Escuela de Ciencias del Movimiento Humano y Calidad de Vida
Universidad Nacional, Costa Rica
e-ISSN: 1659-097X
Vol. 21(1), enero-junio, 2024: e14731
revistamhsalud@una.ac.cr

MHSalud
Revista en Ciencias del Movimiento Humano y Salud

https://doi.org/10.15359/mhs.21-1.14731

Specialization or Diversification in Sports Development: An Integrative Review

Especialización o diversificación en el desarrollo deportivo: Una revisión integrativa

Especialização ou diversificação no desenvolvimento esportivo: uma revisão integrativa

Daniel Rojas Valverde[1], Christian Azofeifa Mora[2], María F. Herrera-Monge[3], Andrea Fallas Campos[4], Emmanuel Herrera González[5]

Recibido: 18/12/2020 / Aceptado: 5/12/2022

1 0000-0002-0717-8827 Universidad Nacional, Escuela Ciencias del Movimiento Humano y Calidad de Vida (CIEMHCAVI), Centro de Investigación y Diagnóstico en Salud y Deporte (CIDISAD), Heredia, Costa Rica, drojasv@hotmail.com

2 0000-0001-8085-9584 Universidad Nacional, Escuela Ciencias del Movimiento Humano y Calidad de Vida (CIEMHCAVI), Heredia, Costa Rica, cristian.azofeifa.mora@una.cr

3 0000-0003-0526-768X Universidad Nacional, Escuela Ciencias del Movimiento Humano y Calidad de Vida (CIEMHCAVI), Proyecto Psicomotricidad y Estilos de Vida Activos (PSICOMI), Heredia, Costa Rica, fherreramonge@gmail.com

4 0000-0002-4182-671X Universidad Nacional, Escuela Ciencias del Movimiento Humano y Calidad de Vida (CIEMHCAVI), Heredia, Costa Rica, fallas.andre@gmail.com

5 0000-0001-7672-3617 Universidad Nacional, Escuela Ciencias del Movimiento Humano y Calidad de Vida (CIEMHCAVI), Proyecto Psicomotricidad y Estilos de Vida Activos (PSICOMI), Heredia, Costa Rica, emmanuel.herrera.gonzalez@una.cr

ABSTRACT

Purpose: To explore and discuss theoretical and practical scientific literature to compare sports diversification and early sports specialization as a sport and educational approach. **Methods**: A systematic review was conducted following PRISMA guidelines, and 61 studies were included.

Results: Coaches, parents, and children consider that the best way to develop sports talent and enter the elite in sports is to practice a single discipline as early as possible to achieve specialization and maximum technical skills and physical and psychological conditions. Sports specialization paths may lead to a physical, social, and mental state that compromises their integral development.

Conclusion: Sports diversification should be considered first at an early age and, afterward, the specialization once the bases of strength, conditioning, neuromuscular training, and a specific psychomotor maturation have been achieved, so that sports performance and health are not compromised in the medium or long term. It is necessary to consider that few children enter elite sports, so for many of them, sports education will be the basis for exercising their citizenship as active people.

Keywords: assessment, childhood primary education, competency-based teaching, diversification of education

RESUMEN

Objetivo: Explorar y discutir literatura científica teórica y práctica para comparar la diversificación y la especialización deportivas tempranas como un enfoque deportivo y educativo.

Métodos: Se realizó una revisión sistemática siguiendo las pautas PRISMA, se incluyó un total de 61 estudios.

Resultados: Entrenadores, padres e hijos consideran que la mejor forma de desarrollar el talento deportivo y alcanzar la élite en el deporte es participar en una sola disciplina y hacerlo lo antes posible para lograr la especialización y las máximas habilidades técnicas, físicas y psicológicas. Los caminos de especialización deportiva pueden conducir a una situación física, social y mental que comprometa su desarrollo integral.

Conclusión: Se puede plantear, en primer lugar, la diversificación deportiva en edades tempranas y luego la especialización; una vez alcanzadas las bases de la fuerza, el acondicionamiento y el entrenamiento neuromuscular, así como una maduración psicomotora específica, para que su rendimiento deportivo y su salud no se vean comprometidos en el mediano o largo plazo. Es necesario considerar que pocos niños logran obtener un lugar en los deportes de élite, por lo que, para muchos de ellos, la educación en torno al deporte será la base para el ejercicio de su ciudadanía como personas activas.

Palabras clave: enseñanza centrada en el rendimiento, enseñanza primaria, evaluación, diversificación en la educación, infancia

RESUMO

Objetivos: Explorar e discutir literatura científica teórica e prática para comparar a diversificação e especialização esportiva precoce como uma abordagem esportiva e educacional.

Métodos: uma revisão sistemática foi realizada seguindo as diretrizes do PRISMA, um total de 61 estudos foram incluídos

Resultados: Treinadores, pais e crianças acreditam que a melhor maneira de desenvolver talentos esportivos e ingressar na elite do esporte é participar de uma única disciplina e fazer o mais cedo possível para alcançar a especialização e o máximo de habilidades técnicas, físicas e psicológicas. Os caminhos da especialização esportiva podem levar a uma situação física, social e mental que comprometa seu desenvolvimento integral.

Conclusão: Primeiro, a diversificação esportiva pode ser considerada em uma idade precoce e depois a especialização, uma vez que os princípios básicos de força, condicionamento e treinamento neuromuscular tenham sido alcançados, bem como a maturação psicomotora específica para que seu desempenho esportivo e saúde não sejam comprometidos a médio ou longo prazo. É necessário considerar que poucas crianças conseguem obter um lugar nos esportes de elite, de modo que, para muitas delas, a educação em torno do esporte será a base para o exercício de sua cidadania como pessoas ativas.

Palavras-chave: avaliação, educação baseada no desempenho, ensino fundamental, diversificação na educação, infância

Introduction

In the last decade, young sports participation has increased (Feeley *et al*., 2016). Childhood and adolescence sports participation is at one of its highest levels, although the evidence of benefit at the level of muscular, skeletal, social relationships and affections is clear (Eime *et al*., 2013; Hiremath, 2019). In recent years, a growing concern for early sports specialisation has revealed a series of problems associated with physical and psychological stress and interference in decision-making by external agents. (Bruner *et al*., 2014; McKay *et al*., 2019; Whitley *et al*., 2018). Besides, there is still a debate about the philosophical and ethical arguments that support sports (Beamish & Ritchie, 2006). (It is suggested that the situation derived from the pandemic be reviewed in the judgments expressed in the previous paragraph and, in the case of Beamish & Richie (2006), it would be appropriate to update it to a more recent one.

Sport specialisation is defined as year-round training, usually more than eight months of participating in a single sports discipline or discarding all sports to focus only on one (Myer *et al*., 2016). Some authors agree that specialisation occurs because of the influence of the parents and legal guardians (Baxter-Jones & Maffulli, 2003; Padaki *et al*., 2017) and because of the perception by the athletes that specialisation should increase the possibility of participating in elite level and receiving an athletic scholarship (Hill & Simons, 1989; Jayanthi *et al*., 2013).

