in comparison to team sport athletes, more likely to specialise in youth/early adolescence (DiSanti & Erickson, 2019), the structural aspects and requirements for the sport might be one strong cause for drop-out. For instance, while individual athletes may receive the credit for success as well as the blame for failure, it is more difficult to attribute success or failure to an individual athlete in a team sport. Consequently, the likelihood that losing in a competition will facilitate an athlete's decision to quit competitive sport may be higher in individual sports than it is in team sports (Baron-Thiene & Alfermann, 2015). In trying to control for this mechanism, it would be necessary to only focus on team sport athletes within this study.

Moreover, many of the potential benefits derived from participation in competitive sports might be even stronger for athletes who partake in

a team sport (Breitstøl et al., 2017; Zuckerman et al., 2021). To maintain health benefits, it may be particularly important to identify specifically those factors that influence team sport participation and drop-out.

A fourth limitation in previous reviews on drop-out from children and youth sport is the lack of information about the weighted effect size of factors that influence drop-out from team sport among adolescents (see e.g., Balish et al., 2014; Crane & Temple, 2015). With no reports on the strength of association, it is difficult to evaluate the importance of different factors in adolescents' decision to drop out of team sports.

To provide an overview of factors that might be related to the risk of drop-out in team sports as well as to overcome the identified limitations of previous systematic reviews, the aim of this review is to (1) synthesise the literature on factors associated with future drop-out from team sport among adolescents and (2) investigate the strength of associations between drop-out and related factors with meta-analysis.

1.1. Approach

The structure and reporting of this review follow the PRISMA guidelines (Page et al., 2020).

1.2. Literature search

We searched for relevant publications from the earliest reported date until October 8, 2021, in the following databases: Academic Search Elite, ERIC, PsycINFO, PubMed, and SPORTDiscus. The following keywords were used: *population keywords*: youth, adolescen*or teen*; *construct keywords*: athletic participation, sports participation, drop-out, dropout, attrition, withdraw*, discontinu*, disengage* or quit; *context keywords*: "team sports" or baseball or basketball or cricket or hockey or soccer or football or handball or floorball or volleyball or lacrosse or softball or polo or rugby. Search terms were mapped to relevant MeSH terms or subject headings where possible and entered into the database in three different groups: population keywords, construct keywords, and context keywords. Keywords in each group were clustered with the OR operator. The results from each group were then combined with the operator AND to produce the final search. The following restrictions were applied to the search: 1) studies written in English only and 2) peer-reviewed journal articles only. We also hand-searched published peer-reviewed articles and the reference lists of included articles for additional studies.

1.3. Inclusion criteria and screening process

Retrieved titles, abstracts, full texts, and citations were aggregated in the Rayyan web application (<https://rayyan.qcri.org>) (Ouzzani et al., 2016). Two of the authors (1, 5) independently assessed the titles and abstracts of the articles identified in the search. In the second step, full-text articles of studies considered potentially eligible for the review were retrieved and assessed by the same two authors independently. Consensus was used to resolve any disagreements; alternatively, a third author (2) was consulted if consensus could not be reached. Articles were included if they met the following criteria: (1) data about drop-out was collected; (2) the focus was on adolescents; (3) the context was team sport and (4) studies were of prospective design. Articles that presented statistical data necessary for the calculation of Hedge's *g* effect sizes were included in the meta-analysis. Three studies did not present the statistical data necessary, and for these studies we contacted the corresponding author and asked if it could be made available to us. In one case the data was no longer available, while another author did not respond. For one study, however, it was sent to us.

1.4. Data extraction

Data about study design, participant characteristics (gender, age, sport), variables measured, and the main findings were extracted and

entered into an Excel spreadsheet. After extraction, the information was reviewed by two of the authors (1, 5), and studies were grouped into three categories according to the variables measured (a): psychological factors; (b) demographic factors; and (c) physiological factors. Studies that measured more than one variable were included in all eligible categories.

1.5. Risk of bias analysis

The Risk of Bias Assessment Tool for Non-Randomized Studies (RoBANS) was used to assess the risk of bias in included studies. The RoBANS includes guidelines for evaluation based on six categories, each to be assessed as “high risk”, unclear risk or “low risk” (Kim et al., 2013). The RoBANS assessment was conducted by two authors independently (1, 5), and the RoBANS guidelines were followed in the evaluation process (Kim et al., 2013). Disagreements were resolved by consensus or consultation with a third assessor (2) when required.

