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Faber, Irene R.; Sloot, Lena; Hoogeveen, Lianne; Elferink-Gemser, Marije T.; Schorer, Joerg

Published in:
High ability studies

DOI:
10.1080/13598139.2021.1900792

High Ability Studies

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/chas20

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To cite this article: Irene R. Faber, Lena Sloot, Lianne Hoogeveen, Marije T. Elferink-Gemser & Jörg Schorer (2022) Western Approaches for the identification and development of talent in schools and sports contexts from 2009 to 2019 - a literature review, High Ability Studies, 33:2, 135-168, DOI: 10.1080/13598139.2021.1900792

To link to this article: https://doi.org/10.1080/13598139.2021.1900792

HIGH ABILITY STUDIES
2022, VOL. 33, NO. 2, 135–168
https://doi.org/10.1080/13598139.2021.1900792

Routledge
Taylor & Francis Group

Western Approaches for the identification and development of talent in schools and sports contexts from 2009 to 2019 - a literature review

Irene R. Faber[a], Lena Sloot[a], Lianne Hoogeveen[b], Marije T. Elferink-Gemser[c] and Jörg Schorer[a]

[a]Institute of Sport Science, University of Oldenburg, Oldenburg, Germany; [b]Pedagogical and Educational Sciences, Behavioural Science Institute, Radboud University Nijmegen, Nijmegen, The Netherlands; [c]Centre of Human Movement Sciences, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands

ABSTRACT

This literature review provides an overview of the various modern approaches in talent programs for the context of schools and sports reported in scientific journals (2009–2019) and presents their similarities and differences and options for cross-pollination between contexts. This is a first attempt to overarch contexts regarding talent identification and development. Searches in 12 databases yielded 31 studies. Similarities and differences between contexts were distilled through a qualitative content analysis and described for the identification of talent and talent development. Based on these results, it is suggested that school contexts might benefit from including a talent transfer pathway, differentiating for maturity-level and sex, emphasizing on deliberate practice, monitoring load-ability, and applying acceleration, which are proposed approaches in the sport context. Furthermore, several approaches from the school context could enhance talent programs in sport, including universal screening, paying attention to underserved populations, focusing on creativity and enrichment as well as enhancing the accountability and education level of trainers/coaches. Future studies need to evaluate the efficacy and feasibility of approaches in practice. Moreover, the search could be expanded to other countries to establish a more global view while examining national patterns regarding policy and funding contexts in which programs are located.

KEYWORDS

Giftedness; child; adolescents; talent programs; sports; education

Introduction

Programs for talent identification and development in children and adolescents have become part of contemporary Western societies in various domains, but especially in the education and sports domain (Baum,

CONTACT Irene R. Faber irene.faber@uol.de Institute of Sport Science, University of Oldenburg, P.O. Box 2503, Oldenburg 26111, Germany

Owen, & Oreck, 1996; Campbell & Walberg, 2010; Cohn, Khurana, & Reeves, 2005; De Bosscher, De Knop, Van Bottenburg, & Shibli, 2006; Haroutounian, 1995; Subramanian, Singh, Misra, & Jayachandran, 2008; Vaeyens, Güllich, Warr, & Philippaerts, 2009). These so-called talent programs generally aim to support individuals in discovering and developing areas of talent and encourage and support the pursuit of excellence within a certain field. Another aspect of these programs is the identification of high potential for excellent performance in a specific field to provide the best opportunities already from a young age. This strategy is often employed to increase the effectiveness and/or efficiency of talent programs and to enlarge the chances for success by using the most sensitive periods for learning (Anderson, Magill, & Thouvarecq, 2012; Bruer, 2001; Watanabe, Savion-Lemieux, & Penhune, 2007). Nevertheless, it appears a challenge to adequately find diamonds in the rough and prevent disappointing results (e.g. talent loss, drop-outs) within the fields of education and sports (Baker, Schorer, & Wattie, 2018; Endepohls-Ulpe & Ruf, 2006; Gentry & Fugate, 2012; Hong & Milgram, 2008; Mills & Brody, 1999; Renzulli & Park, 2000; Till & Baker, 2020; Vaeyens, Lenoir, Williams, & Philippaerts, 2008). As such, institutes and other stakeholders in education and sports are still searching for innovative approaches to improve their strategies for talent identification and development and overcome these setbacks.

Since schools and sports are two contexts in which a great number of children and adolescents participate, it comes as no surprise that many so-called talent programs have emerged here (Burgess & Naughton, 2010; Gilson, 2009; Johnston, Wattie, Schorer, & Baker, 2018; Till & Baker, 2020; VanTassel-Baska & Brown, 2007; VanTassel-Baska & Stambaugh, 2005). It can be argued that cross-pollination of the experiences gained in current approaches in talent programs (e.g. knowledge, ideas, insights, organizational structures, learning environments) could be beneficial for both school and sports contexts by integrating (parts of) best-practice approaches from the other context to improve future programs. Although there are distinctive attributes and qualities that are shared by both contexts (i.e. high level of participation of children and adolescents, systematic organization and creation of environments for learning), there are also considerable differences between schools and sport (e.g. culture, personnel policies, reliance on volunteers, culture and financial structures). Considering the significance that the two contexts hold for the development of children and for talent programs, investigating similarities and differences in practices across contexts is desirable to inform future approaches.

Little research on joint approaches to talent identification and development exists to this day despite the widespread use of talent programs in both contexts. The few studies that were found focused on the association between educational and sports performance in children participating in

talent schools for sport (Christensen & Sørensen, 2009; Emrich, Fröhlich, Klein, & Pitsch, 2009; Jonker, Elferink-Gemser, Toering, Lyons, & Visscher, 2010; Jonker, Elferink-Gemser, & Visscher, 2011; Jonker, Elferink-Gemser, & Visscher, 2009; Van Rens, Elling, & Reijgersberg, 2015) or dual careers targeting student-athletes aiming to find solutions for optimal combination of education and sport (e.g. Borggrefe & Cachay, 2012; Stambulova & Wylleman, 2019; Van Yperen, Den Hartigh, Visscher, & Elferink-Gemser, 2019). Hence, it is likely that the approaches for talent identification and development in both contexts were developed separately from each other and differ at least to a certain extent. Consequently, it seems worthwhile to have a closer look on recent talent approaches within both contexts especially since the context is suggested to have a great impact on the identification and development of talent. Insights from another context might bring new innovations to optimize talent programs in one's own context and minimize talent loss.

Within talent programs, the term talent appears to cover both the concepts of giftedness and talent and refers to (the potential for) excellence or outstanding performance in at least one field of human activity (Al-Shabatat, 2013; Gagné, 2004). Although giftedness and talent are terms used to designate children of high ability, skills and/or performance, the exact meaning of both terms has long been under debate, seemingly with no absolute definitions available (Al-Shabatat, 2013). As a result, giftedness and talent are often used interchangeably. While giftedness has been used for quite some time to refer to highly intelligence with a hereditary component (i.e. Galton, 1892; Terman, 1926), nowadays, exceptional creativity is also generally seen as (a part of) giftedness. Talent, on the other hand, is usually considered as an exceptional athletic, creative or artistic ability, but also used as a description of exceptional intellectual ability. It is apparent that modern conceptions of giftedness and talent are a result of an evolution of thoughts and are still subject to change (Al-Shabatat, 2013). Consequently, one term was chosen for readability, which means that talent in this paper refers to both the concepts of giftedness and talent.

In addition to this, research in various areas that contribute to the understanding of talent emergence suggests the process to be much more complex and observable in different domains (Dai & Chen, 2013; Elferink-Gemser, Jordet, Coelho-E-Silva, & Visscher, 2011; Phillips, Davids, Renshaw, & Portus, 2010). Much of the literature on talent today acknowledges that besides individual components also environmental components contribute largely to the successful development of expertise or exceptional behavior (e.g. Ackerman, 2014; Elferink-Gemser, Te Wierike, & Visscher, 2018; Plucker & Barab, 2005). This is also reflected in modern definitions of talent which embrace a process-oriented approach that emphasizes the dynamics

between nature and nurture (Ackerman, 2014; Al-Shabatat, 2013; Baker, Wattie, & Schorer, 2019) and talent models.

Two models that target the developmental processes are the dynamic-system-theory as proposed by Newell (1986) and the Differentiated Model of Giftedness and Talent proposed by Gagné (1985, 2004). These models are both suggested to be leading models within the fields of education and sport and attribute talent development to a process between three different dimensions; the individual, the environment, and the tasks and activities implemented during the process. According to these models, the contextual influence can take place on macro- (i.e. society level; e.g. national policies, culture, demography), meso- (e.g. community or organization level; national sports associations, education institutes) and the micro-level (i.e. one-to-one interactions; e.g. peers, teacher, trainer, parents), which may interact as well (De Bosscher et al., 2006; Gagné, 2004). Thus, it seems important to reflect on how talent programs within the environment, in this case schools and sports, are focused, structured, organized, and conducted as these can significantly influence children's individual developmental pathways and the merit of these programs.

