



THE UNIVERSITY *of* EDINBURGH

Edinburgh Research Explorer

Teamwork makes the dream work

Citation for published version:

Laureys, F, Deconinck, FJA, Lenoir, M & Collins, D 2023, 'Teamwork makes the dream work: Testing for shared perceptions on psycho-behavioural skills between athletes, coaches and parents', *Psychology of Sport and Exercise*, vol. 68, 102473. <https://doi.org/10.1016/j.psychsport.2023.102473>

Digital Object Identifier (DOI):

[10.1016/j.psychsport.2023.102473](https://doi.org/10.1016/j.psychsport.2023.102473)

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Peer reviewed version

Published In:

Psychology of Sport and Exercise

General rights

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.



Authors Accepted Manuscript

Psychology of Sport and Exercise

Accepted 3 JUN 2023

Teamwork makes the dream work: testing for shared perceptions on psycho-behavioural skills between athletes, coaches and parents

Abstract

Psycho-behavioural skills play a key role in optimising progression through talent development, and this study investigated to what extent athlete's self-perceptions align with those of their coaches and parents. Firstly, we examined if levels of alignment between these three raters differ across age of the athlete. To this end, 122 athletes between 9 and 18 years old (12.17 ± 2.41 years old; 47 gymnasts, 13 cyclists and 62 badminton players) completed a psycho-behavioural questionnaire. The ANOVA's indicated low levels of correspondence between the ratings of the athlete, the coach and the parents during childhood, while better levels of shared perceptions were found in adolescence. Secondly, we investigated to what extent coaches and parents believed their own perception of the athlete's and the perception of the athlete's psycho-behavioural skills were accurate. Parents appeared to be more confident in accurately perceiving the psycho-behavioural skills of the athlete than coaches. Parents and coaches also believed that older athletes would be more honest on their psycho-behavioural shortcomings than younger athletes. Altogether, these findings highlight that athletes and other stakeholders in the talent development environment should strive for better alignment in perceptions on psycho-behavioural skills during the talent development pathway. With better integrated perceptions, a more functional and efficient talent development system for the athlete targeting the psycho-behavioural skills can be created.

Keywords

Shared mental model, psychological characteristics, talent development, sport

Introduction

Psycho-behavioural skills play an important role during (young) athletes' talent development pathway (MacNamara & Collins, 2013). Indeed, talent development systems in sports are finding increasing advantage from the psycho-behavioural skills for enhancing an athlete's practice quality and competition results. However, in order to fully benefit from these skills, there should be a shared understanding and perception across all stakeholders involved in the talent development system (Taylor & Collins, 2021). Coherence between the athlete's perceptions, those of coaches and parents, and the application of the psycho-behavioural skills can improve the opportunity to optimally impact progression. Unfortunately, however, there is little research on the shared understanding and perceptions of psycho-behavioural skills between athletes and other important stakeholders in the talent development process (Pankhurst et al., 2013). To be able to effectively learn and thus improve impact of the psycho-behavioural skills from young ages onwards, it is necessary to gain more understanding on the degree of commonality in perception of these skills.

High-performing athletes will benefit from psycho-behavioural skills during performance at adult ages (Gould et al., 2002), whilst these skills also help them to develop from and overcome challenges during their talent development pathway at younger ages (MacNamara & Collins, 2013; Thomas et al., 1999). Reflecting these advantages, MacNamara and colleagues (2010) developed the Psychological Characteristics of Developing Excellence or PCDEs, a psycho-behavioural skill-set consisting of characteristics and skills which could facilitate the process and optimize the outcome of the talent development pathway (MacNamara & Collins, 2013). In the original version, the use and application of these PCDEs load onto six positive factors (e.g., imagery use or social support). However, athletes should also be able to cope with and overcome PCDEs applied in negative factors (e.g., social isolation) or dual-effect factors (e.g., perfectionistic tendencies) during their talent pathway (Hill et al., 2019). To be

able to monitor the development and deployment of athletes' strengths and weaknesses on these skills, the Psychological Characteristics of Developing Excellence Questionnaire version 2 (PCDEQ2) was developed (Hill et al., 2019; MacNamara et al., 2010; MacNamara & Collins, 2011). This formative assessment tool contains 87 items relating the PCDEs to 7 factors, and can be used to map the development of psycho-behavioural skills during adolescent ages (13 to 18 years old). A short form of the PCDEQ-2 was later developed, which can be used at younger ages (8 to 12 years old), called the PCDEQ-Child version (PCDEQ-C) (Laureys et al., 2021). This questionnaire builds on the same psycho-behavioural skills (i.e., PCDEs), but with lesser items (55) and corresponding factors (5).

Bearing in mind that the PCDEQ is a self-report type of assessment, results reflect the perceived competence of the athletes on the items. Here, athletes process information about their own performance (i.e., self-perception) on the PCDE with underlying motivational, cognitive and affective processes (Bandura, 1989; Bouffard et al., 1998; Harter & Pike, 1984). Traditionally, psychometric tools, including the PCDEQ, assess psycho-behavioural skills according to levels of self-perception and are able to document the deployment and development of these skills as perceived by the athletes. Studies have, for example, found that elite athletes have higher levels of positive psycho-behavioural skills than sub-elite athletes, or revealed differences in deployment between team sport and individual sport athletes (Barquin et al., 2019; MacNamara & Collins, 2013). In addition, longitudinal studies in athletic populations have demonstrated developmental changes on the self-perceived scores of these skills (Saward et al., 2020). As athletes progress through their talent development pathway, they seem to increase their score on some psycho-behavioural skills because of increasing environmental demands. Other skills, such as imagery use, seemed to decrease over time. This could be a sign of either changing contexts, raising self-awareness (e.g., use of imagery could

be more accepted in younger age groups compared to the senior professional stage), or indeed, a combination of both.

Next to assessing self-perception of psycho-behavioural skills on level, this could also be assessed on accuracy (Harter, 1998). Here, accuracy refers to the discrepancy between one's own reflection and the actual competence (Weiss & Amorose, 2005). In order to get an accurate reflection of the athlete's competence, he or she should be able to evaluate, weigh and compare different aspects of past and present experiences, all requiring cognitive skills (Bouffard et al., 1998; Parsons & Ruble, 1977). Self-perception schemas start to develop early during childhood and increase in complexity during adolescence (Harter & Leahy, 2001). It is throughout adolescence that athletes are able to refine their global self-worth by exploring and accepting different forms of 'selves'. At these ages, athletes learn to integrate social sources (e.g., information from parents, peers, coaches) with self-evaluative sources (e.g., performance outcomes, goal-achievement.) and are able to get an accurate perception of competence (Weiss & Amorose, 2005). However, to measure accuracy of the perceived competence on PCDEQ factors, there should be a measure of the 'actual psycho-behavioural skills'. It is clearly not possible to have an accurate reflection of the *actual* skills, since these types are more socially constructed and subjectively measured (Dohme et al., 2017). Consequently, it could be better to not focus on defining actual psycho-behavioural skills or self-perception accuracy *per se* but rather, to invest in a concordance between self and other stakeholders' report on PCDEQ factors (Jussim, 2005; Salley et al., 2010).