1.6. Narrative synthesis and meta-analysis

A narrative synthesis on quantitative studies was conducted in accordance with the reporting guideline of the synthesis without meta-analysis (SWiM) (Campbell et al., 2020). To categorise the included studies we used, in line with the procedure adopted in Balish et al. (2014), the social-ecological model of sport attrition. Within this theoretical framework, different types of correlates for sport attrition can be present at five different levels: *biological and intrapersonal*, *interpersonal*, *institutional*, *community*, and *policy*. To synthesise results from different studies, we created sub-groups of theoretical domains for each category. The sub-groups were created based on previous research and theoretical frameworks relevant to the variables measured. At the biological and intrapersonal level the variables were divided into 10 domains: anthropometrical characteristics (i.e., height, maturity offset, sitting height, sum of skinfolds; Deprez et al., 2015; Figueiredo et al., 2009; Soares et al., 2020); motivational regulations; basic psychological needs (Deci & Ryan, 2000; Ryan and Deci, 2002; Deci & Ryan, 2008); motivational orientations and motivational climate (Cumming et al., 2008); intentions; attitudes and perceived behavioural control (Ajzen, 1991); personality traits (Feingold, 1994), stress (Ford et al., 2017); technical skills (speed, dribble, physical capacities; Deprez et al., 2015; Figueiredo et al., 2009; Soares et al., 2020); and sport experience (Guillet et al., 2002; Soares et al., 2020).

A few additional variables were investigated by single studies, and these results were analysed separately.

At the interpersonal level, the only category of variables was social support (Sheridan et al., 2014). There were no variables for any of the other levels (institutional, community, and policy).

Studies that presented statistical data necessary for the calculation of Hedge’s *g* effect sizes were included in the meta-analysis. Effect sizes were computed using the mean difference between continuers and dropouts, standard deviations, and sample sizes, for both groups. The magnitude of the effect sizes (0.2 = small, 0.5 = medium, 0.8 = large) were interpreted according to guidelines stated by Cohen (1988).

When involving a small number of included studies, traditional frequentist meta-analyses—both random and fixed effects—tend to underestimate the amount of between-study heterogeneity (τ_{study}^2), and in turn provide too narrow confidence bounds for the pooled effect sizes (Chung et al., 2013; Guolo & Varin, 2017). Bayesian methods are recommended to overcome this problem (Williams et al., 2018). Further, traditional meta-analytical models implicitly assume independence between observed effect sizes. This is, however, an unrealistic assumption when studies report multiple effect sizes for a construct, such as comparisons between more than two groups, or with multiple measures of the construct (Cheung, 2014). Three-level meta-analytical models solve this by estimating the covariance between effect sizes within each study—the within-study variance ($\tau_{\text{effect size}}^2$) (Cheung, 2014).

We therefore used Bayesian three-level meta-analytical models with weakly informative priors (Williams et al., 2018) for all constructs with studies containing multiple effect-sizes. For constructs where no study reported multiple effect sizes, Bayesian two-level models were used. For basic psychological needs, physical capacity, and social support, subgroup analyses were made by estimating individual intercepts with common between- and within-study heterogeneity. The models were estimated using a Hamiltonian Monte Carlo algorithm with 10 000 warm-up and 10 000 sampling iterations.

All results are presented as median and 95% Compatibility intervals (CI). CIs were calculated using the 95% highest-density intervals, representing the range in which the value lies with a 95% probability. The interpretation of the CI is that there is a 95% probability that the value falls in this range. All analyses were made in R version 4.0.2., and meta-analytical models were fitted in STAN through the brms package (Bürkner, 2017).

Within all analyses, the drop-out condition was coded as 1, and the continuer condition was coded as 0.

2. Findings

2.1. Study characteristics and risk of bias assessment

The literature search identified 1858 records. Due to duplication, 545 records were removed, and then 1280 records were excluded after title and abstract screening. The remaining 33 articles were assessed in full text. In total, 16 studies met the inclusion criteria and were included in the narrative synthesis; moreover, 12 studies presented statistical data necessary for the calculation of Hedge’s *g* effect sizes and were included in the meta-analysis. The study selection process is outlined in Fig. 1.

In total, 6304 (3747 males, 2169 females, and 388 not specified) adolescent team sport players participated in the selected studies. Sports included basketball ($n = 2$), handball ($n = 6$), ice hockey ($n = 1$) and soccer ($n = 9$). In all studies, athletes participated at different levels of competitive sport in an organised league within their sport (e.g., elite, sub-elite, local, regional). The majority of studies investigated the relationship between psychological factors (e.g., basic psychological needs, motivational regulations, goal orientations) and drop-out ($n = 9$). Some studies investigated drop-out and demographic factors (e.g., training history) ($n = 4$) or physiological factors (e.g., physical fitness and technical skills) ($n = 4$). Four studies investigated variables in more than one category (e.g., psychological and physiological factors). A full summary of all included studies is provided in Table 1. An overview of studies and their measures divided into categories and sub-categories according to a theoretical domain is provided in Table 2.

All studies were identified as entailing a high risk of bias for at least one RoBANS domain and were at low risk of selection bias for the recruitment of participants (item 1). Concerning an adjustment for confounding variables (item 2), two of the identified studies were at low risk of bias. The other studies ($n = 14$) did not address potential confounding variables within their analyses. Fourteen of the studies were at high risk of performance bias due to the use of self-report measures to collect data (item 3), and all the studies were at low risk of bias due to inadequate blinding of the outcome measures (item 4). One of the studies was considered to entail a high risk of attrition bias due to reported missing data without any sensitivity analysis (item 5). Also, ten of the studies did not report or discuss missing data, thus the risk of attrition bias was classified as unclear for these studies. None of the studies had pre-registered protocol, hence the risk of reporting bias was considered unclear for all included studies (item 6).