Consequently, the aim of this literature review was to provide an overview of the various modern approaches in (academic) talent programs for the context of schools and talent programs in sports reported in scientific journals by using a qualitative content analysis. This overview of talent approaches will then be used to present the similarities and differences between contexts, which could be considered a first step in looking over the fence of two important contexts in children's lives. To the best of our knowledge, no similar review has been conducted so far. The specific approaches in practice within schools are expected to provide new insights and innovative ideas for sports and vice versa. In addition, other contexts dealing with the identification and development of talented children and adolescents (e.g. arts and music) might benefit from these insights as well. Since societies and the contexts of schools and sports evolve steadily over time, this review focused on publications of the last decade (2009–2019). Moreover, as environmental circumstances of countries vary tremendously and the learning gap across countries is enormous (https://ourworldindata.org/grapher/share-of-students-achieving-the-advanced-threshold-score?tab=map&time=2015), it seems inappropriate to compare the context of schools and sports without taking this into account. For that reason, this first literature review crossing borders between school and sports contexts is, without any intentions of social discrimination or exclusivity, restricted to the Western societies. To fulfill the aims of this study and reckoning the aforementioned aspects, the following two research questions were formulated: (I) Which approaches within talent programs are proposed in the scientific literature for the context of schools and sports in Western societies

from 2009–2019? (II) What are the similarities and differences between the talent approached in these contexts? Based on the findings, suggestions are made concerning (parts) approaches for the school contexts that could be implemented to optimize talent programs in sport context and vice versa.

Methods

Systematic search

This literature review followed the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement when applicable (Moher, Liberati, Tetzlaff, & Altman, 2009; i.e. identification of study design, description of the rational, search strategy, study selection, flow-diagram, data extraction and synthesis, summary of main findings, limitations, conclusion, and funding). Electronic database searches were conducted by one of the authors (XX) in PubMed, Web of Knowledge, PsychArticles, ScienceDirect, ERIC, Google Scholar, Scopus, SPONET, Wiley, Hogrefe, and JSTOR. This mix of databases was selected to cover most literature within the field of education and sport. The search was limited to published peer-reviewed papers from 2009 until 2019. Search terms for all databases represented the concept of giftedness or talent, the school or sports contexts, and approaches for talent identification and/or development. Searches were restricted to articles covering talent approaches for children and adolescents in school age (i.e. age 4 to 18 years) using additional search terms or limitations, depending on the settings of the database. Because a comprehensive review was intended with the purpose to find as many references to different talent approaches/programs as possible, all study designs were included. Detailed search strategies of the databases included are presented in Appendix A. Language was not restricted during the searches. Duplicates were removed and studies that were not available as full-length publications, but only as an abstract, were excluded.

Selection process

Titles and abstracts retrieved from the systematic search were independently screened by three investigators (XX, YY, ZZ). An article was included if (1); the focus was on an approach (e.g. model, program or framework) for talent identification and/or development for typically developing children/adolescents (4–18 years); (2) the context of schools and/or sports were subject of the study; (3) it covered contexts in western Europe, North America, Australia or New Zealand; and (4) it was written in English or German. Articles were excluded if (1) the article focused outside the target group, for example, on children younger than the age of four, adults or on non-

typically developing children/adolescents; (2) another context than school or sports (i.e. music, arts) was the main subject of the paper; (3) the paper was not the right document type (e.g. book, personal story, or interview); (4) it did not provide a detailed description of a talent program; or (5) the language was not English or German. When inclusion could not be determined from the title or abstract, the full-text articles were retrieved and screened. First, an independent evaluation by all three investigators (XX, YY, and ZZ) was conducted. Secondly, those articles identified by all three investigators as potentially relevant were subject to discussion until consensus on inclusion or exclusion was reached. Reference lists of all relevant articles were manually checked for additional papers published using the same criteria of inclusion and exclusion.

Data synthesis

All articles that were found in the systematic search were the first subject to a formal and then to a content analysis. The formal analysis was conducted by one of the researchers (XX) to summarize the formal attributes like the date of publishing and the field the article focused on. The content analysis was carried out by means of a qualitative approach (XX and YY) (Finfgeld-Connett, 2014; Smith et al., 2020). First, papers were read in detail and systematically searched for all content about approaches for talent identification and development and extracted in a spreadsheet. An inductive approach was used to code the described approaches (i.e. open coding) in this first phase. Themes and subthemes were also inductively created in four debriefing sessions (i.e. axial coding) by discussing the codes found within the individual articles and after that paralleled with background literature to ensure the use of appropriate current professional jargon (research-group). Two main themes were distilled from the data and served as an umbrella for the subthemes: "identification of talent" and "talent development." Four subthemes were derived by the same procedure for the identification of talent: 1.) focus, 2.) assessment methods, 3.) timing, and 4.) strategies to overcome bias. Concerning talent development four themes were identified: 1.) aims, 2.) pathways, 3.) substantive focus, and 4.) guidance and environment. Each subtheme included a comprehensive outline of the similarities and differences within the talent approaches that could be derived from the articles.

Results

Systematic search

The systematic search yielded 2641 articles (Figure 1). The first step was the exclusion of articles based on language, publication date, and article type

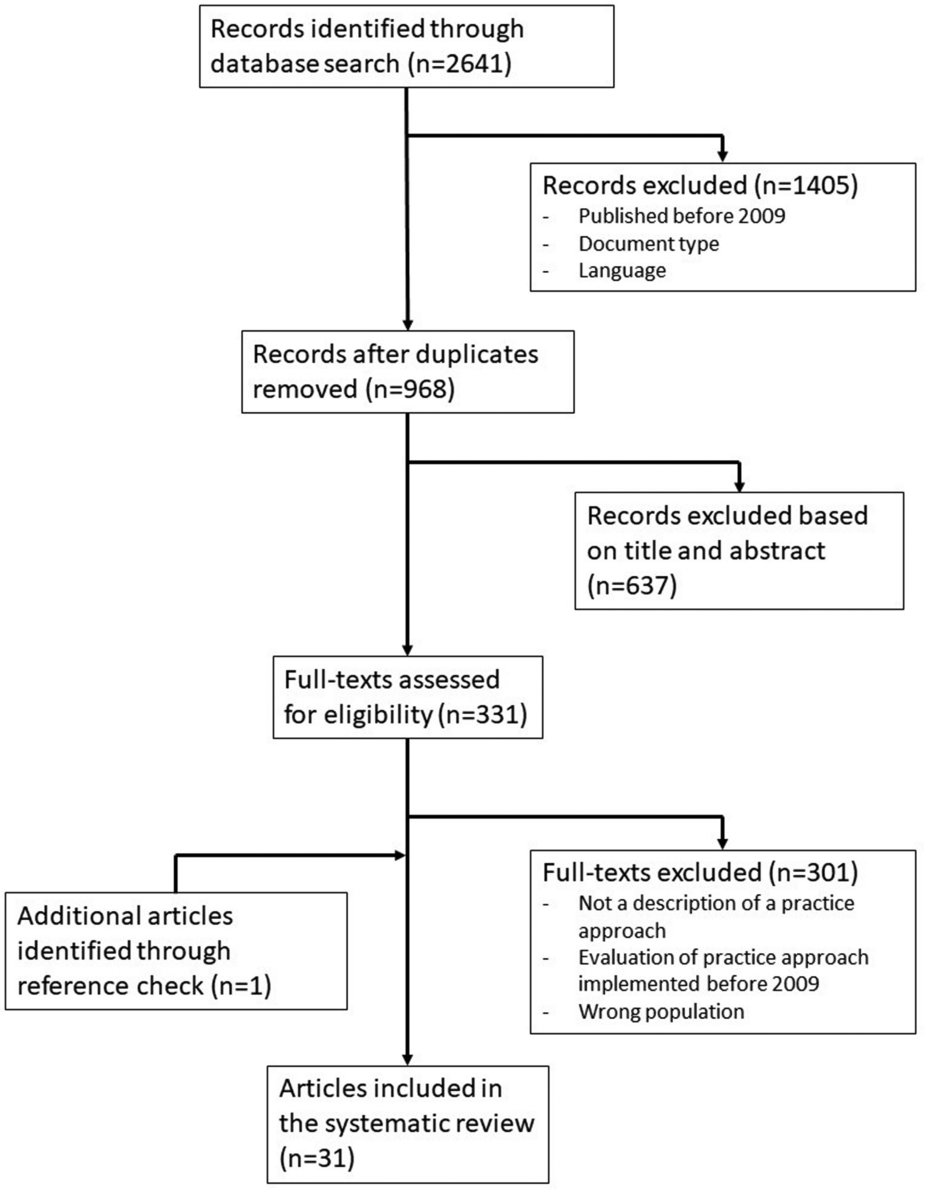

Figure 1. Flow chart systematic search Appendix A.