The sport specialisation in children and young people has been reported since the competition in Olympic disciplines increased, mostly in Eastern Europe and the United States of America, caused by the national systematised selection processes and the implementation of programs for the development of future Olympic and world champions (Myer *et al*., 2016). The popularised idea that to achieve expertise in a specific skill it is necessary a considerable amount of hours of practice, which initially was thought for musicians but was later extrapolated to athletes (Jayanthi *et al*., 2013), reinforces the idea that sports specialisation is the optimal way for the physical and technical development of children and young people in sports. This idea must be taken with caution because it can exclude areas such as social and psychological as fundamental factors, working in intrinsic motivation and skill transferability (Baker *et al*., 2009).

On the other hand, diversification promotes that children participate in a wide variety of motor and sports activities through free play and on other occasions around

a sport, under an informal environment, providing the possibility of maximising the child's motor skills, physically, emotionally, and cognitive areas (Côté *et al*., 2009).

Considering the evidence around the early sport specialisation, there is still controversy around the ideal age to begin and the risks, disadvantages, and benefits of athletic participation in children and young people (Myer *et al*., 2015b). The specialists in human movement sciences and sports medicine have acknowledged the potential of sports specialisation for enhancing athletic performance in some sports (Hume *et al*., 1993), but also recognise that schools should promote sport diversification to develop integral capacities in children and young (Hill & Simons, 1989). Also, some authors agree that early sport specialisation does not lead to a competitive advantage over those who developed around multi-sport participation (Feeley *et al*., 2016), unlike, those elite athletes that specialised later tend to achieve better results at a higher level of performance (Carlson, 1988; Güllich & Emrich, 2006; Moesch *et al*., 2011).

Previous studies have focused on issues related to determining the types, characteristics, and general content of early specialisation items and examining how early specialisation has been defined and measured (DiSanti & Erickson, 2019; Hecimovich, 2004; Mosher *et al*., 2020; Zoellner *et al*., 2021), but systematic work focused on the advantages and disadvantages of up-to-date early sport specialisation are scarce.

Through a systematic review, this review aimed to explore the evidence of the benefits and disadvantages of young sport specialisation and diversification over the past 20 years. This review will discuss theoretical scientific literature to describe the state of the science around sport diversification and early sport specialisation.

Methods

A narrative literature review was performed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Liberati *et al*., 2009; Moher *et al*., 2015). Three authors (D.R-V, C.A-M, and M.H-M) independently considered risk-of-bias questions using a 4-point scale ranging from low and high risk of bias options. Discrepancies between reviewers were resolved using consensus between three authors, as mentioned. The internal quality of each study was assessed using the Office of Health Assessment and Translation (OHAT) Risk of Bias Rating Tool (OHAT, 2015).

Data sources

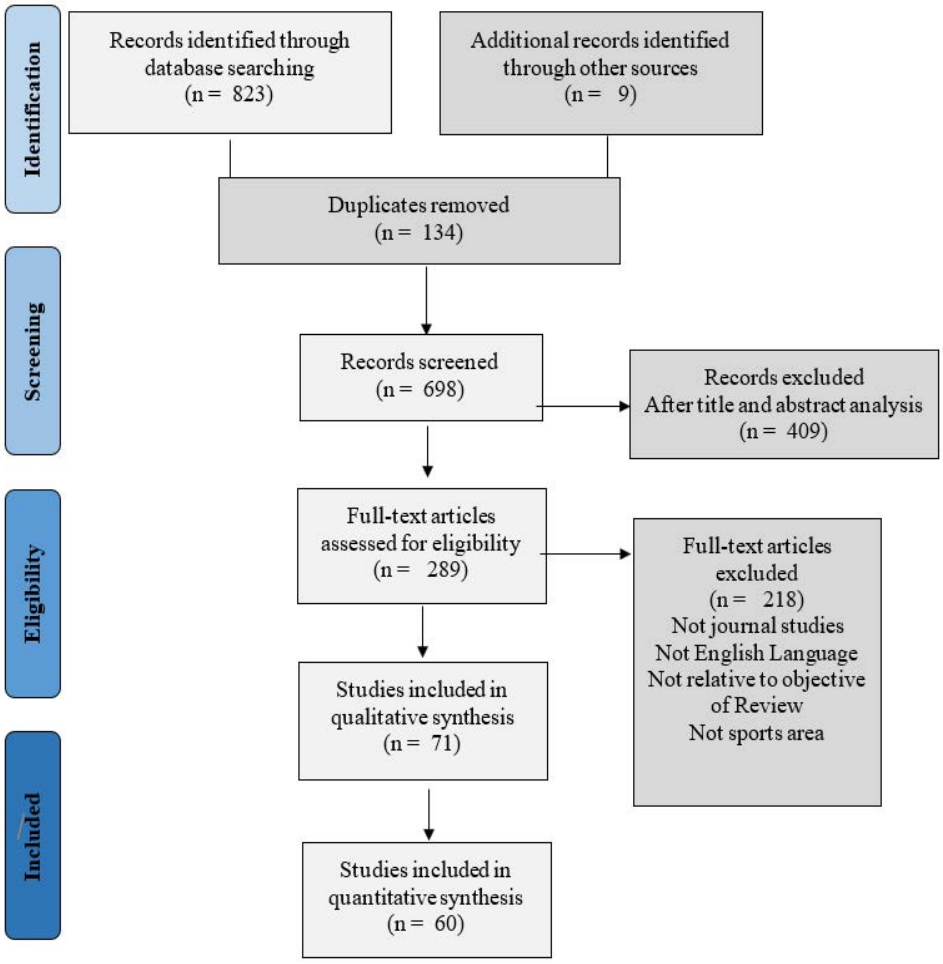
A literature review has been performed using web search engines-databases (SportDISCUS [EBSCO], PubMed Central [MEDLINE], ScienceDirect, Web of Science [WoS]), and Google Scholar. The following descriptors were used for the online literature search: ¨sport¨, ¨specialisation¨, ¨multisports¨, ¨early specialisation¨, ¨youth specialisation¨, and ¨diversification¨. The Boolean keys ¨AND¨ and ¨OR¨ were used to link the words prementioned. All searches were conducted from May-July 2019, and all references were extracted and imported to an open-source research tool (5.0.64, Zotero, USA).

Data Selection

Articles search was limited by title/abstract and year as advance search settings. The investigation was limited to articles published from 2000 until 2020. Duplicates were eliminated following previous guidelines (Rathbone et al., 2015). Studies were incorporated if the following inclusion criteria were fulfilled: a. descriptive, experimental, systematic, or narrative review, b. studies were analysing early specialisation and diversification and its physical, social, and cognitive impact, c. articles in English. Studies were selected based on the title and abstract analysis and were examined in full text, and those that met the inclusion criteria were selected to explore the information reported. No studies were excluded based on participants characteristics such as sport or disciplines and age or on study design.