This concordance in perceptions is of particular importance in talent development environments (TDE). A TDE does not only encompass the athlete's immediate surroundings and interrelations at the micro-level (e.g., coach, peers, parents, siblings, ...), but also takes into account the larger context at the macrolevel (e.g., sport federation, sport culture or education system; Henriksen et al., 2010). An effective and functional TDE succeeds in striving towards

long term goals, with individualized development, and wide ranging coherent messaging and support (Martindale et al., 2007). This will lead to consistently producing elite senior athletes who went through the talent development program from junior ages onwards (Alfermann & Stambulova, 2007). A TDE where there is a lack of coherence between stakeholders' perceptions, can generate a potential failure for athletes to progress (Henriksen et al., 2014; Taylor & Collins, 2021). Next to peers, teammates, siblings and support staff, the most significant contributors to the athlete's talent development pathway are coaches and parents (Bjørndal & Ronglan, 2018; Collins et al., 2016; Morris et al., 2017; Wylleman & Lavallee, 2004). They provide time, effort and energy into the athlete (Jowett & Cramer, 2010; Jowett & Timson-Katchis, 2005; Wolfenden & Holt, 2005) and the motivational climate created by them will most likely facilitate the athlete's talent development pathway (Knight, 2019). Thus, while the coaches' main role is to support athletes develop skills, have successful performances and transfer successfully through talent development stages, the parents are valued for the overall supportive and positive influence on the athletes' sport experience (Jowett & Cramer, 2010; Smoll et al., 2011). Furthermore, for a TDE to be successful, both horizontal (e.g., different stakeholders or contexts) and vertical (e.g., throughout different talent developmental stages) integration is required (Curran et al., 2022; Taylor & Collins, 2021). By integrating the various stakeholders and environments, the various inputs the athlete receive will be systematically combined to shape his curriculum (Taylor & Collins, 2022). Accordingly, a shared understanding of the PCDE constructs and perceived competence of the athlete on the PCDE, will lead to a better horizontal and vertical integration of activity and support, which can impact the coaching and development of these psycho-behavioural skills, and in turn improve athletes' PCDE deployment (Jonker et al., 2010). However, to date there has not been much investigation of this integration in perceptions of psycho-behavioural skills (Curran et al., 2022; Taylor & Collins, 2021; Webb et al., 2016). With no common ground, or no shared perceptions, this could

be a missed opportunity to optimally help young athletes go through the talent development pathway.

Reflecting these considerations, and to optimally monitor the development and deployment of psycho-behavioural skills of the athlete, integration between the athlete and other important stakeholders in the TDE should be evaluated. Therefore, the general aim of this study was to examine to what degree athletes, coaches and parents have shared perceptions on psycho-behavioural skills. First, the level of alignment in perceived PCDEQ factors was investigated by examining differences in mean scores between multiple raters (athletes, coaches and parents) at different age groups. Secondly, we examined to what extent a) coaches and parents can rate athletes' perceptions and b) coaches and parents think athletes can evaluate themselves. Lastly, the study focused on the level of agreement between coach and parent on perceived honesty by the athlete on shortcomings in his/her psycho-behavioural skill-set.

Method

Participants. By using purposive sampling, head coaches in youth talent development systems from three individual sports were contacted to participate in this study, together with their youth athletes (9 to 18 years old). The individual sports were artistic gymnastics, road cycling and badminton; which all have a Flemish talent development system. However, athletes go through the talent development stages at different ages, which allowed us to examine the vertical integration of perceptions (across the aspiring, junior and senior talent development stage). In Flanders, identification of potential elite gymnasts and the instalment of a talent development system, already starts at 8 years old. For badminton players this is slightly later, at 9 years old, and for road cyclists the talent development system starts at 14 years old. Therefore, the gymnasts in this study were athletes in an aspiring (until 12 years old), junior (until 16-18 years old) and senior (from 16 or 18 years old onwards) stage. The badminton players were categorized as aspiring until the age of 14, and then as junior athletes. The road

cyclists were aspiring until 16, and then become junior athletes. At the age of 18, both the badminton and cycling athletes are just prior to the senior stage.

To examine horizontal integration, the perceptions of athletes were compared with those of parents and coaches. Within each talent development programme, athletes have one head coach, but sometimes also multiple assistant-coaches who will work intensively with them. When multiple coaches were involved in the training process of the athlete, we asked the coach who worked with the particular athlete most, to fill out the questionnaire. Parents could choose who would fill out the questionnaire.

Only athletes with complete datasets (questionnaire from athlete, coach and parent) were included. From the original 190 athletes, 5 were excluded because of exceeding the age range (younger than 9 or older than 18 years old), and 63 athletes from whom no complete data-sets were obtained. This resulted in 122 Flemish athletes between 9 and 18 years old (12.17 ± 2.41 years old; 73 self-reported males and 49 self-reported females); 47 of them were artistic gymnasts, 13 were road cyclists and 62 were badminton players.

Informed consent was obtained from each participant (athlete, parent, coach). The parents or legal representative for participants younger than 18 years old, gave their informed consent to let their child participate in this study. This study was conducted in accordance with the code of Ethics of the World Medical Association (Declaration of Helsinki, 1964, and Declaration of Tokyo, 1975, as revised in 1983) and was approved by the local ethics committee of XXXX.