(n = 1282). The remaining articles were checked for duplicates, resulting in a further exclusion of 391 articles. In the next step, 968 titles and abstracts were screened, and 637 texts were excluded based on the in- and exclusion criteria, leaving a total number of 331 full-text articles. After retrieving these full-text articles, they were assessed for eligibility, and 301 were excluded. The main reasons for exclusion were that the articles did not include a description of a practice approach or included an evaluation of a practice approach that was implemented before 2009. Another reason

for exclusion was that it focused on a population outside of the target group (e.g. university students or children under 4 years). A reference check of the remaining 30 studies yielded one additional study. Finally, 31 studies were included of which 23 covered the context of schools and 8 the context of sports. None of the papers covered both contexts. In 14 out of the 23 articles focusing on the school contexts, the first author was affiliated in the United States of America. On the second position were Australia and Germany; both were affiliated to two articles. The United Kingdom, New Zealand, Canada, Chile, and Russia were all affiliated to one article. Concerning the articles in sport, the first authors of three out of eight articles were affiliated to the United Kingdom. Two articles were affiliated to both Australia and Belgium. The United States of America and Germany were affiliated to one article. More detailed information of each study included is presented in Table 1. In the following two subsections, we focus on detailed analysis of the content concerning the two main themes: identification of talent and talent development.

Identification of talent

Four subthemes were derived concerning the identification of talent for which both similarities and differences between sport and school contexts have been found. The first subtheme, "focus," is about the substantive emphasis during the identification process. The second, "assessment methods," refers to the principles used for the implemented test procedures. The third and fourth subthemes, "timing" and "strategies to overcome bias," describe when the identification of talent is proposed to take place and the (proposals for) approaches to prevent mistakes during the identification process, respectively.

Focus

An important similarity between the school and sport context was that the stakeholders of both acknowledged that a holistic multidimensional approach is needed for an adequate identification of talent (Bailey & Collins, 2013; Gagné, 2011; Gulbin, Croser, Morley, & Weissensteiner, 2013; Hoffmann et al., 2013). This ensured that a variety of a child's characteristics was accounted for during the identification process. Additionally, the identification processes for both contexts were similarly described as domain or task specific (Gulbin et al., 2013) and the programs acknowledged more general foundational abilities as well as specific skills during the identification procedures, while still taking domain specificity into account (Cao, Jung, & Lee, 2017; Cumming, Lloyd, Oliver, Eisenmann, & Malina, 2017; Dumas & McNeish, 2017; Gagné, 2011; Grassinger, 2011; Hoffmann et al., 2013; Horn, 2015; Lapp & St. John, 2009; Riley, 2011; Sulak,

Table 1. Characteristics of studies included in the literature review.

Authors and year	Country	Content[a]	Topic	Focus
Context of schools				
Cao et al. (2017)	Australia	Segment/Method	Reviewing assessment strategies	Presentation of nine types of assessment, their strengths, and weaknesses: ability tests, achievement tests, computer adaptive tests, rating scales, performance-based assessment, dynamic assessment, response to intervention, growth modeling and program evaluation.
Wellisch and Brown (2012)	Australia	Complete model/ framework	Model of inclusive gifted identification and progression	Aims to bridge the gap between initial giftedness and its development. Different steps in the process of identification and the placement of students in an appropriate program. Initial screening of giftedness characteristics and underachiever characteristics.
Gagné (2011)	Canada	Segment/Method	Academic talent development	Best-practices advice for academic talent development programs to implement an enriched K-12 curriculum, systematic daily enrichment, full-time ability grouping, customized/accelerated pacing, personal excellence goals, highly selective access, and early interventions.
Kronborg and Cornejo-Araya (2018)	Chile[b,c]	Segment/Method	Accelerated learning and high ability grouping	Presentation of different educational strategies used in Australia. For example, accelerated learning and high-ability grouping, which also includes special entry schools and specialist schools.
Fischer and Müller (2014)	Germany	Critical review/ Discussion	Acceleration, enrichment, and mixed-form programs	Presentation of different talented programs in Germany. They are mostly using acceleration, which requires fast processing speed and enrichment (or in-depth learning) which requires high processing capacity. The combination of both is described as an independent promotion category.
Grassinger (2011)	Germany	Segment/Method	Additions to academic talent development	Additional, systematic, and regular practice realized in everyday life of students in a systemic as well as in a non-systematic way. Use of personalized accelerated pacing in individualized training and group instruction.
Riley (2011)	New Zealand	Segment/Method	Competitions as model for identification and development	Use of competitions between students, with specific steps in identification and development and in accordance with the curriculum and its goals. Selection of students and teachers for participation, while considering certain dangers and possible problems of competitions.
Pomortseva (2014)	Russia[c]	Segment/Method	Grouping practices	Description of three kinds of grouping practice with different sub classifications. For example, pull-out groups of in class grouping.
Hymer (2013)	UK	Segment/Method	The GRACE model of gift-creation	Proposition of five principles for talent development: 1) gifts and talents are grown and created in the individual, 2) trust, warmth, and mutual respect from teachers, 3) recognize visible and invisible processes, 4) use of intellectual contradictions to create new connections, which is important for the development of gifts and talents, 5) gifts and talents are developed over time and with much hard work and setbacks in the process.

(*Continued*)

Table 1. (Continued).

Authors and year	Country	Content[a]	Topic	Focus
Coleman (2016)	USA	Segment/Method	U-Stars plus program	Program containing five components to develop children's fluid potential into crystalized advanced academic skills and abilities. Requirement of early nurture of children in a strength-based culture of excellence. Use of high-quality integrated science instruction that helps recognize and nurture vulnerable students with potential.
Cross and Cross (2017)	USA	Segment/Method	Psychosocial theory	Using principles of psychosocial theory to develop young gifted students: by creating hope, willpower, purpose, competence, fidelity, and love. Also, creating activities that foster ego strength and creating an environment that supports students' development.
Dai (2017)	USA	Complete model/ framework	Evolving complexity theory	Model that has a psychosocial basis. Focus on talent development in four stages and not on giftedness: fundamental stage, transitional stage, crystalized stage, and advanced stage of development.
Dumas and McNeish (2017)	USA	Segment/Method	Non-linear growth models	Using a statistical device to estimate the capacity of students to learn new skills, based on several assessment points from longitudinal data.
Heilbronner (2013)	USA	Segment/Method	Raising future scientists	Seven characteristics for developing science talent. Three strategies that emphasize things: stockpile raw materials, create science libraries, and acquire audio-visual resources that emphasize science. Four strategies that emphasize activities: encourage investigations, take children on science safaris, talk about shared experiences, and investigate learning opportunities. Used to guide parents and teachers.
Horn (2015)	USA	Complete model/ framework	The young scholars model	Collaborative model with three interdependent commitments: collaboration of teachers and leadership of principal, use of non-traditional assessment, interventions/ extensions/enrichment and ongoing professional development of parents and teachers. Use of portfolios that record academic strengths and interests from kindergarten on.
Lapp and St. John (2009)	USA	Segment/Method	Acceleration and enrichment for mathematical education	Description of gifted education for mathematics. Inclusion of creativity as one parameter besides cognitive ability measures for identification. Presentation of different programming options, such as an observational method, acceleration, enrichment, pull-out programs, or pace acceleration. Early introduction and enrichment with the same sequence of areas of math from an earlier age.
Michael-Chadwell (2011)	USA	Critical review/ Discussion	The Chadwell transformative model for gifted program reform	Three key actions are proposed: 1) unifying and inclusive federal definition of giftedness, 2) assessment of the procedures for nomination, identification, and placement to determine growth improvements in inclusion of underserved gifted students, 3) professional and staff development.

(*Continued*)

Table 1. (Continued).