The procedure followed during study extraction or exclusion is presented in figure 1:

Figure 1.
PRISMA flow diagram for search and selection of primary data information. *Data Collecting*



The final extracted articles were analysed in full text and data about authoring, year of publication, design (article type), topic (early specification and diversification), other sample/data characteristics (sample size, age, sport or discipline) and outcomes were systematized in a descriptive table.

Table 1

Specialisation or diversification in sports Evidence Database (PEDro) Scale Scores of Critically Reviewed Articles

	1.Eligibility criteria were specified	2.Subjects were randomly allocated to groups (in a crossover study, subjects were randomly allocated an order in which treatments were received)	3.Allocation was concealed	4.The groups were similar at baseline regarding the most important prognostic indicators	5.There was blinding of all subjects	6.There was blinding of all therapists who administered the therapy	7.There was blinding of all assessors who measured at least one key outcome	8.Measures of at least one key outcome were obtained from more than 85% of the subjects initially allocated to groups	9.All subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least one key outcome was analyzed by "intention to treat"	10.The results of between-group statistical comparisons are reported for at least one key outcome	11.The study provides both point measures and measures of variability for at least one key outcome
Wiersma (2000)	YES	YES	NO	YES	NO	NO	NO	NO	NO	NO	NO
Watts (2002)	YES	YES	NO	YES	NO	NO	NO	NO	NO	NO	NO
Gould et al., (2002)	YES	NO	NO	NO	YES	NO	NO	YES	YES	YES	YES
Mojena & Ucha (2002)	YES	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES
Soberlak & Cote (2003)	YES	NO	YES	NO	NO	NO	NO	YES	YES	NO	YES
Baker et al., (2003)	YES	YES	YES	YES	NO	NO	NO	YES	NO	YES	YES
Hecimovich (2004)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Gustafsson et al. (2007)	YES	YES	YES	NO	NO	NO	NO	YES	YES	YES	YES
Rose et al. (2008)	YES	YES	NO	YES	NO	NO	NO	YES	YES	YES	YES
Baker et al. (2009)	YES	YES	YES	YES	NO	NO	NO	YES	NO	YES	YES
Strachan et al. (2009)	YES	NO	YES	NO	NO	NO	NO	YES	YES	YES	YES
Balaguer, et al.(2009)	YES	NO	YES	NO	NO	NO	NO	YES	YES	YES	YES
Kaleth & Mikesky (2010)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

	1.Eligibility criteria were specified	2.Subjects were randomly allocated to groups (in a crossover study, subjects were randomly allocated an order in which treatments were received)	3.Allocation was concealed	4.The groups were similar at baseline regarding the most important prognostic indicators	5.There was blinding of all subjects	6.There was blinding of all therapists who administered the therapy	7.There was blinding of all assessors who measured at least one key outcome	8.Measures of at least one key outcome were obtained from more than 85% of the subjects initially allocated to groups	9.All subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least one key outcome was analyzed by "intention to treat"	10.The results of between-group statistical comparisons are reported for at least one key outcome	11.The study provides both point measures and measures of variability for at least one key outcome
Malina (2010a)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Gould (2010)	YES	NO	YES	YES	NO	NO	NO	NO	YES	YES	YES
Caruso (2013)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Merkel (2013)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Martínez & Javier (2014)	YES	YES	YES	YES	NO	NO	NO	YES	YES	YES	YES
Sheridan et al. (2014)	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO
Jayanthi et al. (2013)	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO
Fergurson & Sternstern (2014)	YES	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES
DiFiori et al. (2014)	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Myer et al. (2015b)	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Horn (2015)	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Smucny et al. (2015)	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Hastie (2015)	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Goodway & Robinson (2015)	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Hall et al. (2015)	YES	YES	YES	YES	YES	NO	NO	NO	YES	NO	NO

	1.Eligibility criteria were specified	2.Subjects were randomly allocated to groups (in a crossover study, subjects were randomly allocated an order in which treatments were received)	3.Allocation was concealed	4.The groups were similar at baseline regarding the most important prognostic indicators	5.There was blinding of all subjects	6.There was blinding of all therapists who administered the therapy	7.There was blinding of all assessors who measured at least one key outcome	8.Measures of at least one key outcome were obtained from more than 85% of the subjects initially allocated to groups	9.All subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least one key outcome was analyzed by "intention to treat"	10.The results of between-group statistical comparisons are reported for at least one key outcome	11.The study provides both point measures and measures of variability for at least one key outcome
Brenner (2016)	YES	NO	NO	YES	YES	NO	NO	NO	YES	NO	NO
Corea et al., Tierling, Treter, de Souza & Abaide (2016)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
García-Parra et al. , González & Fayos (2016)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Fabricant et al. (2016)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
LaPrade et al. (2016)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
McFadden et al. , Bean, Fortier & Post (2016)	YES	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES
Feeley et al. (2016)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Post et al. (2017)	YES	NO	NO	NO	YES	NO	NO	YES	NON	YES	NO
Blagrove et al. , Bruinvels & Read (2017)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

	1.Eligibility criteria were specified	2.Subjects were randomly allocated to groups (in a crossover study, subjects were randomly allocated an order in which treatments were received)	3.Allocation was concealed	4.The groups were similar at baseline regarding the most important prognostic indicators	5.There was blinding of all subjects	6.There was blinding of all therapists who administered the therapy	7.There was blinding of all assessors who measured at least one key outcome	8.Measures of at least one key outcome were obtained from more than 85% of the subjects initially allocated to groups	9.All subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least one key outcome was analyzed by "intention to treat"	10.The results of between-group statistical comparisons are reported for at least one key outcome	11.The study provides both point measures and measures of variability for at least one key outcome
Normand et al. , Wolfe & Peak (2017)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Smith et al. (2017)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Sluder et al. (2017)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
McGuine et al. (2017)	YES	NO	NO	NO	NO	NO	NO	YES	NO	YES	YES
Wilhelm et al. (2017)											
Pasulka et al. (2017)	YES	NO	NO	YES	NO	NO	NO	YES	NO	YES	YES
Bell et al. (2018)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Jayanthi et al. (2018)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Garinger et al. (2018)	YES	NO	NO	NO	YES	NO	NO	NO	NO	YES	YES
Watson et al. (2018)	YES	NO	NO	YES	YES	NO	NO	NO	NO	YES	YES
Bell et al. (2018)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Walters et al. (2018)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Anderson et al. (2018)	YES	NO	NO	YES	YES	NO	NO	YES	NO	YES	YES
DePhillipo et al. (2018)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
DiStefano et al. (2018)	YES	NO	NO	YES	YES	NO	NO	NO	NO	YES	YES