2.2. Biological and intrapersonal factors

2.2.1. Anthropometrical characteristics

Four studies investigated the relationship between biological factors and drop-out (see Table 2). They all focused on the relationship between

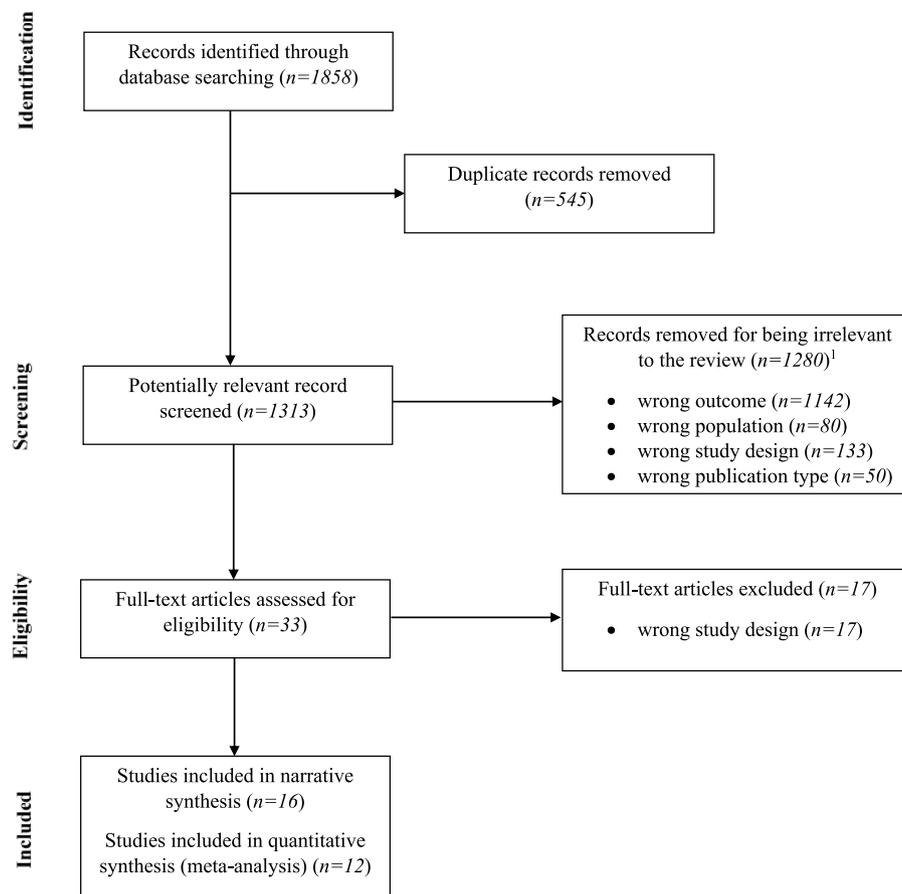


Fig. 1. Preferred Reporting Items for Systematic reviews and Meta-Analysis (PRISMA) study flow diagram.

¹Studies could be excluded for more than one reason.

physical characteristics (e.g., height, weight) and drop-out. Generally, results indicated that those who continued playing team sports were somewhat larger than their dropout peers.

2.2.2. Sport experience

Sport experience (e.g., years of training) was investigated by three studies. Overall, results indicated that adolescents who dropped out had a statistically significant, lower level of experience compared to those who continued in sport. One study investigated the relationship between drop-out, frequency of play from start and playing on high-ranked teams. However, these variables were not measured prospectively and were therefore excluded from the results of this review.

2.2.3. Technical skills

Four studies investigated the relationship between technical skills (e.g., dribble performance, speed) and drop-out (see Table 2). Generally, overall technical skills were better among continuers than dropouts.

2.2.4. Motivational regulations

Five studies investigated drop-out and one or more motivational regulations (e.g., intrinsic motivation, external motivation, amotivation). Overall, results indicated that drop-out team sport players experienced significantly higher levels of amotivation, and lower levels of intrinsic motivation compared to those who continued team sport participation. However, two studies (Lukwu & Luján, 2011; Ullrich-French & Smith, 2009) of drop-out and self-determined motivation (i.e., intrinsic motivation) found no statistically significant differences between dropouts and persistent athletes. Furthermore, results concerning the relationship between external motivation and drop-out varied. In

one study (Calvo et al., 2010) external motivation was related to drop-out, but two other studies (Rottensteiner et al., 2015; Sarrazin et al., 2002) found no significant differences in external motivation between those who dropped out and those who continued.

2.2.5. Basic psychological needs

Seven studies explored the relationship between drop-out and all or any of the basic psychological needs (i.e., autonomy, competence, and relatedness). Overall, results from these studies indicate that low satisfaction of basic psychological needs is related to drop-out from team sports among adolescents.