Test battery. Athletes were asked to fill out the Psychological Characteristics of Developing Excellence Questionnaire (PCDEQ-C/-2) on paper. Athletes between 9 and 12.99 years old (from now on referred to as the childhood group) were given a short form of the PCDEQ version 2 (PCDEQ-2; Hill et al., 2019) that has been redesigned for child athletes with items adapted to their age; the PCDEQ Child version (PCDEQ-C) with 51 items correlating to

5 factors (Laureys et al., 2021) on a 6-point Likert scale. These factors consist of 3 adaptive factors (Imagery and Active Preparation, Self-Directed Control and Management, Seeking and Using Social Support) and 2 maladaptive factors (Adverse Response to Failure, Performance Worries). The older athletes (13-18.99 years old), from now on labelled the adolescent group, filled out the already validated PCDEQ- 2 (Hill et al., 2019), again on a 6-point Likert scale. This version consists of 87 items encompassing all PCDEs, leading to 7 factors. These seven factors consists of 4 adaptive factors (Imagery and Active Preparation, Self-Directed Control and Management, Seeking and Using Social Support, Active Coping), 2 maladaptive factors (Adverse Response to Failure, Clinical Indicators) and 1 dual-effect factor (Perfectionistic Tendencies).

Because of practical and time constraints, and to encourage involvement, parents and coaches were not given the full PCDEQ-C/-2 to fill out, but were asked to fill out a short form of the questionnaire. They were given an explanation of each of the 5 or 7 factors, depending on the age of the athlete, and asked to rate to what extent these factors would apply to the athlete on a 6 point Likert scale (“not at all the athlete” to “completely the athlete”; as in agreement with the Likert scale used for the athletes). Per factor, detailed information about what the factor stood for was given as described by Laureys and colleagues (2021) for the PCDEQ-C and Hill et al. (2019) for the PCDEQ-2. This description entailed an explanation of the item loading most onto the factor, and also of other items correlated with the factor. Next, parents and coaches were also asked to rate on a scale of 1 to 10 how accurately they themselves could assess the athlete on the PCDEQ factors, how accurate they thought the athlete could fill out the questionnaire on the PCDEs and how honest the athlete would be in talking about his/her shortcomings.

Data analysis. First, to make a comparison between all factor scores possible, the standardized factor scores of the athletes were rescaled into a score on 6 for the 5 PCDE factors for

participants between 9 and 12.99 years old, based upon 51 items. For the older participants, 87 items were used to make 7 standardized PCDE factor scores on 6. The first research question investigated alignment between athletes, coaches and parents on each PCDEQ factor. Because a different questionnaire was used for the two age-groups (9-12 yo and 13-18 yo), the analysis was split accordingly. To control for inflation of type I error, a MANOVA (age * PCDEQ factors) per age group was first run, yielding several significant results, then followed-up with univariate ANOVAs, and follow up tests to identify which factors differed. In the childhood group, five separate ANOVAs were run, one for each PCDEQ factor, with age (4 levels: 9, 10, 11, and 12) as a within-factor and rater (athlete, coach, parent) as a between-factor. Seven ANOVAs, one for each PCDE factor, were run in the adolescent group with age (4 levels: 13, 14, 15, and 16-18) as a within-factor and rater (athlete, coach, parent) as a between-factor.

For the second and third research objective, the childhood and adolescent group could be examined together, since the perceived accuracy and honesty questions were not directly related to the PCDE factor scores. Three ANOVAs for age (four age categories) * rater (coaches and parents) were used to examine differences in a) perceived accuracy of the coach/parent, b) perceived accuracy of parent/coach on the athlete and c) perceived honesty on shortcomings of the athlete. To minimise error rates when using too many categories for age, four age categories were made (9-10 years; 11-12 years; 13-14 years; 15-18 years). Significant interactions and main effects were always further examined with Bonferroni post-hoc tests. Values of $p \leq 0.05$ were considered statistically significant for all analyses. Effect sizes were calculated as partial eta squared (partial η^2); η_p^2 sizes between 0.06 and 0.14 were considered average effect, sizes above 0.14 were considered a large effect (Bennett & Allen, 2012). All data were analysed using SPSS version 28.

Results

1. Athlete-coach-parent alignment

The main effect of raters was significant on all five factors (Table 1). Post-hoc analyses showed that athletes scored significantly differently from their coaches on factor 1, 3, 4 and 5. Furthermore, athletes' and parents' scores on factor 2 and 5 were significantly different, while coaches and parents had significantly different scores on factor 3 and 4. Differences between athletes, coaches and parents per PCDEQ factor are visualised in Figure 1. Interestingly, no consistent pattern is apparent with athletes scoring themselves lower than their significant others on some factors but higher on others.

Table 1. F(df), p-value and partial η^2 values of the five ANOVA's from the 5 PCDE factor scores for the athletes, coaches and parents of the childhood group.

	Rater			Age		Rater * Age	
	F (3;6)		η_p^2	F (2;6)	η_p^2	F (6;6)	η_p^2
Factor 1	8.585	***	0.081	0.965	0.015	1.173	0.035
Factor 2	6.358	**	0.061	1.224	0.018	1.203	0.036
Factor 3	10.151	***	0.094	3.036	* 0.045	0.814	0.024
Factor 4	15.391	***	0.136	0.359	0.005	1.077	0.032
Factor 5	5.483	**	0.053	1.796	0.027	2.653	* 0.075

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Factor 1: Adverse Response to Failure, Factor 2: Imagery and Active Preparation, Factor 3: Self-Directed Control and Management, Factor 4: Performance Worries, Factor 5: Seeking and Using Social Support.

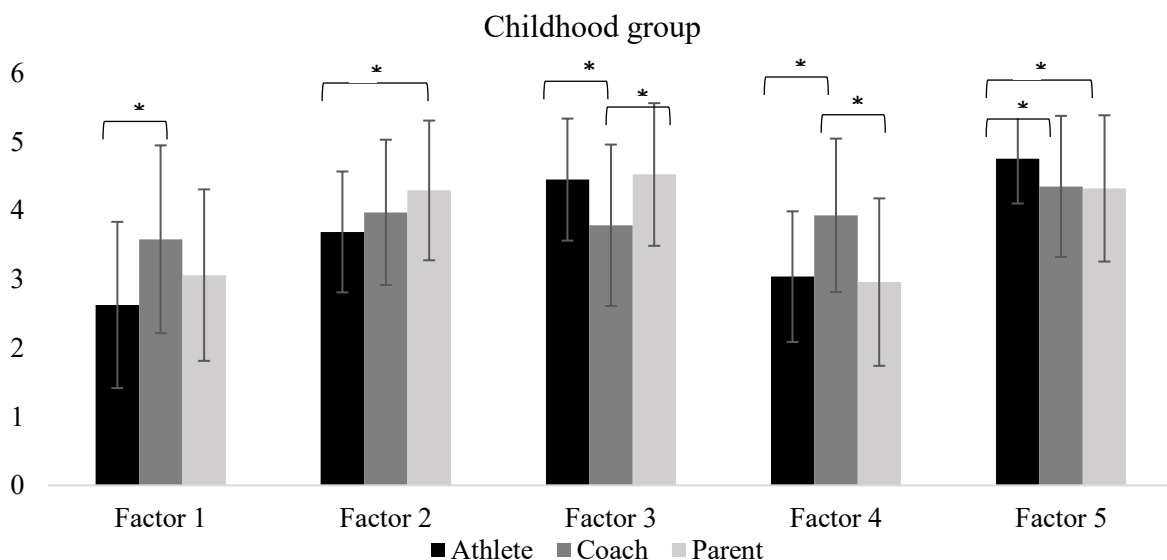


Figure 1. Mean and standard deviations per rater on each PCDEQ factor. * $p < 0.05$. Factor 1: Adverse Response to Failure, Factor 2: Imagery and Active Preparation, Factor 3: Self-Directed Control and Management, Factor 4: Performance Worries, Factor 5: Seeking and Using Social Support.