	1.Eligibility criteria were specified	2.Subjects were randomly allocated to groups (in a crossover study, subjects were randomly allocated an order in which treatments were received)	3.Allocation was concealed	4.The groups were similar at baseline regarding the most important prognostic indicators	5.There was blinding of all subjects	6.There was blinding of all therapists who administered the therapy	7.There was blinding of all assessors who measured at least one key outcome	8.Measures of at least one key outcome were obtained from more than 85% of the subjects initially allocated to groups	9.All subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least one key outcome was analyzed by "intention to treat"	10.The results of between-group statistical comparisons are reported for at least one key outcome	11.The study provides both point measures and measures of variability for at least one key outcome
Russel & Molina (2018)	YES	NO	NO	YES	YES	NO	NO	NO	NO	YES	YES
Post et al. (2019)	YES	NO	NO	YES	YES	NO	NO	NO	NO	YES	YES
Heydinger (2019)	YES	YES	NO	YES	YES	NO	NO	NO	NO	YES	YES
Weekes et al., (2019)	YES	YES	NO	YES	YES	NO	NO	NO	NO	YES	YES
Moseid et al. (2019)	YES	YES	NO	YES	YES	NO	NO	NO	NO	YES	YES
McDonald et al. (2019)	YES	YES	NO	YES	YES	NO	NO	NO	NO	YES	YES
Field et al. (2019)	YES	YES	NO	YES	YES	NO	NO	NO	NO	YES	YES

Results

Table 2 shows the studies of the last two decades extracted from databases concerning young specialisation and diversification with its main outcomes. A total of 60 studies were found in a total of five on-line databases (from a total of n= 832 studies).

Table 2

Studies conducted in the last two decades about early specialisation and diversification by author, year, sport, and design

#	Author/Year	Article type	Sample/Data Characteristics	Sport Specialisation	Sport Diversification	Recommendations
1	Wiersma (2000)	Review	Young Athletes	+Eating disorders +Amenorrhea +Development injuries +Overuse injuries Greater affectation in females	+Remain in sport +Social Development	Less intense training Allow other sports Training Breaks/Recovery Long-term periodization Multiple sport Practice
2	Watts (2002)	Review	High School Students	+Eating disorders +Overuse injuries +Burnout	+Multiple Motor Skills development +Learn of different values	Long-term periodization Set realistic goals Stress management Failure as a learning experience
3	Gould et al. (2002)	Original Research	10 US Olympic Champions	+Social isolation	NR	Read psychological needs
4	Mojena & Ucha (2002)	Original Research	40 Spanish Elite Athletes	+Burnout +Sport Withdraw +Social isolation	NR	Stress management
5	Soberlak & Cote (2003)	Original Research	4 Elite Athletes	NR	+Multiple Motor Skills development	Multiple sport Practice
6	Baker et al. (2003)	Original Research	15 Coaches 16 Athletes	NR	+Decision making expertise	Multiple sport Practice
7	Hecimovich (2004)	Review	Young Athletes	+Eating disorders +Overuse injuries +Delay sexual maturation +Amenorrhea +Cardiac disfunction +Sport Withdraw +Sedentary future +Burnout +Social isolation	NR	Set realistic goals Training Breaks/Recovery Long-term periodization Play sports accessible Health controls Multiple sport Practice
8	Gustafsson et al. (2007)	Original Research	980 youth athletes	+Burnout (individual sports)	NR	Less intense/volume training
9	Rose et al. (2008)	Original Research	2721 high school athletes	+Injuries	NR	Less intense training

#	Author/Year	Article type	Sample/Data Characteristics	Sport Specialisation	Sport Diversification	Recommendations
10	Baker et al. (2009)	Original Research	28 athletes	+Decision making expertise	NR	Quality training instead of volume Multiple sport Practice
11	Strachan et al. (2009)	Original Research	74 youth athletes	+ level of physical and emotional exhaustion.	+ higher levels of physical/emotional exhaustion + higher levels of physical/emotional exhaustion + higher levels of physical/emotional exhaustion + integration of sport and family.	New pathways of sport development
12	Balaguer, et al. (2009)	Original Research	225 young internationally elite tennis players	+ importance of motivational variables as correlates of burnout.	NR	Motivational to prevent burnout.
13	Kaleth & Mikesky (2010)	Review	Children (6 to 12 years)	= endocrine system Muscular system + strength -Hypertropia Nervous system = process of myelination Cardiovascular system = benefits of regular exercise	+ Training philosophies - Injuries +Multiple Motor Skills development. +physically active lifestyle	Multiple sport Practice
14	Malina (2010a)	Original research	Young Athletes	+social isolation +overdependence +Burnout +Risk of overuse injury	NR	Multiple sport practice
15	Gould (2010)	Original research	Elite Athletes	NR	+Parents support +Talent development	Parents support Talent development was easier for young people who learned habits fostered by their talent rather than training.
16	Caruso (2013)	Review	Children	+ Injuries +Burnout	+Physical abilities +Cognitive abilities + Rate cardiovascular	Multiple sport practice

#	Author/Year	Article type	Sample/Data Characteristics	Sport Specialisation	Sport Diversification	Recommendations
17	Merkel (2013)	Review	Young Athletes and children	+ Physical activity -Risk of obesity -Minimizes development of chronic disease +Improves motor skills +Stress to be an elite player	NR	Recreation as critical part of children's lives
18	Martínez & Javier (2014)	Original research	Young Athletes and adults (13 a 20 years)	+Burnout	NR	Less volume of sessions
19	Sheridan et al. (2014)	Review	Children, adolescents, and adults (10 a 22 years)	+Pressure from coaches and parents	NR	Coaches have a fundamental role as supporters
20	Jayanthi et al. (2013)	Review	Children and adolescents	+Psychological stress + Dropping Out of Sports + Injury	+Enjoyment - Fewer injuries +Longer participation, contributing to the chances of success.	Multiple sport practice
21	Fergurson & Stern (2014)	Review	Children	+Overuse injury -Proper rest -Interest in sport +Social isolation +Burnout +Overdependence	+Gain competitive edge +Develop skills faster +Early talent recognition +Increase opportunity for scholarships or professional contracts	Multiple sport practice
22	DiFiori et al. (2014)	Review	Children and adolescents	+Risk overuse injuries Burnout	NR	Multiple sport practice
23	Myer et al. (2015b)	Review	Children and adolescents	+Repetitive Technical Skills and High-Risk Mechanics +Overscheduling and competition +Psychological burnout +Primary Injury and Effects of Fear of Reinjury	NR	Less intensity and volume in sessions Multiple sport practice
24	Horn (2015)	Review	Children	+Overuse injury -Proper rest -Interest in sport +Social isolation +Burnout +Overdependence	+Gain competitive edge +Develop skills faster +Early talent recognition + Increase opportunity for scholarships or professional contracts	Multiple sport practice
25	Smucny et al. (2015)	Review	Children and adolescent	+Detrimental both physically and emotionally	NR	Multiple sport practice