2.2.6. Achievement goal orientations and motivational climate

Achievement goal theory constructs (i.e., achievement goal orientations and motivational climate) were investigated in four studies. These studies presented varying results, indicating no difference in achievement goal orientations between dropouts and continuers, as well as higher levels of both task and ego-oriented goals among persistent team sport players. The single study that investigated the effects of a mastery-oriented motivational climate (i.e., a focus on task-oriented goals) indicated that a mastery-oriented climate had significant positive effects on adherence.

2.2.7. Intentions, attitudes, and perceived behavioural control

The relationship between constructs related to the theory of planned behaviour (e.g., intentions and attitudes) and drop-out from sport was investigated in five studies. Overall, studies indicated that less favourable intentions and attitudes toward sport continuation were related to drop-out and that persistent athletes, in comparison to drop-outs, had

Table 1
Studies included in the systematic review.

Study	Participants (N, Mage, gender, sport)	Variables measured	Conclusions presented in the paper
Calvo et al. (2010)	N = 490, Mage = 14,3, boys, soccer	<ul style="list-style-type: none"> – Intrinsic motivation stimulation – Intrinsic motivation knowledge – Intrinsic motivation accomplishment – Identified regulation – Introjected regulation – External regulation – Amotivation – Relatedness – Competence – Autonomy – Age – Maturity – Height – Sit height – Weight – Body fat – Jumping sideways – Moving sideways – Backward balance – Dribble test without ball – Dribble test with ball – Standing broad jump – Countermovement jump – Yo-yo test 	<p>Results indicated that higher levels of amotivation, external regulation, introjected regulation and lower satisfaction of relatedness and autonomy needs explained sport dropout</p> <p>Specific physical characteristics (endurance, strength, soccer-specific skills) are relevant to distinguish players who continued or dropped out from soccer.</p>
Deprez et al. (2015)	N = 388, soccer (Mage and gender not specified)	<ul style="list-style-type: none"> – Years of training in soccer – Chronological age – Skeletal age – Weight – Height – Sitting height – Estimated leg length – Sitting height ratio % – Sum of skinfolds – Fastest sprint – Mean sprint – Agility shuttle run – Intermittent endurance run – Squat jump – Counter-movement jump – Ball control hits – Ball control log – Dribbling speed – Wall pass – Shooting accuracy – Task orientation – Ego orientation – Skeletal maturity status – Stage of pubic hair – Femininity – Masculinity 	<p>Results indicated that elite players were chronologically and skeletally older, larger in body size and performed better in functional capacities and three skill tests compared to club players and dropouts. Baseline task and ego orientation did not differ between dropouts, club and elite players at follow-up in either age group.</p>
Figueiredo et al. (2009)	N = 159, boys, soccer (Mage not specified)	<ul style="list-style-type: none"> – Years of training in soccer – Chronological age – Skeletal age – Weight – Height – Sitting height – Estimated leg length – Sitting height ratio % – Sum of skinfolds – Fastest sprint – Mean sprint – Agility shuttle run – Intermittent endurance run – Squat jump – Counter-movement jump – Ball control hits – Ball control log – Dribbling speed – Wall pass – Shooting accuracy – Task orientation – Ego orientation – Skeletal maturity status – Stage of pubic hair – Femininity – Masculinity 	<p>Results indicated that elite players were chronologically and skeletally older, larger in body size and performed better in functional capacities and three skill tests compared to club players and dropouts. Baseline task and ego orientation did not differ between dropouts, club and elite players at follow-up in either age group.</p>
Guillet et al. (2000)	N = 336, Mage = 14,07, girls, handball	<ul style="list-style-type: none"> – Intention toward behaviour – Attitude toward behaviour – Subjective norm – Perceived behavioural control – Attitude beliefs – Normative beliefs – Control beliefs 	<p>Feminine and undifferentiated girls stopped the practice of handball significantly earlier than did masculine and androgynous girls.</p>

Table 1 (continued)

Study	Participants (N, Mage, gender, sport)	Variables measured	Conclusions presented in the paper
Guillet et al. (2002)	N = 253, Mage = 15, girls, handball	<ul style="list-style-type: none"> – Competence – Relatedness – Progress – Autonomy – Coach's support – Time of play – Commitment – Social constraints – Involvement alternatives – Years of practise – Practice hours per week 	<p>Dropout players perceived themselves as significantly less competent, less autonomous, less related to their team, lower progress and less supported by their coach than persistent players.</p>
Guillet et al. (2006)	N = 333, Mage = 14,8, girls, handball	<ul style="list-style-type: none"> – Femininity – Masculinity – Subjective activity value – Perceived competence – Intention to drop out 	<p>The masculinity orientation positively predicted value for and perceived competence in handball. The femininity orientation negatively predicted perceived competence. In addition, the two motivational variables negatively predicted intention to drop out. Finally, such intentions were the more proximal predictors of actual dropout.</p>
Isoard-Gauthier et al. (2016)	N = 458, Mage = 15,44, boys & girls, handball	<ul style="list-style-type: none"> – Burnout 	<p>The results suggest that individuals with a "higher burnout" profile at Time 1 were more likely to have stopped playing handball 6 years later.</p>
Lukwu and Luján (2011)	N = 302, Mage = 15,6, boys & girls, handball	<ul style="list-style-type: none"> – Mastery climate – Satisfaction of psychological needs – Self-determination index – Sport commitment 	<p>Results demonstrated that athletes' perception of coach-created mastery was related to psychological need satisfaction, self-determined motivation and commitment.</p>
Nache et al. (2005)	N = 354, boys, soccer (Mage not specified)	<ul style="list-style-type: none"> – Intention toward behaviour – Attitude toward behaviour – Subjective norm – Perceived behavioural control – Attitude beliefs – Normative beliefs – Control beliefs 	<p>Significant differences were found between athletes that continued and athletes that dropped out from soccer in nearly all variables included in the model of planned behaviour. Intention was found to be the most significant discriminant</p>