Results of the adolescent group showed a similar pattern; whilst no significant interaction or univariate effect for age was found (Table 2). Significant effects of rater were found on five out of the seven PCDEQ factors. For Factor 1 (adverse response to failure) and Factor 7 (Clinical Indicators) no differences between raters emerged. Figure 2 visualises the differences on the PCDEQ factors between raters, where once again the pattern is mixed.

Table 2. F(df) and partial η^2 values of the ANOVA's from the 7 PCDE factor scores for the athletes, coaches and parents of the adolescent group.

	Rater		Age		Rater * Age	
	F _(3;6)	η_p^2	F _(2;6)	η_p^2	F _(6;6)	η_p^2
Factor 1	0.103	0.002	0.210	0.005	1.002	0.043
Factor 2	5.438	**	0.075	0.036	0.948	0.040
Factor 3	3.829	**	0.054	0.056	0.437	0.019
Factor 4	15.856	***	0.190	0.017	0.277	0.012
Factor 5	7.337	***	0.098	0.016	1.036	0.044
Factor 6	3.306	*	0.047	0.032	0.621	0.027
Factor 7	1.667	0.024	0.992	0.022	0.660	0.029

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Factor 1: Adverse Response to Failure, Factor 2: Imagery and Active Preparation, Factor 3: Self-Directed Control and Management, Factor 4: Perfectionistic Tendencies, Factor 5: Seeking and Using Social Support, Factor 6: Active Coping, Factor 7: Clinical Indicators.

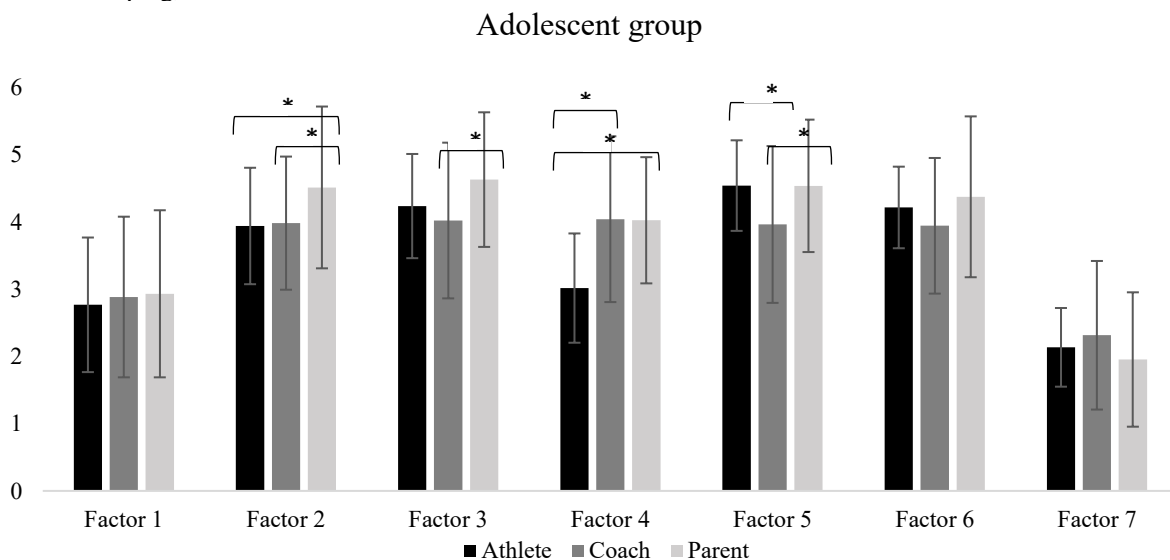


Figure 2. Mean and standard deviations per rater on each PCDEQ factor for the adolescent group. * $p < 0.05$. Factor 1: Adverse Response to Failure, Factor 2: Imagery and Active Preparation, Factor 3: Self-Directed Control and Management, Factor 4: Perfectionistic Tendencies, Factor 5: Seeking and Using Social Support, Factor 6: Active Coping, Factor 7: Clinical Indicators.

2. Perceived accuracy and honesty

ANOVAs showed no significant interaction effects, but main effects were found for both age and rater (Table 3). Post-hoc analysis revealed that parents and coaches considered

13-14yo as more accurate in their self-perception compared to their 9-10yo peers (Figure 3). Athletes from the 13-14yo group also got higher scores than athletes from the 11-12yo group on perceived athlete honesty. On all three variables, the parents had higher scores compared to the coaches, indicating that they felt that their perceptions on the athletes PCDE skills were more accurate than the coaches did.

Table 3. F, p and partial eta squared values on perceived own accuracy, perceived athlete accuracy and perceived athlete honesty.

	Rater		Age		Rater * Age		
	F (1; 116)	η_p^2	F (1; 116)	η_p^2	F (1; 118)	η_p^2	
Accuracy Coach / Parent	13.818	***	0.056	2.592	0.032	2.581	0.032
Accuracy Athlete	4.706	*	0.020	4.240	**	0.052	0.006
Honesty Athlete	8.759	**	0.036	4.171	**	0.051	0.006