#	Author/Year	Article type	Sample/Data Characteristics	Sport Specialisation	Sport Diversification	Recommendations
26	Hastie (2015)	Review	Young athletes	+Unnecessary Intense training and specialisation before puberty +Long competitive goals.	NR	Train less and Multiple sport practice
27	Goodway & Robinson (2015)	Review	Children and adolescent	=Elite level performance in sport. +Sport specialisation benefits in gymnastics. +Youth sport injury. +Incidence and severity of overuse injuries. =Lifelong physical activity patterns.	NR	Motor skill programs (not sport-specific) Multiple sport practice
28	Hall et al. (2015)	Original research	Female adolescent athletes	+Risk of anterior knee pain	NR	Specialisation led to more injuries
29	Brenner (2016)	Clinical Report	Young athletes	+Overuse injuries +Overtraining +Burnout	NR	Multiple sport practice
30	Corea et al. (2016)	Review	Youth athletes	-Respect maturation and development stages and motor, coordinative and conditioning capacities' optimal window of trainability +Sports dropout	+General development of fundamental motor skills and technical/tactical skills.	Competitions only after the players have their basic techniques and patterns of play under control
31	García-Parra et al. (2016)	Review	Man and woman	+Burnout due to training loads +Burnout due to specialisation	NR	Motivational aspect Prevention burnout
32	Fabricant et al. (2016)	Review	Children and adolescent	Incidence of injury Overuse injuries	NR	Increased risk of overuse injury due to specialisation
33	LaPrade et al. (2016)	Review	Children and teenagers	+Overuse injuries +Burnout +Decreased motivation for participation +Sports withdraw	+Long-term sports performance +Enjoy physical activity +Lifelong recreational sports participation	Avoid excessive sports commitments. Monitor burnout. Have a balance between sports, school, and friends.
34	McFadden et al. (2016)	Original research	61 youth male hockey players	+Psychological needs dissatisfaction + Demotivation + Lack of autonomy	-Psychological needs dissatisfaction + Mental health + Wellness	Specialize in a certain sport after age 12. Coaches and parents offer a positive, supportive, and empowering motivational climate that will lead to low levels of mental illness

#	Author/Year	Article type	Sample/Data Characteristics	Sport Specialisation	Sport Diversification	Recommendations
35	Feeley et al. (2016)	Review	Young Athletes	High level of achievement +Overuse injuries	NR	Educate parents, coaches, trainers, and physicians on the risks of early sport specialisation and the early signs of injury.
36	Post et al. (2017)	Original research	Young Athletes	+Overuse injuries	NR	Long-term periodization Promote the fun Multiple sport Practice
37	Jayanthi & Dugas (2017)	Review	Young Athletes	+Overuse injuries +Burnout +Leave the sport	+Leads to success +Promote motivation -Less injury +More participation	Sports Specialisation at the end of adolescence
38	Blagrove et al. (2017)	Review	Female teenage athletes	+ Female athlete triad + Amenorrhea +Overuse injuries +Limit motor skills	NR	Multiple sport Practice Long-term periodization
39	Normand et al. (2017)	Review	Young Athletes	Professional status Early recognition +Social pressure +Overuse injuries +Burnout	+Healthy psychological development +Participation in multiple youth sports allow for periods of active rest and recuperation + Sense of autonomy +Multiple motor skills	Sport specialisation only after the development of specific skills, abilities, and psychological maturity.
40	Smith et al. (2017)	Review	Young Athletes	+ increase injury risk, -decrease social opportunity - life satisfaction + Skill acquisition required for competitive success in many sports	NR	Before making sweeping recommendations against early sports specialisation, solid data are needed. Only research done with rigorous methodology will provide answers.
41	Sluder et al. (2017)	Review	Young Athletes	+ Coaching & skill instruction + Skill acquisition through deliberate practice accumulation + Time management + Peer relationships within group + overuse injury - Cost development of lifetime sports skill +Burnout to include emotional and physical exhaustion +Social development issues	+Development of pro social behaviours and personal. +Promotes development of intrinsic motivation. +Promotes motor skill development. +Increased connection to community, integration of family, and better health outcomes.	An athlete's early specialisation in a sport does not guarantee a future in that sport at an elite level Based on available evidence. Multiple sport practice

#	Author/Year	Article type	Sample/Data Characteristics	Sport Specialisation	Sport Diversification	Recommendations
42	McGuine et al. (2017)	Original research	Young Athletes	+risk of musculoskeletal lower extremity	NR	Specialisation leads to a higher risk of musculoskeletal lower extremity injuries than athletes with low specialisation.
43	Wilhelm et al. (2017)	Original research	Children and adolescent	+ serious injuries during their professional career	NR	Higher rate of serious injury if specialisation development was selected
44	Pasulka et al. (2017)	Original research	Children and adolescent	+ proportion of overuse injuries	NR	Athletes in individual sports may be more likely to specialize in a single sport than team sport athletes. Single-sport specialized athletes in individual sports also reported higher training volumes and greater rates of overuse injuries than single-sport specialized athletes in team sports.
45	Bell et al. (2018)	Review and meta-analysis	adolescent	+ overuse injury	NR	Sport specialisation is associated with an increased risk of overuse musculoskeletal injuries
46	Jayanthi et al. (2018)	Original research	Children and adolescent	+ sport injuries	NR	High-income athletes reported more serious overuse injuries than low-income athletes, possibly due to higher rates of sports specialisation, more hours per week playing organized sports, a higher proportion of hours per week in organized sports relative to free play and increased participation in individual sports
47	Garinger et al. (2018)	Original research	351 Division II and III specialized and multiple-sport athletes	+ perfectionistic + burnout + stress	NR	Stress associated with burnout and perfectionistic Specialized athletes' lower levels of burnout
48	Watson et al. (2018)	Original research	49 Female youth soccer players	+ stress + Fatigue + Soreness - Mood - sleep quality	- Stress - Fatigue - Soreness + Mood + sleep quality	Sport specialisation is associated with significantly worse mood, stress, fatigue, soreness, and sleep