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Table 1 (continued)

Study	Participants (N, Mage, gender, sport)	Variables measured	Conclusions presented in the paper
Ommundsen and Vaglum (1991)	N = 223, boys, soccer (Mage not specified)	–Soccer enjoyment –Perceived soccer competence –Perceived social competence in soccer	variable between the two groups. For older players, low perceived soccer competence and low perceived peer popularity negatively influenced soccer persistence. Furthermore, in this relationship, low soccer enjoyment was a significant mediating factor. For younger players, a low sense of interpersonal attraction and belongingness had a direct negative effect on soccer persistence. Whereas perceived soccer competence was more influential than perceived social competence for persistence in soccer among the older players (14–16 years old), the opposite holds for the younger group (12–13 years old).
Patel et al. (2020)	N = 355, boys, soccer (Mage not specified)	–Anthropometry –Physical Performance –Relative age –Maturity status	Retained players were typically older, advanced in maturity and superior in body size and physical performances compared to dropouts. This study indicates that within a highly selective cohort of young football players, somatic maturity, anthropometric and physical performance characteristics, but not birth quartile, distinguish individuals that are subsequently retained or dropout in an age group-dependent manner. Players with higher levels of relative autonomous motivation indicated greater persistence in organised sports than those players who reported lower levels of relative
Rottensteiner et al. (2015)	N = 1962, Mage = 15,09, boys & girls, soccer, ice hockey, basketball	–Task orientation –Ego orientation –Perceived competence –Intrinsic motivation –Identified regulation –Introjected	

Table 1 (continued)

Study	Participants (N, Mage, gender, sport)	Variables measured	Conclusions presented in the paper
Sarrazin et al. (2002)	N = 335, Mage = 14,07, girls, handball	regulation –External regulation –Intrinsic motivation stimulation –Intrinsic motivation knowledge –Intrinsic motivation accomplishment –Identified regulation –Introjected regulation –External regulation –Amotivation –Behavioural intentions	autonomous motivation. Results revealed that dropout female handballers had lower levels of intrinsic motivation (toward knowledge, accomplishment and experiencing stimulation), but higher levels of amotivation than persistent players. Moreover, the results of SEM supported the hypotheses that the lack of self-determined motivation leads to dropping out of sport. The results of this study also suggest that the impact of motivation on behaviour is not direct but is fully mediated by behavioural intentions.
Skard and Vaglum (1989)	N = 300, Mage = 14,5, boys, soccer	–Fear of failure –Nervous symptoms –Acting out behaviour –Sport competition anxiety –Motive to approach success –Soccer self-confidence –Soccer priority –Soccer satisfaction –Relation to coach –Friends in soccer –Parental attitude –Frequency of play from start –Playing on a high ranked team	Seven pre-dropout variables predicted a subsequent dropout. Players at risk of becoming a drop-out were characterised by lower soccer satisfaction, lower soccer self-confidence and soccer priority, a poorer relationship with the coach, and a lower frequency of playing from the start of the matches.
Soares et al. (2020)	N = 57, boys, basketball (Mage not specified)	–Chronological age –Maturity offset –Age at start of basketball training –Years of experience –Stature –Body mass –Sitting height –Sum of skinfolds –Line drill test –Yo-yo-test –Scaled yo-yo –Performance composite score –Achievement motivation work –Achievement motivation mastery –Achievement motivation –Competitiveness –Deliberate practice	Dropouts were slightly older but had less accumulated training experience than those who continued. Considering variation between players for chronological age, maturity status and training experience, those retained in the youth basketball training programs had higher body dimensions and worse functional capacity but notably, had higher

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Table 1 (continued)

Study	Participants (N, Mage, gender, sport)	Variables measured	Conclusions presented in the paper
		motivation will to excel –Deliberate practice motivation will to compete	values for competitiveness (achievement motivation), will to excel and will to compete (deliberate practice motivation) compared to those who dropped out.
Ullrich-French and Smith (2009)	N = 148, Mage = 11,7, boys & girls, soccer	–Perceived peer acceptance –Perceived friendship quality –Perceived mother relationship quality –Perceived father relationship quality –Soccer enjoyment –Soccer stress –Perceived soccer competence –Self-determined motivation	Greater perceived competence, more positive friendship quality, and the combination of mother relationship quality and peer relationships predict soccer continuation.

more positive intentions and attitudes toward team sport participation.