* p < 0.05, ** p < 0.01, *** p < 0.001

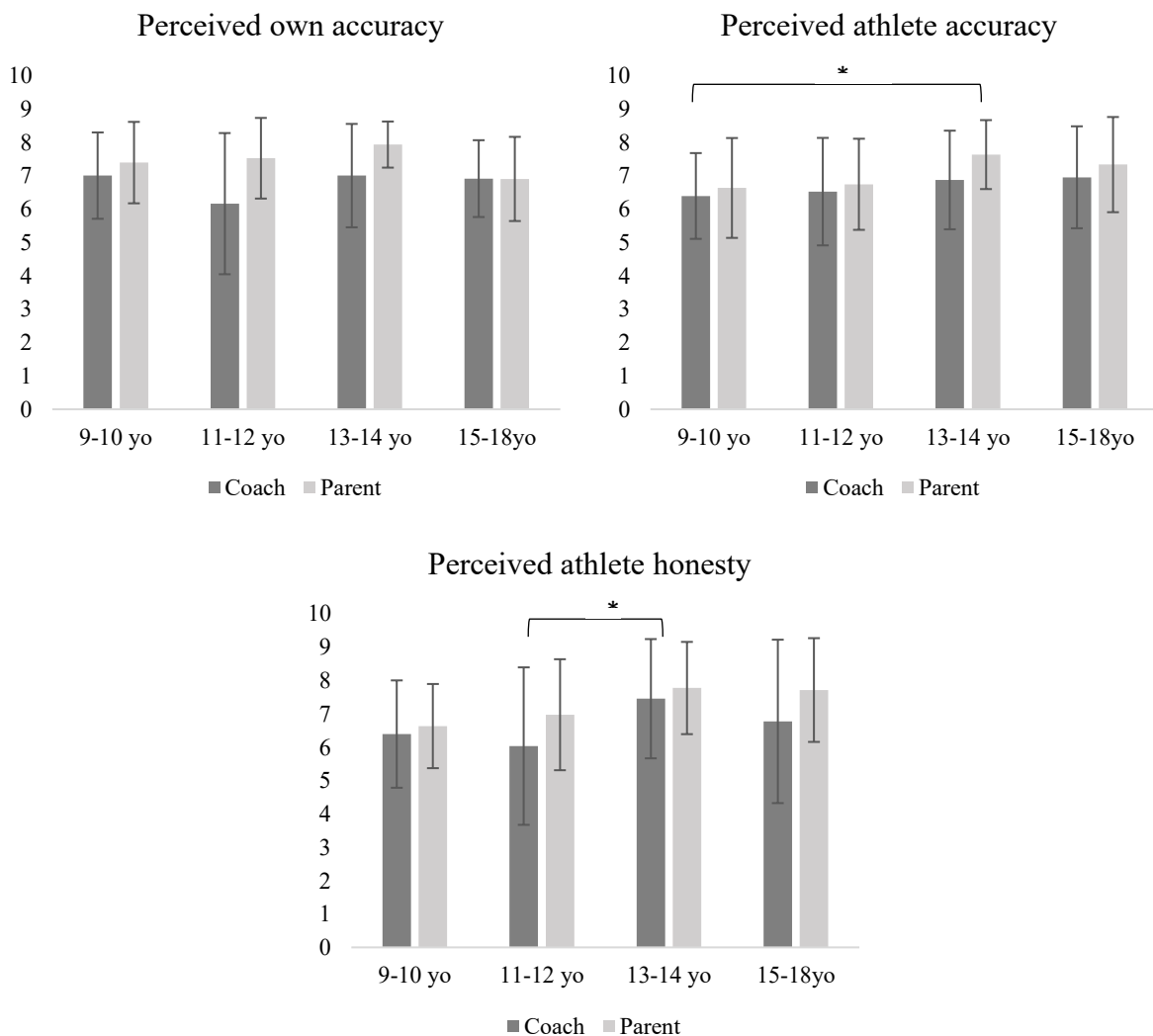


Figure 3. Mean and standard deviations on each variable for coaches and parents per age category. * p < 0.05.

Discussion

This study focused on the degree of shared perceptions on psycho-behavioural skills between athletes, coaches and parents. Firstly, overall differences between athletes, coaches and parents in PCDEQ perceptions were present. In the childhood group, athletes mostly aligned with parents but did show differences in level of perceptions on PCDEQ factors with coaches. In the adolescent group, there seemed to be more shared perceptions but differentially as athletes aligned better with coaches and less with parents. Secondly, coaches perceived themselves as being less accurate in assessing the athlete on the PCDEQ compared to parents, independent of athlete age. Parents also thought that athletes can assess themselves more accurately than coaches reported. Thirdly, parents believed that athletes would be more honest on their shortcomings than coaches did, and this score was higher in the group of older athletes compared to the younger ones.

A close observation of the horizontal and vertical integration between athletes, coaches and parents shows a different pattern for the childhood compared to the adolescent group. In agreement with the development of self-perception in sports, children predominantly lean on parents as sources of feedback to determine their sport competencies, and adolescents rely more on coaches and peers (Harter & Leahy, 2001; Kipp, 2018). Results of this study indeed indicate that perceptions of child athletes are more aligned with parents, and adolescent athletes with coaches. Overall, integration is present between stakeholders in the adolescent group, while in the childhood group, better integration between athletes' and coaches' perceptions of PCDE skills is necessary. This result aligns with other studies finding a lack in integration both horizontally (between stakeholders) and vertically (across talent development stages) (Curran et al., 2022; Pankhurst et al., 2013). Different stakeholders can interpret the PCDEQ factors in different ways which could, in turn, influence the talent development pathway processes and outcomes. Based on our findings, more coherence between coaches and athletes on the

understanding and operationalisation of the PCDEQ factors is needed, since they are seen as the key agents in the process of developing psycho-behavioural skills (Curran et al., 2022; MacNamara & Collins, 2013). When these psycho-behavioural factors are operationalised differently, feedback on the deployment of the PCDEQ factors can be different. This could, in turn affect the TDE's coherence and cooperation (Taylor & Collins, 2021). With better integration, coaches and other stakeholders can work more efficiently with the athlete on PCDE development, which could in turn help the athlete to benefit from developmental challenges. Installing a shared understanding, coherence and cooperation is otherwise termed creating a shared mental model (Taylor & Collins, 2021).

Interestingly, parents perceived themselves as being better in accurately assessing the psycho-behavioural factors of the athletes than coaches. This result is indeed expected in the younger age group, where parents are relatively closer to the athletes than the coaches are. However, during the talent development pathway, the role of the coach becomes increasingly more important and perhaps even takes over from the parent (Kipp, 2018). Since the PCDEQ factors specifically focus on psycho-behavioural skills in sports, rather than more general life skills, it would have been expected that the coaches would perceive themselves the better evaluator. Although not taken into account in this study, the number of hours the coach spends with their athletes, and the coach-athlete and athlete-parent relation, could be possible confounding factors. In line with development of self-perception, coaches and parents do believe that older athletes are better in accurately assessing their PCDE abilities compared to the youngest athletes. Weiss and colleagues also concluded that stakeholders can expect fairly accurate levels of self-perception when working with adolescent and adult athletes (Weiss & Amorose, 2005).