#	Author/Year	Article type	Sample/Data Characteristics	Sport Specialisation	Sport Diversification	Recommendations
49	Bell et al. (2018)	Systematic Review with Meta-analysis	N/A Young multi-sport specialized	+ risk an overuse injury	None	Sport specialisation is associated with an increased risk of overuse musculoskeletal injuries
50	Walters et al. (2018)	Systematic Review	N/A Young multi-sport specialized	+ Resistance training decrease risk of injury and overtraining + increased repetition and increasing the risk of injury + early sport dropout	NR	Correct supervision of Coaches and physical educators engage in healthy training for sport
51	Anderson et al. (2018)	Original research	5 Female of Division I college soccer team	+ lower extremity injury	NR	Lost an average of four days of training
52	DePhillipo et al. (2018)	Case Report	1 Young alpine skier	+ Patellofemoral articular cartilage defect	NR	healthcare professionals must be educated on the known causes of knee effusions and influence early sport specialisation may result in overuse injuries to knee joint cartilage.
53	DiStefano et al. (2018)	Cross-sectional	355 Youth athletes		+ good neuromuscular control	Multi-sport participation may reduce injury risk in youth athletes
54	Russel & Molina (2018)	Original research	77 female high school athletes	= sport motivations and burnout		Specializers and non-specializers young athletes are similar levels of sport motivation and burnout.
55	Post et al. (2019)	Original research	647 Female youth athletes	+ Daytime sleepiness associated high levels of specialisation, overuse injury, traveled regularly	NR	Specialisation= increased daytime sleepiness
56	Heydinger (2019)	Original research	24 athletes	= risk injury	NR	Sports specialisation in high school does not ever affect the rate of injury in collegiate athletics.
57	Weekes et al., (2019)	Original research	602 High school students	+ Hours practicing their primary sport + Injured playing their primary sport	- injured playing multi-sport	Relationship between more hours of sport specialisation and injure associated

#	Author/Year	Article type	Sample/Data Characteristics	Sport Specialisation	Sport Diversification	Recommendations
58	Moseid et al. (2019)	Original research	259 Youth elite athletes	= Increase injury risk	NR	Single sport and specialisation appear to represent risk factors for injury or illness
59	McDonald et al. (2019)	Original research	143 youth elite-level wrestlers	+ more serious injuries	NR	Athletes, coaches, and parents should consider the risk of injury associated at the sport specialisation
60	Field et al. (2019)	Original research	10,138 youth athletes	+ Females increased risk of injury + Females association vigorous activity and develop injury = no clear pattern of risk	NR	Sports specialisation can be associated with a greater volume of vigorous activity and injury risk. Parents and coaches must be aware of volume training threshold.

+: increase; **-:** decrease; **=:** no effect, NR= Nonspecific reports.

Discussion

Benefits and disadvantages of diversification

Diversification of sport at an early age has been an element that literature over the years has stood out as a practice that collaborates in the fast development of athletes. This modality is characterized by a free play model with a high component of fun, sport variability, and non-rigid rules, providing the possibility that infants explore other types of experiences. Both with peers and with other ages, diversification offers greater possibilities of social relationships that help in the development of emotional skills which influence self-regulating behaviours and emotions are essential in the competition (Brenner & Fitness, 2016).

Physical

When children are allowed to participate in a development model based on diversification, they are influencing the development of neuromuscular patterns which are associated with the prevention of injuries at later ages or in young athletes (DiFiori *et al*., 2014a; DiStefano *et al*., 2018; LaPrade *et al*., 2016a). This allows higher performance at the sports level as it offers significant possibilities of staying present in competitions. In multiple studies involving elite athlete in field hockey, ice, basketball, and triathlon they reported that before becoming Olympic or high-performance international athletes they trained and competed in multiple sports, in addition to their primary sport,

unlike fellow they only compete at the national level that practiced a single sport since childhood (Baker *et al*., 2003, 2009; Soberlak & Cote, 2003; Vaeyens *et al*., 2009).

Also, understanding motor development as an area that is responsible for studying human motor behaviour and the changes in the underlying processes that interact during the growth and maturation of the individual, is that diversification at an early age offers higher and better experiences that allow performing transfers from one sport to another sport or other activity. It must be analysed under the premise that a more significant amount of motor experiences offers greater possibilities to influence the maturation processes of systems such as the central nervous system or the senses. (Goodway & Robinson, 2015).

According to Fransen et al. (Fransen *et al*., 2012) when determining the differences in the physical condition and motor coordination in children from 6 to 12 years who specialized versus those who practiced more than one sport, they found that diversified children, specifically with ages between 10 and 12 years, obtained better physical condition and motor skills. These results are attributed to the full range of motor resources that these subjects had (Hecimovich, 2004).

Social

The practice of any sport takes place in a social environment and requires, among other things, the ability to interact effectively with coaches, parents, and peers (Gould, 2010). According to the evidence (Strachan *et al*., 2009), in an investigation that 74 young athletes, classified in specialists (in sports such as swimming, gymnastics, and diving) and diversified (by the practice of multiple sports), diversified athletes showed greater sports integration with the family and a more reliable link with the community, while specialists reported difficulty in relating to their peers and higher levels of emotional exhaustion. Contemplating that there is a fundamental right of children to an open future (Torres, 2015).

Psychological

As stated by Caruso (2013) notes that providing the child with a multi-sport environment can foster an authentic preference for sports so that he can continue with more structured and productive practice in late childhood and even in adulthood. Multiple authors have mentioned that early sports diversification leads to success, due to the intrinsic motivation that stems from fun, enjoyment and competition of children through participation in various sports (Baker *et al*., 2003, 2009; Jayanthi *et al*., 2013). There are fewer reports of burnout related to sports practice in non-specializer than in those that specialized earlier (Russell & Molina, 2018).

Sports activities require a high degree of cognitive-perceptual skills, to make the right decisions during competitions, besides affective skills, to have control of their emotions (Côté et al., 2009). In this way, diversification is linked to a longer sports career (Gould, 2010). Indeed, diversification is related to better long-term health consequences and promotes a holistic approach, using a variety of sports to better develop the athlete's lifestyle (Blagrove *et al*., 2017).

Benefits and Disadvantages of specialisation

Specialisation tendency was born in Eastern Europe, mainly with the purpose of competition. Talent identification and development programs were constants in the pursuit of a medal by these countries (Malina, 2010a). Parents have a fundamental role in specialisation in sports, industry, television, society, and educational programs to emphasize their process in achievement. That was the beginning of sport organization for children (Malina, 2010a). This led to the creation of expectations from the parents and the labelling of children based on their talents, this increased the belief that specialisation was the right path for children's development.

On the other hand, early sports specialisation seems to be associated in many cases with adverse physical and psychological effects (Brenner, 2016; Feeley *et al*., 2016; Sluder *et al*., 2017). Given this, several studies have shown the presence of overuse injuries, overtraining and burnout in these athletes; as well as, possible affectations at the nutritional level and musculoskeletal and psychological maturation that undoubtedly cause the impossibility of sports practice and loss of continuity (Anderson *et al*., 2018; DePhillipo *et al*., 2018; Myer *et al*., 2015a).

On the other hand, early sports specialisations may have an impact on the isolation of their friends and partners, as well as, alterations in family relationships together with the manifestation of a greater co-dependency of third persons due to the loss of control of their own lives, bringing with it possible maladaptive social behaviours (Corrêa *et al*., 2016; Malina, 2010a; Smith *et al*., 2017).