2.2.8. Personality

Two studies investigated the relationship between femininity, masculinity, and drop-out. In sum, results showed that androgynous or masculine personality traits were more common among girls who continued playing handball compared to those who dropped out.

2.2.9. Stress

Stress (e.g., nervous symptoms, soccer stress, sport competition anxiety) and drop-out were examined in two studies. No significant differences between continuers and dropouts in soccer stress and nervous symptoms were found. However, dropouts reported significantly more sport competition anxiety compared to those who continued.

2.2.10. Other psychological factors

Other psychological factors that were investigated by single studies were progress, social constraints, involvement alternatives, burnout,

Table 2

An overview of studies with the variables divided into categories and sub-categories according to theoretical domains.

Study	Biological and intrapersonal										Interpersonal
	AC	SE	TS	MR	BPN	AG & MC	IAPBC	P	S	O	SoS
Calvo et al. (2010)				X	X						
Deprez et al. (2015)	X		X								
Figueiredo et al., 2009	X	X	X			X					
Guillet et al. (2000)								X			
Guillet et al. (2002)		X			X		X			X	X
Guillet et al. (2006)					X		X	X			
Isorad-Gauthier et al., 2016										X	
Lukwu & Luján, 2011				X	X	X	X				
Nache et al. (2005)							X				
Ommundsen and Vaglum (1991)					X						
Patel et al. (2020)	X		X								
Rottensteiner et al. (2015)				X	X	X					
Sarrazin et al. (2002)				X			X				
Skard and Vaglum (1989)		X							X	X	X
Soares et al. (2020)	X	X	X			X				X	
Ullrich-French and Smith (2009)				X	X				X		X

Note. AC = Anthropometrical characteristics; SE = Sport experience; TS = Technical skills; MR = Motivational regulations; BPN = Basic Psychological Needs; AG & MC = Achievement goal orientations and motivational climate; IAPBC = Intentions, attitudes, and perceived behavioural control; P = Personality; S = Stress; O = Other psychological factors; SoS = Social Support

fear of failure, acting out behaviour, motive to approach success, soccer self-confidence, soccer priority, soccer satisfaction, and deliberate practice motivation.

2.3. Interpersonal factors and drop-out

2.3.1. Social support

Three studies focusing on social support factors (e.g., coach support, parental relationship, peer relationship) and drop-out, met the inclusion criteria for this review. All three studies investigated factors related to intangible social support, for instance, positive encouragement and emotional involvement from coaches, parents and peers. Altogether, studies indicate that social support variables may be important factors in drop-out from sport among adolescents. Results showed some perceived reasons for why some dropped out of sport: less support from their coach, more pressure to succeed in sports from others, and fewer friends in the sport compared to those who continue participation.

2.3.2. Meta-analysis

The estimation of effect size, and inter- and intra-study variation, with 95% CI from models without any moderators are presented in Table 3. Amotivation only contained one observation per study, and intra-study variation is therefore not modelled.

Regarding the biological and intrapersonal factors, results from the meta-analysis showed a significant small positive effect for the satisfaction of basic psychological needs (g = 0.42, 95% CI 0.11–0.77). A small negative effect was found for speed (g = -0.42, 95% CI -0.68–0.19), indicating that those who continued in sports were faster compared to those who dropped out. There was also a small positive effect for dribble (g = 0.43, 95% CI 0.02–0.87). Furthermore, small positive effects were found for self-determined motivation (g = 0.27, 95% CI 0.04–0.51). Sport experience had a medium effect on drop-out (g = 0.53, 95% CI 0.03–1.09), and finally, a large effect was found for intentions, attitudes, and perceived behavioural control (g = 0.92, 95% CI 0.10–1.65).

For the interpersonal factors, a small positive effect was found for social support (g = 0.36, 95% CI 0.04–0.68). No other statistically significant effects were discovered.

3. Discussion

This review aimed to synthesise the current evidence on factors associated with future drop-out from team sport among adolescents and investigate with meta-analysis the strength of associations between

Table 3
Estimated effect sizes, inter- and intra-study variance, with 95% compatibility interval.