Authors and year	Country	Content[a]	Topic	Focus
Olszewski-Kubilius and Thomson (2015)	USA	Critical review/ Discussion	Review of identification and development programs	Description of several different projects that include summer programs or classes, Saturday classes, college visits, mentoring, parent engagement, coordinated counseling, after school classes, tutoring, individual advising, parent seminars, and long-term support from grade 3–12.
Paul and Seward (2016)	USA	Complete model/ framework	Place-based investment model of talent development	Model with a regional focus. Presentation of five pathways for developing talents: enrichment, advanced learning, human connections, entrepreneurial thinking, and specialized guidance.
Peterson and Jen (2018)	USA	Segment/Method	The Peterson proactive developmental attention model	Model with affective curriculum for gifted children and adolescents that is proactive, developmental, and includes attention components. Their characteristics include heightened sensitivity to environmental stimuli, emotional intensity, and intellectual, emotional, imaginational, sensual, and psychomotor over excitability.
Plucker et al. (2017)	USA	Complete model/ framework	Model for excellence gaps	Reducing excellence gaps by preparing students before they have the chance to be identified or enroll for a program. Also providing access to opportunities, implementation of educator and counselor training, use of accountability systems, use of universal screening with local norms, ability grouping, facilitating professional development, and using opportunity recruitment and acknowledging the impact of psychosocial factors.
Siegle et al. (2016)	USA	Complete model/ framework	Model for identification and talent development for gifted students	Description of five stages of development: pre-identification, preparation, identification, intervention, and outcomes. Implementation of an intervention with a curriculum and instructions, service delivery and general education program as parameters.
Sulak (2014)	USA	Segment/Method	Curriculum-based measurements to identify advanced learners/gifted students	Growth monitoring of students' progress by using three or more scores that display the growth of each student as a representative graph. Use of this approach for identification and monitoring in development programs.
Context of sports				
Davids et al. (2013)	Australia[b]	Segment/Method	Representative performance tests	Design of evaluation test as basis for identifying and manipulating the major constraints of learners: tasks that are close to real-game situations and require similar cognitive, perceptive actions, interactions, decisions, and the overall dynamic of the sport with the expectancy of variation in performance.
Gulbin et al. (2013)	Australia	Complete model/ framework	Integrated FTEM	Model with ten developmental phases that integrates general and specialized phases within the three pathways of active lifestyle, sport participation and sport excellence. Includes three foundation stages, four talent stages, two elite stages and one mastery stage.

(*Continued*)

Table 1. (Continued).

Authors and year	Country	Content[a]	Topic	Focus
Vaeyens et al. (2009)	Belgium[b]	Segment/Method	Talent recycling	Description of second chance opportunities for athletes. This should lead to improved chances of success, increased return on investment and the reduction of uncertainty in talent identification.
Hoffmann et al. (2013)	Germany	Complete model/ framework	Model for talent identification and development	Seven stages of performance, development, and training level, that are: giftedness, development of basics, basics training, specialization, continuous training, high-performance training, and elite level. Influenced by the environment and enhancement, interconnected to talent identification and the analysis of expectations.
Bailey and Collins (2013)	UK	Complete model/ framework	The standard model of talent development	Description and critique of usual components and characteristics of talent models used in western sport: use of a pyramid model where trickle-down effects are expected. Focus on small elite and de-selection many talents who are under a certain performance threshold. Early specialization is required, and early ability onset is treated as an indicator of later success.
Cumming et al. (2017)	UK[b]	Segment/Method	Bio-banding	Grouping of athletes based on different biological criteria rather than chronological age, such as maturity status and technical and psychological development. Used for competition, strength and conditioning, and talent identification.
Lloyd and Oliver (2012)	UK	Complete model/ framework	The youth physical development model	Long-term model with focus on youth development. The model differentiates between male and female development and provides different phases based on age periods (e.g. early childhood and adolescence), growth rate, and maturational status. These are connected to physical qualities, training structure and training adaptation. Less focus on chronological age by using the other described parameters for estimating the ideal structure and adaptation of training.
Bergeron et al. (2015)	USA[b]	Critical review/ Discussion	Recommendations by the IOC	Description of guidelines for a sustainable model to develop healthy, resilient, and capable youth athletes. Includes factors like maturation, challenges to health, well-being, and performance with the whole athlete in center using 'best practice' for each developmental level.

Note. UK: United Kingdom; USA: United States of America.

[a]Complete model/framework: a full model/framework based on theories of learning/development which stand on its own. Segment/Method: focused on a specific phase/part/aspect of talent identification and/or development. Critical review/Discussion: one or more aspects of talent identification and/or development are critically discussed leading to different ways of implementation or guidelines. [b]International group of authors. [c]Despite the first author coming from a non-western society, the substantive focus of the article on programs in the western society.

2014). This also included a consideration of specific psychological and psychosocial characteristics, which were acknowledged as essential factors for achieving success (Cumming et al., 2017; Grassinger, 2011; Hoffmann et al., 2013).

Although stakeholders in both schools and sport contexts adapted holistic and multidimensional approaches, clear difference in the setting of substantive accents was identified in the analysis. Within the school context, a clear focus on the academic strengths and interests emerged (Cao et al., 2017; Dumas & McNeish, 2017; Gagné, 2011; Grassinger, 2011; Horn, 2015). Moreover, specific attention was paid to creativity (Lapp & St. John, 2009; Riley, 2011), scientific talent (Heilbronner, 2013), and day-to-day school skills (e.g. reading, spelling, written expression, math's problem solving) (Sulak, 2014). Stakeholders in sport, on the other hand, focused on the physical aspects and included other aspects which were suggested necessary to be able to keep up with the extensive training program (e.g. motivation, self-regulative skills, and learning behavior) and/or to perform optimally in the target sport (e.g. motivation, cognition, readiness for performance) (Cumming et al., 2017; Davids, Araújo, Vilar, Renshaw, & Pinder, 2013; Hoffmann et al., 2013; Vaeyens et al., 2009). In addition to this, the stakeholders in the sports context recommend considering early childhood development for a better estimate of potential (Hoffmann et al., 2013; Vaeyens et al., 2009). Another difference was the proposition of universal screening for all children and adolescents within the context of schools while creating opportunities for pupils to recognize their talents and interests (Peterson & Jen, 2018; Plucker, Peters, & Schmalensee, 2017). Moreover, screening for signs of underachievement was also a proposed implementation in schools (Wellisch & Brown, 2012) and the importance of the role of the teacher during the identification process was emphasized (Cao et al., 2017; Coleman, 2016; Horn, 2015; Lapp & St. John, 2009; Plucker et al., 2017). The articles about sports did not provide similar procedures/recommendations.

Assessment methods

Both the approaches for schools and sports included standardized tests and/or performance outcomes as objective measures for talent to provide relevant information and prevent measurement noise while referring to thresholds or making relative comparisons between children (Cao et al., 2017; Gagné, 2011; Hoffmann et al., 2013; Sulak, 2014). However, sole reliance on such methods for identification was criticized in both contexts (Bailey & Collins, 2013; Hoffmann et al., 2013; Michael-Chadwell, 2011). It was suggested that a combination of objective and subjective measures would provide the best estimate for talent identification (Bailey & Collins, 2013; Coleman, 2016; Dumas & McNeish, 2017; Hoffmann et al., 2013; Horn,

2015; Paul & Seward, 2016; Wellisch & Brown, 2012). In addition, both recommended using ecological valid instruments (Gulbin et al., 2013). This necessity of using a domain-specific authentic/real-world task and creating an environment during the child's assessment that is similar or the same as during practices/training or performance tasks was suggested to ensure a more valid outcome and transfer to fit the subsequent program for talent developmental (Davids et al., 2013). Furthermore, it was recommended for both contexts to incorporate the assessment of talents into a systematic multiple step program that distinguishes the level of talent and the intensity of training/fostering at more points in time (Grassinger, 2011; Hoffmann et al., 2013; Vaeyens et al., 2009). Approaches in education suggested using dynamic assessment, growth tracking or repeated measures throughout the whole talent identification and development process (Cao et al., 2017; Dumas & McNeish, 2017; Sulak, 2014)

Timing

Finally, there seemed to be an ongoing debate about the timing of talent identification in school as well as in sport contexts. Although early identification was proposed in both (Bailey & Collins, 2013; Cross & Cross, 2017; Hoffmann et al., 2013; Kronborg & Cornejo-Araya, 2018; Vaeyens et al., 2009), other options for timing were also suggested. Some authors put emphasis on multiple points of entry into talent programs in schools and stated that domain-specific identification should only take place in later middle-school year (Grassinger, 2011; Olszewski-Kubilius & Thomson, 2015). Other authors suggested not to use one time point for entry, but a process with measurements over time for a fair identification of talent in schools (Coleman, 2016; Dumas & McNeish, 2017; Horn, 2015; Paul & Seward, 2016; Wellisch & Brown, 2012) or a reverse identification process including a pre-programming phase or other preparation for the formal identification process (Olszewski-Kubilius & Thomson, 2015; Siegle et al., 2016). In sports, late identification and entry (i.e. post-pubertal) were proposed as part of talent transfer comprising a change of target sport at a later stage of development (Hoffmann et al., 2013; Vaeyens et al., 2009).