Physical

The greatest benefit of specialisation is the acquisition, development and proficiency of motor skills related to success in a specific sport. A child who practices certain skills and abilities on a regular basis and even more with a certain scientific basis may develop and improve those skills better than another who performs less periodically and irregularly, such as diversification (Wiersma, 2000).

A series of investigations have shown the consequences at a physical level that can be obtained a specialisation in the early ages (Bell et al., 2018; Fabricant et al., 2016; Myer et al., 2015a; Smucny et al., 2015a; Walters et al., 2018), which highlights injuries from overuse, overtraining and lack of sleep among the main problems and those that can be see increased mainly when the specialisation begins before the age of 12, independently of age, sport or other contextual factor (Feeley *et al*., 2016; Field *et al*., 2019; LaPrade *et al*., 2016a; McDonald *et al*., 2019; McGuine *et al*., 2017; Moseid *et al*., 2019; Myer *et al*., 2015a; Post, Trigsted, *et al*., 2017; Torres, 2015; Weekes *et al*., 2019; Wilhelm *et al*., 2017). Additionally, individual sport athletes tend to specialize more than team sport athletes, so there is a greater incidence of sport related injuries in individual sports specializers (Pasulka *et al*., 2017).

Within a large number of possible consequences linked to the early specialisation, the injuries by transit in the ages between 6 to 18 years, the results to the most recurrent and mainly to the works that are characterized by the repetitive actions with high volumes, frequencies and intensities of work (Brenner, 2016; Post, Bell, *et al*., 2017), what brings with it a large number of hours of specialisation, those with a strong relationship of injuries reaching values between 55% and 70% (DiFiori *et al*., 2014c; Rose *et al*., 2008; Smucny *et al*., 2015a). And in the case of injuries such as tendinopathies, stress fractures and apophysitis, they are the most recurrent affecting the bone, muscular and ligamentous structures; In addition, premature development can alter the aspects of motor coordination and flexibility deficit product of musculoskeletal imbalances and connective tissues (Hall *et al*., 2015; Kaleth & Mikesky, 2010; Malina, 2010a) and could compromised growth and maturation (Malina, 2010b).

In a case report (DePhillipo *et al*., 2018), found cartilage lesions and osteochondral defects in a young alpine scheme, excessive and repetitive use of microtrauma because of early specialisation. Also, the economic and social level they have an important incidence, (Jayanthi et al., 2018), show differences significantly in young athletes with ages of 8 to 18 years, in which socioeconomic level was higher with the greater occurrence of overuse injuries and where this situation is associated with a greater number of hours of sports practice.

Social

Specialisation requires that children understand the value of commitment. And apparently, they learn to value the investment of energy, time, and emotions, which is essential for sporting success (Wiersma, 2000). Additionally, sports could create an enabling environment for development activities such as cooperative skills, behaviours

in favor of a group environment and close relationships, because this sport is social by nature (Wiersma, 2000).

Despite the above, at the social level the intense training that involves sports specialisation at an early age can cause young athletes to develop problems of self-concept and social skills (Merkel, 2013). According to (Ferguson & Stern, 2014; Normand *et al*., 2017) this damages the construction of social relations and unleash social isolation (Malina, 2010a). From this perspective, some elements such as high training volume and frequency of sessions, athlete´s parents and coaches expectations could lead athletes to abandon the sport before reaching their peak. (Baker *et al*., 2003) due to burnout states (Malina, 2010a). In addition, these authors claim that the commitment required for sporting success usually obstructs the normal process of developing interpersonal skills and identity during childhood, because it can lead to familial disorders and rivalry among peers (Callender, 2010; Heydinger, 2019).

According to (Wiersma, 2000) in an interview with teenage athletes, those who were successful but who abandoned the sport indicated that they did so due to a set of life experiences that lead to the development of a self-concept, which the sport in some way prevented them from experiencing. In other words, as an athlete increases participation in a single sport, opportunities for social interaction outside of that sport may be less likely.

Psychological

Although sports specialisation and the sport itself could cause experiences where self-esteem and self-perception are improved because of the achievement of goals and objectives, there are negative psychological effects that are often difficult to recognize (Horn, 2015; Wiersma, 2000). Additionally, it is important to understand the potentiality of early sport specialisation to develop psychological needs satisfaction in youth (McFadden *et al*., 2016). However, they are very important aspects to consider for the maintenance of sports practice over time (Watts, 2002). One of the most damaging aspects of specialisation is emotional and mental physical exhaustion, also known as "Burnout syndrome" (García-Parra *et al*., 2016). This exhaustion is mainly induced, when participation in a sport exceeds the rewards of its participation, which causes a decrease in performance, lack of concentration, mental fatigue and even depression (Mojena & Ucha, 2002).

This exhaustion of the athlete from a multidimensional psychological perspective has been related to early sports specialisation, where marked manifestations of stress and anxiety, loss of intrinsic motivation, added to a lower sensation towards the sports context is shown with recurrence in this population (DiFiori *et al*., 2014b; Jayanthi *et*

al., 2018; Sheridan *et al*., 2014). Indeed, sport specialisation has been associated with worse mood, fatigue, sleep quality, stress, soreness with no relation to age or training load (Garinger *et al*., 2018; Post *et al*., 2019; Watson *et al*., 2018).

Aspects such as excessive schedules of sports practices, the low emphasis on physical fitness skills through enjoyment and applicable to life, along with the low application of valid and reliable tools to determine burnout states are some of the main triggers of these problems (Kaleth & Mikesky, 2010; LaPrade *et al*., 2016b; Torres, 2015).

Likewise, certain social and psychological characteristics associated with the development of excessive perfectionism of young people, coaches or parents are frequently observed aspects; For this reason, the monitoring related between the intensity of sports participation and their degree of specialisation coupled with the interaction with friends, school and any other type of extracurricular activities are essential for the well-being of young people (Sluder *et al*., 2017; Smith *et al*., 2017; Smucny *et al*., 2015.

However, the choice of a single sport can cause the athlete to lose the sense of enjoyment of the discipline, so, usually the athlete suffers psychologically (Gould *et al*., 2002). Studies previously conducted (Balaguer *et al*., 2009; Gustafsson *et al*., 2007; Martínez & Javier, 2014), reinforce this information, because when analysing the presence of this exhaustion in young elite athletes they found its presence in tennis athletes and other disciplines, arguing that the rigorous hours of intense training through specialisation can interfere with the benefits of sports participation. Also, based on the evidence shown, specialisation causes an increase in the probability of withdrawal and dropout from sports practice (Baker *et al*., 2009; Wiersma, 2000). Indeed, adults that reported early specialisation were less likely to still be active in their adulthood (Hastie, 2015).