	Effect size			Tau ² study			Tau ² effect size		
	Median	LL	UL	Median	LL	UL	Median	LL	UL
Amotivation	-0.80	-1.99	0.78	1.10	0.09	9.00	NA	NA	NA
Basic Psychological Needs	0.42	0.11	0.77	0.05	0.00	0.32	NA	NA	NA
Controlled motivation	-0.23	-0.72	0.29	0.08	0.00	0.61	0.09	0	0.37
Dribble	0.43	0.02	0.87	0.02	0.00	0.52	0.04	0	0.13
Ego orientation	0.19	-0.29	0.57	0.02	0.00	0.27	0.01	0	0.19
Height	0.19	-0.01	0.40	0.01	0.00	0.11	0.00	0	0.04
Maturity Offset	0.09	-0.36	0.57	0.02	0.00	0.45	0.02	0	0.12
Physical Capacities	-0.29	-1.56	1.02	2.70	0.41	10.56	0.04	0	0.09
Self-Determined motivation	0.27	0.04	0.51	0.01	0.00	0.13	0.03	0	0.09
Sitting Height	0.13	-0.21	0.48	0.01	0.00	0.21	0.01	0	0.10
Speed	-0.42	-0.68	-0.19	0.04	0.00	0.51	0.00	0	0.03
Sport Experience	0.53	0.03	1.09	0.04	0.00	0.51	0.02	0	0.34
Stress	-0.21	-0.61	0.13	0.02	0.00	0.25	0.01	0	0.13
Sum of Skinfolids	0.18	-0.81	1.17	0.20	0.00	2.51	0.06	0	1.09
Social Support	0.36	0.10	0.65	0.01	0.00	0.18	0.04	0	0.15
Task orientation	0.17	-0.28	0.49	0.02	0.00	0.29	0.01	0	0.14
Theory of Planned Behaviour	0.92	0.10	1.65	0.29	0.00	2.35	0.04	0	0.22
Weight	0.05	-0.43	0.54	0.03	0.00	0.48	0.07	0	0.26

drop-out and related factors. None of the biological factors had any statistically significant relationship with drop-out (height had, however, a small effect). The results showed that intrapersonal factors related to self-determination theory (i.e., basic psychological needs, self-determined motivation), theory of planned behaviour (i.e., intentions, attitudes and perceived behavioural control), as well as technical skills (i.e., speed) and sport experience were associated with the risk for drop-out. The only interpersonal factor (i.e., social support) had a small effect.

As stated earlier, none of the biological factors was found to have any statistically significant relationship with the risk for drop-out. This supports the results of previous reviews indicating that there is no significant evidence for a relationship between anthropometric factors (e.g., body mass index and height) and drop-out (Balish et al., 2014). While anthropometric characteristics such as height and weight might influence an athlete's performance (Rees et al., 2016), which could be associated with perceptions of competence and the risk of dropping out from sports, there are numerous other factors (e.g., psychosocial) that are more closely related to motives of participation. For example, the social environment has been deemed highly important both to perceptions of competence and athlete motivation (Ryan & Deci, 2017).

On the intrapersonal level, several of the factors associated with future drop-out were related to different aspects of motivation. More specifically, they were all constructs from theoretical frameworks: self-determination theory, theory of planned behaviour, and achievement goal theory. All these frameworks have been used to provide an understanding as to why people engage in competitive sports.

From a self-determination theory perspective, the results showed that satisfaction of basic psychological needs (i.e., autonomy, competence, and relatedness) had a small effect on adolescents' future drop-out from team sport. The results indicated that those whose psychological needs were better satisfied were more likely to continue in team sports. The fulfilment of basic psychological needs is found to be associated with self-determined motivation (Ryan & Deci, 2017) as well as positive emotions, such as enjoyment (e.g., Huhtiniemi et al., 2019). Both self-determined motivation, as well as positive emotions, can increase the likelihood of engaging in specific behaviours (e.g., physical activity; Chen et al., 2020; Ryan & Deci, 2017).

Importantly, self-determined motivation is associated with behaviour adherence while external motivation generally does not sustain behaviour maintenance over time (Teixeira et al., 2012). An interpretation of these results is that the sports environment plays an integral part in preventing drop-out from adolescents' team sports. In line with the above reasoning, we also found a small effect by self-determined motivation, indicating that athletes who continued in team sports

were more intrinsically motivated. This adds additional support to the argument that intrinsic or self-determined motivation supports behaviour adherence and lifts the importance of promoting intrinsic motivation to support continued team sport participation among adolescents. According to previous research, more controlled motivation should be related to increased risk for drop-out (Sarrazin et al., 2002). The results do not, however, support this hypothesis. One potential explanation might be that because motivation can be viewed as a multidimensional construct, people might have competing reasons for engaging in specific activities, such as physical activities or sports (e.g., Lindwall et al., 2017).

Another finding was that dropouts had lower levels of intentions, attitudes and norms toward team sport participation compared to those who continued. Comparing the effect estimates between the self-determination theory constructs (basic psychological needs, self-determined motivation) and theory of planned behaviour constructs (intentions, attitudes, norms), the latter seems to have a stronger effect on the risk of drop-out. These results are in line with the suggestions from Hagger and Chatzisarantis (2009) who proposed that the fulfilment of basic psychological needs, as well as self-determined motivation, have an indirect effect on behaviour via the theory of planned behaviour constructs (i.e., attitude, subjective norm, perceived behavioural control, intention). Also, while self-determination theory focuses more on the currently perceived motivation for a specific activity, the theory of planned behaviour constructs is more related to future behavioural engagement (Hagger & Chatzisarantis, 2012). Because of the prospective design, the theory of planned behaviour constructs might, therefore, be more aligned with the future decision to drop out from competitive sport.

For other motivational constructs, the results showed mixed (and not statistically significant) support for the influence of constructs linked to achievement motivation (e.g., goal orientations) on the risk of dropping out from team sports. Within those studies, the variables have been used as single risk factors of drop-out. One potential explanation for the mixed results is a failure to account for combinations of goal orientations (e.g., high task/high ego, low task, high ego), that might have an influence on the motivational responses (Harwood & Biddle, 2002).