Strategies to overcome bias

Similar within school and sports contexts was the awareness of possible bias that could occur during talent identification. This identification bias refers generally to the deselection of children for talent programs that only have a (temporary) disadvantage compared to others due to, for example, their growth curve, maturation process (training) experience, socio-economic status or relative age. Consequently, strategies to overcome this identification bias were developed in both contexts while focusing on the prevention of false negatives and early deselection. Moreover, specific strategies to not

overlook late-bloomers were proposed (Olszewski-Kubilius & Thomson, 2015; Vaeyens et al., 2009). Nevertheless, school and sport contexts acknowledged different causes for bias and as a result developed different approaches. Schools strategies focused mainly on the prevention of bias that occurred due to differences in demographical background (e.g. country of origin, socio-economic status, and educational level) by among others, non-verbal testing (Horn, 2015) or stakeholders' introspection and reflection of their own feelings and discussing with peers (Peterson & Jen, 2018). Moreover, some articles specifically targeted underserved populations and underachieving pupils or pointed out challenges and possible solutions to reduce the so-called "excellence or achievement gaps" (Coleman, 2016; Horn, 2015; Michael-Chadwell, 2011; Plucker et al., 2017; Siegle et al., 2016; Wellisch & Brown, 2012). For example, by raising awareness in parents within this subgroup and support their active involvement, practicing ability grouping, by preparing educators and creating accountability, through increased and universal testing, and increased access to higher education (Coleman, 2016; Olszewski-Kubilius & Thomson, 2015; Plucker et al., 2017). In sport, taking into account the difference in growth, maturation, gender, training experience and the relative age effects were proposed to overcome bias in talent identification (Bailey & Collins, 2013; Bergeron et al., 2015; Cumming et al., 2017; Hoffmann et al., 2013; Vaeyens et al., 2009). Besides keeping track on individual growth and maturation curves and reckoning this at selection procedures together with the relative age, bio-banding (i.e. grouping players on their biological age) was introduced in training and competition as well (Cumming et al., 2017). No specific attention for underserved populations could be identified in the sports context based on the included articles.

Talent development

Four additional subthemes were identified for the development of talent, starting with the "aims," which focuses on the overall aims of the talent programs. The second subtheme, "pathways" includes information on how the process of talent development advances throughout the talent program. The third subtheme is labeled "substantial focus" and focuses on the general principles of talent development programs. Lastly, the subtheme "guidance and environment" refers to the stakeholders, the organizations, and surroundings that talented children are placed in for the talent development program.

Aims

The main focus of talent programs in schools and sports was often on supporting students in developing their high abilities and, consequently,

reaching excellence within their specific domain. This embraced the development of full potential and abilities, creation of capable pupils, and the establishment of high-caliber performance (Bergeron et al., 2015; Gagné, 2011; Grassinger, 2011; Hoffmann et al., 2013; Plucker et al., 2017; Vaeyens et al., 2009). Complementary to this was the aim of developing domain-specific skills and abilities in children, and the promotion of self-regulated life-long activity. Education institutes proposed this as life-long learning (Fischer & Müller, 2014), while in sports this was covered by the concept of active for life or an active lifestyle (Bailey & Collins, 2013; Bergeron et al., 2015; Gulbin et al., 2013; Hoffmann et al., 2013). Furthermore, approaches in both contexts aimed to develop the whole child/personality by means of a holistic multidimensional approach for talent development including, for example, psychosocial interventions (Bailey & Collins, 2013; Bergeron et al., 2015; Hoffmann et al., 2013; Michael-Chadwell, 2010; Peterson & Jen, 2018; Plucker et al., 2017; Olszewski-Kubilius & Thomson, 2015). Finally, the identification of talent was stated as an important aim within the talent programs (Cao et al., 2017; Hoffmann et al., 2013; Riley, 2011; Sulak, 2014; Vaeyens et al., 2009).

The school context differed from the sport context regarding their specific aim to reduce the excellence gaps (Horn, 2015; Michael-Chadwell, 2010). The early identification and nurturing of vulnerable student groups, to which pupils from low-income households and minorities belong, were proposed as a central aim of talent programs for education (Coleman, 2016). Another difference was the strong emphasis on social, emotional, psychological, psychosocial and interpersonal skill development in most of the articles in the field of education (Cross & Cross, 2017; Grassinger, 2011; Olszewski-Kubilius & Thomson, 2015; Peterson & Jen, 2018; Plucker et al., 2017; Pomortseva, 2014). Although this was mentioned for the context of sport as well, it seemed to be less centered compared to education. Furthermore, one specific aim described for talent programs in schools was to keep talented and gifted students in rural areas, not just for their development, but also to work against the brain-drain effect (Paul & Seward, 2016). Sport contexts, on the other hand, added winning competitions as central aim within their talent programs to present excellence. In addition to this, the approaches aimed to keep their pupils healthy throughout the development process and reduce injuries (Cumming et al., 2017; Lloyd & Oliver, 2012). Finally, Vaeyens et al. (2009) aimed to create an enlarged talent pool in sports, mostly for rather unpopular sports, by means of talent transfer procedures to increase the chances of success. Articles from the school context did not reveal similar approaches.

Pathways

Talent development was clearly described as a non-linear process including different stages in the school as well as the sport contexts (Bailey & Collins, 2013; Dai, 2017; Gulbin et al., 2013; Hoffmann et al., 2013; Hymer, 2013). Like in the proposed talent identification approaches, a holistic and multi-dimensional approach was favored in both contexts, acknowledging the influences of both nature and nurture in the process (Bailey & Collins, 2013; Bergeron et al., 2015; Coleman, 2016; Cross & Cross, 2017; Cumming et al., 2017; Dai, 2017; Gulbin et al., 2013; Hoffmann et al., 2013; Hymer, 2013; Michael-Chadwell. 2010; Lloyd & Oliver, 2012; Olszewski-Kubilius & Thomson, 2015; Peterson & Jen, 2018; Siegle et al., 2016; Vaeyens et al., 2009). In addition to that, school and sports talent programs revealed an approach in which the individuality of development is highlighted and the process is, when possible, individually adjusted to the children's needs (Bergeron et al., 2015; Dai, 2017; Hymer, 2013; Vaeyens et al., 2009). Moreover, tailored activities and tasks were considered to facilitate the development process through the different stages of development. Both contexts therefore proposed a shift away from the chronological age and have less fixed time-frames for transitions through stages of development (e.g. faster transitioning as "leapfrogs"; Gulbin et al., 2013), taking into account the individual differences in development speed (Bergeron et al., 2015; Cumming et al., 2017; Davids et al., 2013; Gagné, 2011; Grassinger, 2011; Hoffmann et al., 2013; Lapp & St. John, 2009; Lloyd & Oliver, 2012; Vaeyens et al., 2009; Wellisch & Brown, 2012).

Some differences could be identified between school and sport talent pathways. First of all, sports differentiated between early (e.g. table tennis, figure skating, gymnastics) and late (e.g. rowing and cycling) specialization sports (Bailey & Collins, 2013; Bergeron et al., 2015; Hoffmann et al., 2013; Vaeyens et al., 2009), whereas the school context did not make such a distinction. Although the analysis showed an ongoing discussion about the necessity of early specialization and the negative side-effects (e.g. early burn-out and drop-out) in sports (Bergeron et al., 2015), approaches in sports revealed both the early and late specialization pathways including different gender-specific times of entry and phasing of training (Lloyd & Oliver, 2012). This also applied to the talent transfer pathway as described in sports (Vaeyens et al., 2009). This strategy, in which athletes changed their target sport at a later stage to increase the chances of success and the return of investments, had no comparable counterpart in school contexts in the selected articles. Furthermore, unlike in schools, sports contexts made an explicit difference between the "sport pathway" for elite sports and the "active lifestyle" pathway (recreational sports) within their approach for talent development (Bergeron et al., 2015; Hoffmann et al., 2013). In addition, school contexts used special pathways for pupils with socio-emotional

problems and/or learning disorders (Wellisch & Brown, 2012) and paid more attention to maximize opportunities. This was considered especially important in early education to prevent no-show of gifted behavior or underachievement and self-perception of low capabilities throughout the education process (Dumas & McNeish, 2017; Sulak, 2014).