With socially desirable responding in mind, where individuals are more likely to over-emphasise positive skills and characteristics and minimise negative skills and traits (Tracey,

2016), we also questioned coaches and parents on how honest athletes would be on their psycho-behavioural shortcomings. Earlier research suggested that coaches could be prone to view the athlete in the best possible light and thus use impression management techniques when assessing their athletes (Jowett & Clark-Carter, 2006; Partington & Cushion, 2012; Wolanin & Galese, 2021). However, our current results indicate that it is more likely that parents are using this type of behaviour, as they believe athletes will be more honest on their shortcomings. This could indicate a more positively biased view of the parents regarding the athletes, instead of the coaches. Nevertheless, research on prevalence of socially desirable responding within context of relations (athlete-coach or athlete-parent) is scarce, and more research regarding this topic is necessary (Wolanin & Galese, 2021).

Parents and coaches also believed that younger athletes would be less honest about their shortcomings than older athletes. This result is also present when observing the athletes' perceptions on the PCDEQ factors, compared to the coaches and parents. A specific dimension of socially desirable responding, i.e., impression management is observed in the young age group (Tracey, 2016). Young athletes have the tendency to be more positive about their own competencies and underestimate themselves on maladaptive factors, compared to significant others. Engaging in impression management means that athletes will present themselves in a manner tailored to the audience (e.g., coaches), especially when there are (highly) favourable consequences at stake (e.g., selection for a competition) (Tracey, 2016). Athletes in those situations are more prone to consciously minimise their negative mental state (e.g., distress, anxiety or stress) to avoid potential negative consequences of reduced playing time or non-selection for competitions (Wolanin & Galese, 2021). Nevertheless, given the young age of the athletes, they still need to develop a more realistic understanding of their own self (Harter & Leahy, 2001). These young athletes could therefore not be aware that they have the tendency to overemphasise on the positive and ignore the negative. This kind of behaviour would then

not be labelled as impression management, but as positive self-deception (Tracey, 2016). Although mixed results have been found (Tracey, 2016), it could be that this is a desired protective mechanism serving the young athletes' functioning (Gravdal & Sandal, 2006). The only positive PCDEQ factor younger athletes have lower scores on than coaches or parents, is imagery use. In line with our results, Saward and colleagues (2020) also saw a decline over time on imagery use. One reason could be that as athletes progress to a more professional context where (the explicit and overt use of) imagery skills seem to be less accepted (Saward et al., 2020), they are responding in a more socially desirable way. On the other hand, it could be an indication that athletes become more honest (and/or have a better idea of their self-perception) on rating themselves on the psycho-behavioural skills. Another reason for the younger athletes could be that, instead of viewing this as an underestimation or socially desirable responding, this is due to a misinterpretation of the term imagery by the athletes. Previous research has indeed indicated that young athletes will use imagery during practice and competition situations, although they may not fully comprehend the concept (McCarthy et al., 2010).

In the older age group, the athletes seemed less likely to overestimate themselves on the positive PCDEQ factors. Moreover, parents had the highest score, compared to athletes and coaches, which could again be an indication of the positive self-biased view parents have on their own child. The underestimation on the negative factors observed in the youngest age group, is not present in the adolescent athletes. Although this could indicate better self-perception skills for the athlete (Harter & Leahy, 2001), this could also be a sign of the use of less impression management techniques and better coach-athlete relationships at these ages (Duffy et al., 2006). This could indicate that these athletes feel more open to talk about weaknesses with their coaches. Nevertheless, on the dual-effect factor perfectionistic tendencies, athletes clearly scored lower than coaches and parents. Perhaps athletes do not

interpret this factor as a potential risk for their mental health (e.g., extreme perfectionistic tendencies can lead to obsession) and therefore do not consciously recognise this kind of behaviour in themselves (i.e., positive self-deception).

This study is one of the first to take into account perceptions of athletes, coaches and parents from a young age onwards, and investigate vertical and horizontal integration in perceptions. Nevertheless, some limitations and suggestions for future research should be addressed. In this study, athletes scored themselves at the item level, whereas coaches and parents only had to rate the athlete on a factor level. Ideally, future research should compare scores on only item or factor level, and not mix both. However, former analyses have confirmed the correlation between the items and the factors (Hill et al., 2019; Laureys et al., 2021), which indicates alignment between the two types of assessment here. It should also be mentioned that the athletes, coaches and parents participating in this study were familiar with psycho-behavioural skills but were not actively or intentionally working on these skills. This can influence perceptions on the PCDEQ factors of the raters, especially given the possible discrepancy between the social construct and the operationalisation of the factors. Coaches should be provided with tools to systematically teach and promote PCDE into their practices, starting from the youngest athletes onwards and throughout the athlete's talent development process (Laureys et al., 2021; MacNamara, 2011). When working with skilled coaches and athletes, and parents familiar with the PCDEQ factors, it would be expected to find more understanding and coherence from the young ages onwards. In this study, coaches and parents were asked to report on the athletes since these are important stakeholders in the talent development process. However, some studies have also highlighted the important role peers play, especially during adolescence (Horn & Weiss, 1991; Mossman et al., 2021; Wiese-Bjornstal, 2009). It could therefore be helpful to also integrate peer-report in future research.

Investigating shared levels of self-perception on psycho-behavioural skills has shown that during childhood, there is a clear lack of integration between athletes, coaches and parents on PCDEQ perceptions. There are still differences in perceptions between all stakeholders during adolescence, although more similarities (e.g., coherence on two negative PCDE factors) now emerge. These results call for more alignment between athletes, coaches and parents, especially at the younger ages. Developing psycho-behavioural skills already start at these young ages, and a lack of shared perceptions can be a barrier to appropriate feedback, and in its turn induce the efficiency of the talent development process. Within the bigger TDE picture, engaging in creating shared mental models on psycho-behavioural skills and its development, would facilitate the athlete's talent development pathway. Coaches and other stakeholders can use the PCDEQ already from young ages onwards, if they take into account that younger athletes have the tendency to overestimate on adaptive factors and underestimate themselves on the dual-effect and maladaptive factors. Overall, if coaches and parents are aware of these issues, the PCDEQ can be used to assess and monitor the psycho-behavioural skills from young ages onwards.