Furthermore, we found effects of the technical skills speed and dribbling on drop-out. Players that continued in team sports were faster and had better dribbling skills compared to players that dropped out. In addition to being related to players' own perceptions of competence, this may also be related to selection processes within competitive sports that favour players with more developed skills (e.g., Bidaurrazaga-Letona et al., 2019).

There was a statistically significant effect regarding the relationship between sport experience and drop-out. The results indicated that adolescents that dropped out had less experience compared to those who continued in competitive sport. A potential explanation may be found in athletes' perception of competence. As described above, fulfilment of competence needs is important to building intrinsic motivation, something that is in turn important to behaviour adherence (i.e., continued sport participation) (Deci & Ryan, 2008; Teixeira et al., 2012). For instance, adolescents with more training experience may perceive themselves as more competent and may therefore be less likely to drop out compared to less experienced peers. Another potential explanation for the relationship between sport experience and drop-out may be found in the personal investment construct from the sport commitment model. According to the sport commitment model, the more personal investment (e.g., time, effort) athletes put into their sport, the more committed (i.e., persistent) to the activity they become (Scanlan, 1993; Scanlan et al., 2016). In this perspective, more experienced athletes may be more committed and, therefore, less likely to drop out.

On an interpersonal level, only social support has been investigated in relation to drop-out. Consistent with previous research that highlights the significance of social support from coaches, parents, and peers to athlete motivation and sports participation (Feingold, 1994; Gardner et al., 2017), we also found that social support had a small effect on team sport participation. The results showed that those who continued in team sports perceived they received more support from their coach, parents, and peers compared to those who dropped out. This relationship can be explained from a self-determination theory perspective where basic need support is suggested as related to improved levels of basic need fulfilment (Deci & Ryan, 2000; 2002).

4. Limitations

There are a few limitations associated with this systematic review. First, the number of effects sizes for some of the variables, included in the meta-analysis, were small. This can, potentially, reduce the accuracy of the results.

Second, for some of the variables included in the meta-analysis, several different constructs were included. The heterogeneity of constructs within these variables can influence the interpretation of the results. To decrease these potential risks, we performed the development of the variables based on theoretical frameworks and previously published research.

Third, within this study, we decided to, in line with most previous studies, divide the studies into individual and team sports but include only the team sports studies in our analyses. One reason for this decision was the potential differences in age of specialisation as well as other structural aspects related to selection processes between these two groups of sports. Research has, however, highlighted that some individual sports might, based on how team members rely on each other, also be considered as team sports (Evans et al., 2012).

A fourth limitation concerns 14 of the studies included in the meta-analysis. These were classified as entailing a high risk of performance bias due to inadequate measurement of exposure. According to the RoBANS guidelines for measurement of exposure, studies that use self-report measures should be characterised as entailing a high risk of performance bias. Many of the studies included in this review investigated the relationship between psychological constructs (e.g., motivation) and drop-out. Such psychological constructs are difficult to measure in ways other than through self-report measures. However, validated instruments were used, reducing the risk of bias.

5. Conclusions and practical implications

The present results showed that most of the included studies had focused on intrapersonal factors. Furthermore, we found relatively few prospective studies of factors associated with drop-out from adolescent

team sports. Considering the current evidence, it therefore seems that there is a specific need for prospective investigations of factors that may predict adolescents' decisions to drop out from team sport. Variables from the theory of planned behaviour and self-determination theory frameworks had, together with speed and sport experience, the strongest associations with the risk for drop-out. More specifically, adolescents' attitudes, intentions, and norms regarding team sport participation, as well as the satisfaction of basic psychological needs and self-determined motivation, were those variables from the motivational frameworks that had the strongest relationship to future drop-out from team sport.

From an applied perspective the results illustrate the importance of considering motivation as one key concept related to drop-out. Organisations, teams, coaches, and parents are, therefore, recommended to create a high-quality motivational climate facilitating, for example, the basic psychological needs. For instance, motivational climates characterised by a focus on learning new skills and the development of one's own ability (i.e., a task-involving climate), as well as inviting supportive and respectful relationships (i.e., a caring-climate), have been shown to support the satisfaction of basic psychological needs (Fry & Gano-Overway, 2010). Moreover, coach participation in theoretically informed intervention programmes focusing on autonomy support has, for example, resulted in enhanced need-supportive behaviours at the intra (awareness of own coaching practise) and interpersonal level (interaction with athletes) (Berntsen & Kristiansen, 2019; Raabe et al., 2019). Because coaches are a crucial part of creating the motivational climate, participation in these types of educational programmes can be beneficial to decrease the risk for drop-out.

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Registration and protocol

This review was not pre-registered.

Data available statement

The data that support the findings of this study are available upon request from the corresponding author.

Declaration of competing interest

AI is Associate Editor with Psychology of Sport and Exercise.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.psychsport.2022.102205>.

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