Substantive focus

Several similar principles for how talent can be developed in talent programs could be identified in both contexts. One of them was the use of systematic or deliberate practice to realize the aim of domain-specific skill development (Grassinger, 2011; Gulbin et al., 2013; Hoffmann et al., 2013; Siegle et al., 2016). Furthermore, the design of the tasks and exercises in the talent programs were embedded in a "real-world-setting," which was used to make the tasks for skill development more authentic (Coleman, 2016; Davids et al., 2013; Gulbin et al., 2013; Horn, 2015; Plucker et al., 2017; Wellisch & Brown, 2012). This was connected to the acknowledgment of the influence that the environment has on the interaction between the child, the tasks, and its developmental process (Bailey & Collins, 2013; Bergeron et al., 2015; Coleman, 2016; Dai, 2017; Hoffmann et al., 2013; Hymer, 2013; Paul & Seward, 2016). To ensure an optimal development of each child, it was described as necessary to adjust the activities to the developmental stage of the child whenever possible (Gulbin et al., 2013; Hoffmann et al., 2013; Siegle et al., 2016; Wellisch & Brown, 2012). Another principle for talent development found in each context was the necessity of including regular evaluations that are systematically documented (Bergeron et al., 2015; Cao et al., 2017; Davids et al., 2013; Grassinger, 2011; Pomortseva, 2014), to assess the progress and identify obstacles. It was emphasized that the setting of these evaluations must be real-life tasks or situations, just as the development programs. Both contexts used acceleration or enrichment programs to structure the content and the skills that are targeted (Gagné, 2011; Grassinger, 2011; Gulbin et al., 2013; Lapp & St. John, 2009), although the realization differed strongly.

One difference was the use of a compact and in-depth curriculum for enrichment in education (Coleman, 2016) and the exposure to a variety of different sports and (fundamental) transferrable skills as form of enrichment in sport (Bergeron et al., 2015; Cumming et al., 2017; Gulbin et al., 2013; Vaeyens et al., 2009). Acceleration in education was realized in forms of grade-skipping, early school entrance, or subject-based acceleration (Fischer & Müller, 2014; Kronborg & Cornejo-Araya, 2018; Wellisch & Brown, 2012), while acceleration in sport was more flexible, with individualized development based on gender, maturation, age, and training history (Hoffmann et al., 2013; Lloyd & Oliver, 2012). This was reflected in the approach to determine a child's level of performance by years until high

achievement or expertise in sports instead of chronological age (Cumming et al., 2017; Hoffmann et al., 2013). Individual development of children was addressed in school by using different strategies to create opportunities for showing and initiating development, for example, through pre-identification programs that expose children to different areas of expertise (Coleman, 2016; Gagné, 2011; Horn, 2015; Hymer, 2013; Olszewski-Kubilius & Thomson, 2015; Siegle et al., 2016). This was combined with grouping practices, such as multi-age classrooms for instructions and programming (Coleman, 2016; Horn, 2015), full-time grouping (Gagné, 2011; Kronborg & Cornejo-Araya, 2018), and cluster grouping or mixed-ability groups that are more homogeneous (Horn, 2015; Plucker et al., 2017; Pomortseva, 2014). Another difference in focus of talent programs was that the school context emphasizes the use of continuous testing, dynamic assessment of progress and growth tracking using statistical methods (Cao et al., 2017; Dumas & McNeish, 2017; Riley, 2011; Sulak, 2014). This was not found in the context of sport, however, talent programs focus on the health and safety of children, maintaining an appropriate load threshold, decreasing the drop-out rate of talents and creating respect for rules, other athletes and the sport itself (Bergeron et al., 2015; Cumming et al., 2017; Lloyd & Oliver, 2012).

Guidance and environment

In both contexts, the increase of accountability within talent programs was proposed to be of high importance and this applies to the people directly in contact with the children as well as those making decisions and policies (Bergeron et al., 2015; Coleman, 2016; Hoffmann et al., 2013; Hymer, 2013; Michael-Chadwell, 2010; Plucker et al., 2017; Siegle et al., 2016). Similar was also the emphasis on the importance of the coach/teacher throughout the developmental pathway and their qualifications and education, at best with special focus on talent development (Bergeron et al., 2015; Coleman, 2016; Hoffmann et al., 2013; Horn, 2015; Hymer, 2013; Kronborg & Cornejo-Araya, 2018; Michael-Chadwell, 2010; Olszewski-Kubilius & Thomson, 2015; Paul & Seward, 2016; Plucker et al., 2017; Siegle et al., 2016). It was furthermore argued that it is necessary for all stakeholders to create a positive and facilitating environment within the talent programs (Bergeron et al., 2015). The support that children in the talent programs receive was not limited to stakeholders involved in the programs, but both contexts pointed out the importance of parental and family support for the development in the programs (Coleman, 2016; Grassinger, 2011; Heilbronner, 2013; Hoffmann et al., 2013). Lastly, it was described that talent programs in school and sport are susceptible to budget cuts or one-sided distribution of funding, which would have detrimental effects on the support and chances of the children (Bergeron et al., 2015; Dumas &

McNeish, 2017; Gulbin et al., 2013; Lapp & St. John, 2009; Michael-Chadwell, 2010; Vaeyens et al., 2009).

There were several issues that are specific to the sport context, as they are not found in the included articles considering school context. One of them was to provide medical supervision for injuries, overload due to increased physical activity and mental strain put on young athletes (Bergeron et al., 2015; Hoffmann et al., 2013; Lloyd & Oliver, 2012). Another important proposed guideline for the sport context was the implementation of policies against harassment and exploitation within talent programs (Bergeron et al., 2015). In the articles concerning education, it was suggested to create more general and inclusive definitions of "talents" and to be careful with the label giftedness/talented due to the associations with it (Hymer, 2013; Michael-Chadwell, 2010). A different aspect in the sport context was that the proposition that cooperation between national sport institutes is necessary and should be increased to make talent transfer between sports and reintegration into talent programs possible (Bailey & Collins, 2013). Furthermore, the importance to acknowledge the differences between early and late specialization sports was emphasized as well as the consideration of how this determines the implementation of talent programs (Vaeyens et al., 2009). On a personal level, the coach was suggested to be the most important guidance; they have the responsibility for interactions with the children in the talent programs and between them and by that they can create an environment that is nurturing for talent development (Bergeron et al., 2015; Hoffmann et al., 2013). In school context, it was proposed to cover this by increasing the number of counselors within talent programs and not by teachers (Peterson & Jen, 2018). Furthermore, children should be more involved in the decisions and selection process of the talent program (Heilbronner, 2013; Riley, 2011) and the programs must be implemented as a continuum of services that are long term, going beyond school into higher education (Gagné, 2011; Horn, 2015; Olszewski-Kubilius & Thomson, 2015).

Summary of the results

The results of the substantive analysis are summarized in Table 2. Separate columns present the talent approaches identified in both contexts, approaches only found in school contexts and approaches only found in sport contexts. The first column reflects the similarities, while the second and the third reflect the specific approaches per context, i.e. differences, between the contexts of schools and sports. All approaches are arranged for the main themes (i.e. identification of talent and talent development) separately and described per accompanying subtheme.

Table 2. Summary of the Results.

Themes	Subthemes	Approaches in school and sport contexts *(similarities)*	Approaches only found in school contexts *(differences)*	Approaches only found in sport contexts *(differences)*
Identification of Talent	Focus	• A holistic multidimensional approach. • Domain/task specific. • General foundational abilities as well as specific skills for identification. • Consideration of psychological and psychosocial characteristics.	• Focus on academic strengths and interests; creativity, scientific talent and day-to-day school skills. • A universal screening for all to recognize talents and interests and/or discover underachievement.	• Focus on physical aspects to keep up with the training program and to perform optimally in the target sport. • Take into account the early childhood development.
	Assessment methods	• Combination of objective and subjective measures. • Use of standardized tests and/or performance outcomes as objective measures. • Use of ecological valid instruments. • Measure at more points in time.		
	Timing	• Early identification, but also other options for timing are suggested.		• Late identification, and entry (i.e. post pubertal) is proposed as part of talent transfer.
	Strategies to overcome bias	• Prevention of false negatives and early deselection. • Specific strategies to not overlook late-bloomers.	• Prevention of bias due to differences in demographical background (underserved pupils).	• Taking into account the difference in growth, maturation, gender, training experience, and the relative age effects to overcome bias.
Talent development	Aims	• Supporting pupils in developing their high abilities and, consequently, reaching excellence within their specific domain. • Promotion of self-regulated life-long activity. • A holistic multidimensional approach.	• Reduce the excellence gaps. • Strong emphasis on social, emotional, psychological, psychosocial, and interpersonal skill development. • Keep talented and gifted students in rural areas	• Winning competitions as ultimate aim. • Keep pupils healthy throughout the development process, and reduce injuries. • Create an enlarged talent pool in sports, mostly for rather unpopular sports, by means of talent transfer procedures to increase the chances of success.

(*Continued*)

Table 2. (Continued).