Disclosure statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

References

- Abbott, A., Collins, D., Sowerby, K., & Martindale, R. (2007). *Developing the Potential of Young People in Sport: A report for SportScotland by The University of Edinburgh*. Edinburgh: Sport Scotland.
- Alfermann, D., & Stambulova, N. (2007). Career transitions and career termination. In Tenenbaum & Eklund (Eds.), *Handbook of sport psychology* (pp. 712–733). John Wiley & Sons, Inc.
- Bandura, A. (1989). Human agency in social cognitive theory. *American psychologist*, *44*(9), 1175. <https://doi.org/10.1037/0003-066X.44.9.1175>

- Barquin, R., Maldonado, A., & Gutierrez-Garcia, C. (2019). Psychological characteristics of developing excellence in mixed martial arts athletes [Article]. *Revista De Artes Marciales Asiaticas*, 14, 37-39. <https://doi.org/10.18002/rama.v14i2s.6005>
- Bennett, K., & Allen, P. (2012). *SPSS Statistics a practical guide version 20*. Cengage learning Australia pty limited.
- Bjørndal, C. T., & Ronglan, L. T. (2018). Orchestrating talent development: youth players' developmental experiences in Scandinavian team sports. *Sports Coaching Review*, 7(1), 1-22. <https://doi.org/10.1080/21640629.2017.1317172>
- Bouffard, T., Markovits, H., Vezeau, C., Boisvert, M., & Dumas, C. (1998). The relation between accuracy of self-perception and cognitive development [Article]. *British Journal of Educational Psychology*, 68, 321-330. <https://doi.org/10.1111/j.2044-8279.1998.tb01294.x>
- Collins, D., MacNamara, A., & McCarthy, N. (2016). Super Champions, Champions, and Almosts: Important Differences and Commonalities on the Rocky Road [Article]. *Frontiers in Psychology*, 6, 11, Article 2009. <https://doi.org/10.3389/fpsyg.2015.02009>
- Curran, O., Passmore, D., & MacNamara, Á. (2022). Singing off the same hymn sheet? Examining coherence in a talent development pathway (part 2). *Journal of sports sciences*, 40(8), 863-870. <https://doi.org/10.1080/02640414.2021.2021702>
- Dohme, L. C., Backhouse, S., Piggott, D., & Morgan, G. (2017). Categorising and defining popular psychological terms used within the youth athlete talent development literature: a systematic review. *International Review of Sport and Exercise Psychology*, 10(1), 134-163. <https://doi.org/10.1080/1750984x.2016.1185451>
- Duffy, P. J., Lyons, D. C., Moran, A. P., Warrington, G. D., & MacManus, C. P. (2006). How we got here: Perceived influences on the development and success of international athletes. *The Irish Journal of Psychology*, 27(3-4), 150-167. <https://doi.org/10.1080/03033910.2006.10446238>
- Gould, D., Dieffenbach, K., & Moffett, A. (2002). Psychological characteristics and their development in Olympic Champions. *Journal of applied sport psychology*, 14(3), 172-204. <https://doi.org/10.1080/10413200290103482>
- Gravdal, L., & Sandal, G. M. (2006). The two-factor model of social desirability: Relation to coping and defense, and implications for health. *Personality and Individual Differences*, 40(5), 1051-1061. <https://doi.org/10.1016/j.paid.2005.11.004>
- Harter, S. (1998). The development of self-representations. In W. Damon & N. Eisenberg (Eds.), *Handbook of child psychology: Social, emotional, and personality development* (pp. 553-617). John Wiley & Sons, Inc.
- Harter, S., & Leahy, R. L. (2001). The construction of the self: A developmental perspective. *Journal of Cognitive Psychotherapy*, 15(4). <https://doi.org/10.1891/0889-8391.15.4.383>
- Harter, S., & Pike, R. (1984). The pictorial scale of perceived competence and social acceptance for young children. *Child development*, 55(6), 1969-1982. <https://doi.org/10.2307/1129772>
- Henriksen, K., Larsen, C. H., & Christensen, M. K. (2014). Looking at success from its opposite pole: The case of a talent development golf environment in Denmark. *International Journal of Sport and Exercise Psychology*, 12(2), 134-149. <https://doi.org/10.1080/1612197X.2013.853473>
- Henriksen, K., Stambulova, N., & Roessler, K. K. (2010). Holistic approach to athletic talent development environments: A successful sailing milieu. *Psychology of Sport and Exercise*, 11(3), 212-222. <https://doi.org/10.1016/j.psychsport.2009.10.005>
- Hill, A., MacNamara, A., & Collins, D. (2019). Development and initial validation of the Psychological Characteristics of Developing Excellence Questionnaire version 2 (PCDEQ2). *European journal of sport science*, 19(4), 517-528. <https://doi.org/10.1080/17461391.2018.1535627>
- Horn, T. S., & Weiss, M. R. (1991). A developmental analysis of children's self-ability judgments in the physical domain. *Pediatric Exercise Science*, 3(4), 310-326. <https://doi.org/10.1123/pes.3.4.310>