Themes	Subthemes	Approaches in school and sport contexts *(similarities)*	Approaches only found in school contexts *(differences)*	Approaches only found in sport contexts *(differences)*
	Pathways	• Talent development is clearly described as a non-linear process including different stages. • A holistic and multidimensional approach. • Individuality of development; a tailor-made approach when possible, individually adjusted to the children's needs. • Shift away from the chronological age and have less fixed time-frames for transitions through stages of development.	• Special pathways for pupils with socio-emotional problems and/or learning disorders. • Prevention of no-show of gifted behavior or underachievement	• Early and late specialization pathways. • An explicit difference between the "sport pathway" for elite sports and the "active lifestyle" pathway
	Substantive focus	• Use of systematic or deliberate practice • Tasks and exercises are authentic and embedded in a "real-world-setting" • Acknowledgment of the environmental influence. • Adjustment of the activities to the developmental stage of the child. • Regular evaluations that are systematically documented. • Use of acceleration or enrichment programs.	• Various option for enrichment. • Emphasis on the use of continuous monitoring of development.	• Acceleration in sport is more flexible (leap-frogging). • Focus on the health and safety of children, maintaining an appropriate load threshold, decreasing the drop-out rate.
	Guidance and environment	• Accountability within talent programs is proposed to be of high importance to the people directly in contact with the children as well as those making decisions and policies. • Emphasis on the importance of the coach/teacher and their qualifications and education at best with special focus on talent development • Creating a positive and facilitating environment. • Importance of parental and family support. • Talent programs are susceptible to budget cuts or one-sided distribution of funding.	• Proposal to create more general and inclusive definitions of "talents" and to be careful with the label giftedness/talented due to the associations with it • Use of counselors for guidance next to the teachers. • Children should be more involved in the decisions and selection process of the talent program. • Talent programs must be implemented as a continuum of services that are long term, going beyond school into higher education.	• Provide medical supervision for injuries, overload due to increased physical activity, and mental strain put on young athletes. • Implementation of policies against harassment and exploitation. • Proposition for cooperation between national sport institutes for talent transfer and reintegration. • Acknowledge the differences between early and late specialization sports and consider how this determines the implementation of talent programs. • The coach is the most important guider.

Discussion

This literature review aims to provide an overview of the various modern approaches in talent programs for children and adolescents within the contexts of schools and sports reported in scientific journals from 2009 until 2019 and to present the similarities and differences between contexts. Since both contexts deal with difficulties in finding high potentials and support them in fulfilling their potentials, but developed different approaches over time, it seems promising to look behind the scenes to look for possibilities to learn from each other.

Before going into details, some general aspects of the results seem to be worth mentioning regarding the systematic search and the data synthesis. The systematic search led to the inclusion of 23 articles in the field of education and 8 in the field of sports (Table 1). This unequal distribution of articles could be due to a higher level of emphasis on talent programs in schools, but maybe more likely on the difference between the number of professionals working within the field of education compared to the sports context. Moreover, the articles covering the education field seem to have a more national focus and were written by authors from the same nation, mainly the United States of America, while the sports' articles showed a more international focus and were frequently created by an international team of writers. This seems a logical consequence of the differences between the contexts; primary school and high school mainly support the development of their pupils within the national society, whereas elite sports have a highly international character. Furthermore, it is worth mentioning that the selection and naming of the main themes and subthemes to describe the results of the current review were intended as umbrella for structuring the data and not to exclude other aspects of talent identification and development. Additionally, the subthemes are interrelated and not always mutually exclusive, which was also not targeted.

Practical contributions to talent identification and development

Subsequent, it is important to acknowledge the similarities that were recognized within the proposals of the included articles that were similar in schools and sports and are intended to contribute positively to the talent identification and development (Bergeron et al., 2015; Gagné, 2011; Grassinger, 2011; Hoffmann et al., 2013; Olszewski-Kubilius & Thomson, 2015; Peterson & Jen, 2018; Plucker et al., 2017; Vaeyens et al., 2009). Stakeholders in both contexts reveal an awareness of the necessity of special programs for talented pupils using a holistic multidimensional approach while taking into account the influence and importance of the environment for both identification and development (Bailey & Collins, 2013; Bergeron

et al., 2015; Coleman, 2016; Cross & Cross, 2017; Cumming et al., 2017; Dai, 2017; Gulbin et al., 2013; Hoffmann et al., 2013; Hymer, 2013; Michael-Chadwell. 2010; Lloyd & Oliver, 2012; Olszewski-Kubilius & Thomson, 2015; Peterson & Jen, 2018; Siegle et al., 2016; Vaeyens et al., 2009). Talent programs have been designed and implemented into practice to support children and adolescents that (have the potential to) excel. Also, similar between schools and sports is the stakeholders' proposal to combine objective and subjective measures to identify talented children and to use more than one point in time for a better estimation of potential within a certain field (Bailey & Collins, 2013; Coleman, 2016; Dumas & McNeish, 2017; Hoffmann et al., 2013; Horn, 2015; Paul & Seward, 2016; Wellisch & Brown, 2012). Furthermore, stakeholders from both contexts propose for tailor-made approaches in which the program can be adapted to the needs of the child (Bergeron et al., 2015; Dai, 2017; Gulbin et al., 2013; Hoffmann et al., 2013; Hymer, 2013; Siegle et al., 2016; Vaeyens et al., 2009; Wellisch & Brown, 2012). Moreover, they express long-term goals that include life-long activity within their field (Bailey & Collins, 2013; Bergeron et al., 2015; Fischer & Müller, 2014; Gulbin et al., 2013; Hoffmann et al., 2013).

What schools can learn from sports' practice

Some approaches which are proposed within sports could not be found in the context of schools but might be worth exploring in the latter context. Stakeholders within the context of sports suggested an active promotion of transfer of skills (Hoffmann et al., 2013; Vaeyens et al., 2009). As such, an athlete can make a decision to change his/her target sport to increase the changes to excel while building upon previous learned skills. This could be a pathway that could be explored within education in, for example, high schools that require pupils to choose for certain profiles including specific courses. Talented pupils might be able to adequately transfer their skills for a new course easily and find new opportunities to excel. Furthermore, sports' stakeholders suggest differentiating between children with a different level of maturity and between girls and boys to overcome bias in talent identification and better support development (Bailey & Collins, 2013; Bergeron et al., 2015; Cumming et al., 2017; Hoffmann et al., 2013; Lloyd & Oliver, 2012; Vaeyens et al., 2009). The addition of these indicators within schools is likely to contribute to better talent programs in schools as well. Moreover, it seems that more emphasis is put on the development of self-regulative skills, goal-oriented approaches, and deliberate practice within the proposals for sports compared to the school contexts. Additionally, special attention is paid to monitor the athlete's physical and mental load ability/threshold to prevent injuries and drop-outs in sports (Bergeron et al., 2015; Cumming et al., 2017; Hoffmann et al., 2013; Lloyd &

Oliver, 2012). Children and adolescents in talent programs in schools are likely to benefit from more emphasis on these aspects as well. Finally, sport talent programs often support acceleration to a high extent shown by "leapfrogging" of young talented athletes through age and/or competition levels (Gulbin et al., 2013). Although acceleration is sometimes also provided as an option to talented pupils in schools, this seems to be offered less frequently and in smaller steps when compared to sports (Assouline, Colangelo, & VanTassel-Baska, 2015; Colangelo, Assouline, & Gross, 2004). The experiences of the stakeholders in sports concerning acceleration ("leap-frogging") might provide insight into a successful transition into the field of education.

What sports can learn from schools' practice

Vice versa, the articles including the approaches within schools presented applications that might be interesting for the field of sports. One of these is the universal screening to recognize their talent and find their interests (Peterson & Jen, 2018; Plucker et al., 2017). Although examples were found within literature of similar initiatives in sports (e.g. Flemish Sports Compass; Pion, 2015), these were not mentioned in the articles included in the current review concerning sports. Such a universal screening in sports is likely to support youngsters in finding the sport that fits them best and to increase the talent pool. Both aspects are suggested to contribute to talent programs in practice. In addition, more attention is paid to underserved groups within the context of schools (Coleman, 2016; Horn, 2015; Michael-Chadwell, 2010; Olszewski-Kubilius & Thomson, 2015; Plucker et al., 2017). No such focus was recognized within the articles on sports approaches. Nevertheless, it can be argued that this issue not only plays a role in education, but also in the domain of sports. Therefore, universal opportunities, not only for those with parental support, could be recommended for sports. Furthermore, approaches in schools give the impression to focus more on the development of creativity and to be less driven by (immediate) success, when compared to those in sports (Lapp & St. John, 2009; Riley, 2011). Also, talent programs in schools regularly propose various options for enrichment, a diversity in provision of training and hold special pathways for pupils with special needs (Coleman, 2016; Gagné, 2011; Horn, 2015; Hymer, 2013; Olszewski-Kubilius & Thomson, 2015; Siegle et al., 2016; Wellisch & Brown, 2012). Finally, there was an eye-catching awareness of the importance of those directly involved in the guidance of pupils (e.g. teacher, coach, supervisor) in the articles concerning the contexts of schools (Cao et al., 2017; Coleman, 2016; Horn, 2015; Kronborg & Cornejo-Araya, 2018; Lapp & St. John, 2009; Michael-Chadwell, 2010; Olszewski-Kubilius & Thomson, 2015; Paul & Seward, 2016; Plucker et al., 2017; Siegle

et al., 2016). This concerned both the setting of priority to the accountability and education level of these guiders. The context of sports would benefit from such a priority setting as well; a large part of the system is run by volunteers who are not educated for the specific task to guide and train young athletes aiming for the elites.