- Jonker, C. M., Riemsdijk, M., & Vermeulen, B. (2010). Shared mental models. In *Coordination, Organizations, Institutions, and Norms in Agent Systems VI* (pp. 132-151). Springer. https://doi.org/10.1007/978-3-642-21268-0_8
- Jowett, S., & Clark-Carter, D. (2006). Perceptions of empathic accuracy and assumed similarity in the coach-athlete relationship. *British Journal of Social Psychology*, 45(3), 617-637. <https://doi.org/10.1348/014466605X58609>
- Jowett, S., & Cramer, D. (2010). The prediction of young athletes' physical self from perceptions of relationships with parents and coaches. *Psychology of Sport and Exercise*, 11(2), 140-147. <https://doi.org/10.1016/j.psychsport.2009.10.001>
- Jowett, S., & Timson-Katchis, M. (2005). Social networks in sport: Parental influence on the coach-athlete relationship. *Sport psychologist*, 19(3), 267-287. <https://doi.org/10.1123/tsp.19.3.267>
- Jussim, L. (2005). Accuracy in social perception: Criticisms, controversies, criteria, components, and cognitive processes. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 37, pp. 1-93). Elsevier Academic Press. [https://doi.org/10.1016/S0065-2601\(05\)37001-8](https://doi.org/10.1016/S0065-2601(05)37001-8)
- Kipp, L. E. (2018). Developmental considerations for working with young athletes. In *Sport psychology for young athletes* (pp. 32-42). Routledge. <https://doi.org/10.4324/9781315545202-4>
- Knight, C. J. (2019). Revealing findings in youth sport parenting research. *Kinesiology Review*, 8(3), 252-259. <https://doi.org/10.1123/kr.2019-0023>
- Laureys, F., Collins, D., Deconinck, F. J., & Lenoir, M. (2021). Exploring the use of the Psychological Characteristics of Developing Excellence (PCDEs) in younger age groups: First steps in the validation process of the PCDE Questionnaire for Children (PCDEQ-C). *PLoS one*, 16(11), e0259396. <https://doi.org/10.1371/journal.pone.0259396>
- Longo, A. F., Siffredi, C. R., Cardey, M. L., Aquilino, G. D., & Lentini, N. A. (2016). Age of peak performance in Olympic sports: A comparative research among disciplines. *Journal of Human Sport and Exercise*, 11(1).
- MacNamara, A. (2011). Psychological characteristics of developing excellence. In D. Collins, A. Abbott, & H. Richards (Eds.), *Performance psychology: A Practitioner's Guide* (pp. 47-64). Elsevier Limited.
- MacNamara, A., Button, A., & Collins, D. (2010). The Role of Psychological Characteristics in Facilitating the Pathway to Elite Performance Part 2: Examining Environmental and Stage-Related Differences in Skills and Behaviors. *Sport Psychologist*, 24(1), 74-96. <https://doi.org/10.1123/tsp.24.1.74>
- MacNamara, A., & Collins, D. (2011). Development and initial validation of the Psychological Characteristics of Developing Excellence Questionnaire. *Journal of Sports Sciences*, 29(12), 1273-1286. <https://doi.org/10.1080/02640414.2011.589468>
- MacNamara, A., & Collins, D. (2013). Do mental skills make champions? Examining the discriminant function of the psychological characteristics of developing excellence questionnaire [Article]. *Journal of Sports Sciences*, 31(7), 736-744. <https://doi.org/10.1080/02640414.2012.747692>
- Martindale, R. J., Collins, D., & Abraham, A. (2007). Effective talent development: The elite coach perspective in UK sport. *Journal of applied sport psychology*, 19(2), 187-206. <https://doi.org/10.1080/10413200701188944>
- McCarthy, P. J., Jones, M. V., Harwood, C. G., & Olivier, S. (2010). What do young athletes implicitly understand about psychological skills? *Journal of Clinical Sport Psychology*, 4(2), 158-172. <https://doi.org/10.1123/jcsp.4.2.158>
- Morris, R., Tod, D., & Eubank, M. (2017). From youth team to first team: An investigation into the transition experiences of young professional athletes in soccer. *International Journal of Sport and Exercise Psychology*, 15(5), 523-539. <https://doi.org/10.1080/1612197X.2016.1152992>

- Mossman, G. J., Robertson, C., Williamson, B., & Cronin, L. (2021). Coaches, parents, or peers: Who has the greatest influence on sports participants' life skills development? *Journal of Sports Sciences*, 39(21), 2475-2484. <https://doi.org/10.1080/02640414.2021.1939980>
- Pankhurst, A., Collins, D., & Macnamara, A. (2013). Talent development: linking the stakeholders to the process [Article]. *Journal of Sports Sciences*, 31(4), 370-380. <https://doi.org/10.1080/02640414.2012.733821>
- Parsons, J. E., & Ruble, D. N. (1977). The development of achievement-related expectancies. *Child Development*, 48(3), 1075-1079. <https://doi.org/10.2307/1128364>
- Partington, M., & Cushion, C. J. (2012). Performance during performance: Using Goffman to understand the behaviours of elite youth football coaches during games. *Sports Coaching Review*, 1(2), 93-105. <https://doi.org/10.1080/21640629.2013.790167>
- Salley, C. G., Vannatta, K., Gerhardt, C. A., & Noll, R. B. (2010). Social self-perception accuracy: Variations as a function of child age and gender. *Self and Identity*, 9(2), 209-223.
- Saward, C., Morris, J. G., Nevill, M. E., Minniti, A. M., & Sunderland, C. (2020). Psychological characteristics of developing excellence in elite youth football players in English professional academies. *Journal of sports sciences*, 38(11-12), 1380-1386. <https://doi.org/10.1080/02640414.2019.1676526>
- Smoll, F. L., Cumming, S. P., & Smith, R. E. (2011). Enhancing coach-parent relationships in youth sports: Increasing harmony and minimizing hassle. *International Journal of Sports Science & Coaching*, 6(1), 13-26. <https://doi.org/10.1260/1747-9541.6.1.13>
- Taylor, J., & Collins, D. (2021). Getting in the way: Investigating barriers to optimizing talent development experience. *Journal of Expertise*, 4(3), 315-332.
- Thomas, P. R., Murphy, S. M., & Hardy, L. (1999). Test of performance strategies: Development and preliminary validation of a comprehensive measure of athletes' psychological skills. *Journal of sports sciences*, 17(9), 697-711. <https://doi.org/10.1080/026404199365560>
- Tracey, T. J. G. (2016). A Note on Socially Desirable Responding [Article]. *Journal of Counseling Psychology*, 63(2), 224-232. <https://doi.org/10.1037/cou0000135>
- Webb, V., Collins, D., & Cruickshank, A. (2016). Aligning the talent pathway: exploring the role and mechanisms of coherence in development. *Journal of sports sciences*, 34(19), 1799-1807. <https://doi.org/10.1080/02640414.2016.1139162>
- Weiss, M. R., & Amorose, A. J. (2005). Children's self-perceptions in the physical domain: Between- and within-age variability in level, accuracy, and sources of perceived competence [Article]. *Journal of Sport & Exercise Psychology*, 27(2), 226-244. <https://doi.org/10.1123/jsep.27.2.226>
- Wiese-Bjornstal, D. M. (2009). Sport injury and college athlete health across the lifespan. *Journal of Intercollegiate Sport*, 2(1), 64-80. <https://doi.org/10.1123/jis.2.1.64>
- Wolanin, A. T., & Galese, C. (2021). Looking Good: Understanding Impression Management in Assessment of Athletes. In *The Routledge Handbook of Clinical Sport Psychology* (pp. 201-208). Routledge.
- Wolfenden, L. E., & Holt, N. L. (2005). Talent development in elite junior tennis: Perceptions of players, parents, and coaches. *Journal of applied sport psychology*, 17(2), 108-126. <https://doi.org/10.1080/10413200590932416>
- Wylleman, P., & Lavallee, D. (2004). A developmental perspective on transitions faced by athletes. In M. R. Weiss (Ed.), *Developmental sport and exercise psychology: A lifespan perspective* (pp. 503-523). Fitness Information Technology.