Future Opportunities

In addition to these issues brought forward by the systematic literature search for cross-pollination between the contexts of schools and sports, we would like to address two aspects that are suggested to enhance future talent programs. The first issue to mention is the suggested importance of the accountability of the talent programs themselves including all stakeholders involved. All levels (i.e. micro-, meso- and macro-level) should be aligned and cohesive in an open and transparent approach that provides opportunities for children and adolescents to explore, find and develop their talents (Pankhurst & Collins, 2013). There is scientific evidence, as is reported in the current review, that can be helpful in designing talent programs and decision-making, but in the end, it is essential that this is really implemented in practice. Too often, it appears that stakeholders have taken a different route based on their thought/beliefs or are not able to act in accordance with the talent programs due to a variety of reasons (Assouline et al., 2015; Colangelo et al., 2004). As such, it is recommended to improve the accountability of the talent programs and with that perhaps a more broader talent system (Bergeron et al., 2015). The second issue, directly related to the first one, is to recommend having better connection and cooperation between the different organization levels in both the contexts of schools and sports. In sports, this refers, among others, to the links between clubs, regional and national training centers. In the contexts of schools, one can think of the connection and cooperation between different levels of school (i.e. primary and high school) as well as higher education levels (i.e. universities). Talented children and adolescents encounter several organizations/institutes during their development. They will benefit from a strong, cohesive system that is flexible and prompt actions (Bailey & Collins, 2013; Gagné, 2011; Horn, 2015; Olszewski-Kubilius & Thomson, 2015; Pankhurst & Collins, 2013). One might even want to consider the possibility to get across the border of the different domains (e.g. education, sport, music, arts, etc.) and put together a joint approach for practice. In addition to this, it is crucial to keep an open-minded approach toward children and adolescents within such a cooperative approach to overcome the so-called Pygmalion effect (i.e. the phenomenon whereby others' expectations of a target person affect the target person's performance) leading to self-fulfilling prophecy (Leonardo Filho, 2016; Szumski & Karwowski, 2019).

Limitations

Some limitations must be acknowledged regarding this literature review. First, although as a first step it was intended to review scientific literature, it is arguable whether scientific literature is the most complete reflection of the approaches that are used in practice. Perhaps other approaches have been implemented that are not published in scientific literature and therefore were not recognized in the systematic search. Secondly, this literature review only provides an overview on existing approaches and did not intend to evaluate the effectiveness and/or feasibility of the programs. Such an information is necessary to have a better insight about the costs and benefits for practice, however, that was not intended to be part of this study. Finally, it must be mentioned that this review focused on the talent programs within the western society. The generalizability of the results to other societies is therefore dependent on the similarities with the western societies (e.g. culture, educational system, talent beliefs, financial resources). Moreover, even within western society, the education and sport policies and particularly funding can vary. This can cause differences per country in the arise, shaping and sustainability in both school and sport contexts. Looking at patterns for specific countries might be worth exploring in future studies.

Conclusions

In conclusion, this first study transcending contexts provide an overview of the approaches for the identification and development of talent in the contexts of schools and sports in the Western societies based on scientific literature from 2009–2019 and reveal the similarities and differences between these contexts. The comprehensive overview within this review brings aspects forward which aim to inspire the stakeholders from both contexts (and others, i.e. music, art, business, etc.) to further improve talent programs in their domain. Schools' contexts might benefit from including a talent transfer pathway, differentiating for maturity-level and gender, emphasizing on deliberate practice, monitoring load-ability and applying more extensive acceleration, all of which are proposed approaches in the sports' context. Universal screening, paying attention to underserved populations, focusing on creativity and enrichment, as well as enhancing the accountability and education level of trainers/coaches are approaches from the school context that could enhance talent programs in sports. Future studies need to evaluate the efficacy and feasibility of approaches to gain a better insight in their value for practice. Moreover, new ideas on how to develop a joint approach from the different domains to include a broad opportunity for children and adolescents are recommended to explore. Such an approach using cross-pollination of knowledge, skills, and experiences could build up a strong, cohesive, and accountable talent system from which a society can benefit in a lot of fields while still

taking into account possible influencing factors of temporary underachievement (e.g. late-bloomers, underserved populations, difference in growth, maturation, gender, training experience, and relative age effects) (Bailey & Collins, 2013; Bergeron et al., 2015; Coleman, 2016; Cumming et al., 2017; Hoffmann et al., 2013; Olszewski-Kubilius & Thomson, 2015; Plucker et al., 2017; Vaeyens et al., 2009; Wattie, Schorer, & Baker, 2015). Finally, future studies should be expanded to other countries to establish a more global view while accounting for the patterns associated with a specific country to examine the policy and funding contexts within which programs are located.

Acknowledgments

We acknowledge Marisa Jensen (MJ) for her help with the selection procedure.

Disclosure of interest

The authors report no conflicts of interest.

Data availability

The datasets generated and/or analyzed during the current review are available from the corresponding author on reasonable request.

Disclosure statement

No potential conflict of interest was reported by the authors.

Geolocation

Germany

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID

Irene R. Faber http://orcid.org/0000-0002-4994-0453
Lena Sloot http://orcid.org/0000-0002-4106-812X
Lianne Hoogeveen http://orcid.org/0000-0002-3362-240X
Marije T. Elferink-Gemser http://orcid.org/0000-0003-2555-4782
Jörg Schorer http://orcid.org/0000-0002-4888-7048

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Appendix A. Detailed search strategy per database

ERIC	Google scholar	Hogrefe	JSTOR	Pubmed	PSYCH-Articles	Science Direct	SCOPUS	SPONET	Web of Knowledge	WILEY
+talent OR +gifted OR giftedness	+talent +gifted giftedness	Talent* OR Gifted*	Talent* OR Gifted*	Talent* OR Gifted*	ANY FIELD Talent* OR Gifted*	Talent OR Giftedness OR Gifted	talent OR talented OR gifted*	Talent* OR Gifted*	TOPIC Talent* OR Gifted*	KEYWORDS Talent* OR Gifted*
OR		AND	AND		AND ANY FIELD	AND	AND	AND	AND TOPIC	AND ANYWHERE
"high ability" OR aptitude OR "high potential" OR "natural ability"	"natural ability" "high ability" "high performance" aptitude	"high ability" OR "high intelligence" OR aptitude OR "high potential" OR "natural ability"	"high ability" OR "high intelligence" OR aptitude OR "high potential" OR "natural ability"	"high ability" OR "high intelligence" OR aptitude OR "high potential" OR "natural ability"	"high ability" OR "high intelligence" OR aptitude OR "high potential" OR "natural ability"	"high ability" OR "high intelligence" OR aptitude OR "high potential" OR "natural ability"	"high ability" OR "high intelligence" OR aptitude OR "high potential" OR "natural ability"	"high ability" OR "high intelligence" OR aptitude OR "high potential" OR "natural ability"	"high ability" OR "high intelligence" OR aptitude OR "high potential" OR "natural ability"	"high ability" OR "high intelligence" OR aptitude OR "high potential" OR "natural ability"
OR enhancement OR extracurricular OR excellence										
AND		AND	AND	AND	AND ANY FIELD	Title, abstract or author	AND	AND		AND ANYWHERE
school OR academic OR education OR sport	academic education school sport	School* OR Education OR Academic* OR Sport	School* OR Education OR Academic* OR Sport	School* OR Education OR Academic* OR Sport	School* OR Education OR Academic* OR Sport	School OR Education OR Academic OR Sport	School OR Education OR Academic OR Sport	School* OR Education OR Academic* OR Sport		School* OR Education OR Academic* OR Sport
AND		AND	AND	AND	AND ANY FIELD	AND	AND	AND	AND TOPIC	AND ANYWHERE
+development OR +Identification	"Talent identification" "Talent development"	development OR identification OR enhancement OR indication	development OR identification OR enhancement OR indication	development OR identification OR enhancement OR indication	development OR identification OR enhancement OR indication	Development OR identification OR enhancement	development OR identification OR enhancement OR indication	development OR identification OR enhancement OR indication	development OR identification OR enhancement	development OR identification OR enhancement OR indication
							NOT College AND university AND disability			
Filter Since 2000			Journals & Education				PUBYEAR > 2009, SRCTYPE "j," DOCTYPE "ar" & "re," English and German			Articles& chapters & Anthropology Education & psychology &2000-2019