Conclusion

It is clear and dates to the recent qualitative and quantitative scientific evidence; sports diversification and sports specialisation in children have advantages and disadvantages at a physical, social, and psychological level. These pros and cons are dependent on the objective with which the sporting activity is developed, in this case, it will depend on the type of process and the philosophical line of the sports centre, coaches, parents and children. What is clear is that the disadvantages of each process must be considered in the hands of the integral development of children. Additionally, considering that there are ethical and philosophical arguments to discuss even around high-performance sport (Beamish & Ritchie, 2006), and the rate of high-performance athletes compared to the whole population, politicians, educators, and parents should consider if the world needs

new and better athletes or citizens? Indeed, some authors considered that excessive training processes may also be considered as a form of child abuse (Pipe, 1993), from a perspective a interpersonal violence psychological and physical (Vertommen *et al*., 2016; Witt & Dangi, 2018). That although it is true, sports specialisations are not a synonym of excessive training, the line between both practices is very thin, often leading to confusion and because of it the consequences are suffered by boys and girls.

Based on this evidence, the alternative of sport diversification at an early age is considered firstly, and then work around sport specialisation once the bases of strength, conditioning and neuromuscular training have been achieved, as well as a certain psychomotor maturation so that their sports performance and health are not compromised in the medium or long term. It is necessary to consider that few children manage to obtain a place in the sports elite or do not have the specific capabilities to achieve high performance (Wojtys, 2013), so for many of them, the education around sports will be the basis for the exercise of their citizenship as active people. It is suggested that in relation to this assessment, there be a slightly more detailed analysis in the conclusion, since it is a very relevant aspect that is not necessarily addressed in the sports specialisation in early childhood stages. Indeed, some authors considered that excessive training processes may also be considered as a form of child abuse (Pipe, 1993).

Funding: The authors received no financial support for the research, authorship, and/or publication of this article.

Declaration of conflict interests: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

References

Anderson, J., Lewenthal, B., Kim, S.-K., & Ko, J. (2018). Sport Specialisation and Lower Extremity Injury Incidence: A Retrospective Pilot Study among Female Collegiate Soccer Players. *The Asian Journal of Kinesiology*, *20*(3), 32-36. https://doi.org/10.15758/ajk.2018.20.3.32

Baker, J., Cobley, S., & Fraser-Thomas, J. (2009). What do we know about early sport specialisation? Not much! *High Ability Studies*, *20*(1), 77-89. https://doi.org/10.1080/13598130902860507

Baker, J., Cote, J., & Abernethy, B. (2003). Sport-Specific Practice and the Development of Expert Decision-Making in Team Ball Sports. *Journal of Applied Sport Psychology*, *15*(1), 12-25. https://doi.org/10.1080/10413200305400

Balaguer, I., Duda, J. L., Moreno, Y., & Crespo, M. (2009). Interacciones entre las perspectivas situacionales y disposicionales de meta y el burnout psicológico de los tenistas junior de la élite internacional [Interplays between situational and dispositional goals perspectives and psychological burnout...]. *Acción Psicológica*, *6*(2), 63-75. https://doi.org/10.5944/ap.6.2.222

Baxter-Jones, A. D. G., & Maffulli, N. (2003). Parental influence on sport participation in elite young athletes. *The Journal of Sports Medicine and Physical Fitness*, *43*(2), 250-255.

Beamish, R., & Ritchie, I. (2006). *Fastest, Highest, Strongest: A Critique of High-Performance Sport*. Routledge. https://doi.org/10.4324/9780203967850

Bell, D. R., Post, E. G., Biese, K., Bay, C., & McLeod, T. V. (2018). Sport Specialisation and Risk of Overuse Injuries: A Systematic Review With Meta-analysis. *Pediatrics*, *142*(3), e20180657. https://doi.org/10.1542/peds.2018-0657

Blagrove, R. C., Bruinvels, G., & Read, P. (2017). Early Sport Specialisation and Intensive Training in Adolescent Female Athletes: Risks and Recommendations. *Strength & Conditioning Journal*, *39*(5), 14. https://doi.org/10.1519/SSC.0000000000000315

Brenner, J. S. (2016). Sports Specialisation and Intensive Training in Young Athletes. *Pediatrics*, *138*(3), e20162148. https://doi.org/10.1542/peds.2016-2148

Brenner, J. S., & Fitness, C. on S. M. A. (2016). Sports Specialisation and Intensive Training in Young Athletes. *Pediatrics*, *138*(3), e20162148. https://doi.org/10.1542/peds.2016-2148

Bruner, M. W., Boardley, I. D., & Côté, J. (2014). Social identity and prosocial and antisocial behavior in youth sport. *Psychology of Sport and Exercise*, *15*(1), 56-64. https://doi.org/10.1016/j.psychsport.2013.09.003

Callender, S. S. (2010). The Early Specialisation of Youth in Sports. *Athletic Training and Sports Health Care*, *2*(6), 255-257. https://doi.org/10.3928/19425864-20101029-03

Carlson, R. (1988). The Socialization of Elite Tennis Players in Sweden: An Analysis of the Players' Backgrounds and Development. *Sociology of Sport Journal*, *5*(3), 241-256. https://doi.org/10.1123/ssj.5.3.241

Caruso, T. (2013). Early Sport Specialisation Versus Diversification in Youth Athletes. *NSCA Coach*, *2*(4).

Corrêa, C., Tierling, R., Treter, G. H., de Souza, S. P., & Abaide, C. A. (2016). Early specialisation in sports: A factor to be considered in brazilian tennis players? *Coaching & Sport Science Review*, *70*, 18-20.

Côté, J., Lidor, R., & Hackfort, D. (2009). ISSP position stand: To sample or to specialize? Seven postulates about youth sport activities that lead to continued participation and elite performance. *International Journal of Sport and Exercise Psychology*, *7*(1), 7-17. https://doi.org/10.1080/1612197X.2009.9671889

DePhillipo, N. N., Cinque, M. E., Kennedy, N. I., Chahla, J., Moatshe, G., & LaPrade, R. F. (2018). Patellofemoral Chondral Defect in a Preadolescent Skier: A Case Report in Early Sport Specialisation. *International Journal of Sports Physical Therapy*, *13*(1), 131-136.

DiFiori, J. P., Benjamin, H. J., Brenner, J. S., Gregory, A., Jayanthi, N., Landry, G. L., & Luke, A. (2014a). Overuse injuries and burnout in youth sports: A position statement from the American Medical Society for Sports Medicine. *British Journal of Sports Medicine*, *48*(4), 287-288. https://doi.org/10.1136/bjsports-2013-093299

DiFiori, J. P., Benjamin, H. J., Brenner, J. S., Gregory, A., Jayanthi, N., Landry, G. L., & Luke, A. (2014b). Overuse injuries and burnout in youth sports: A position statement from the American Medical Society for Sports Medicine. *British Journal of Sports Medicine*, *48*(4), 287-288. https://doi.org/10.1136/bjsports-2013-093299

DiFiori, J. P., Benjamin, H. J., Brenner, J. S., Gregory, A., Jayanthi, N., Landry, G. L., & Luke, A. (2014c). Overuse injuries and burnout in youth sports: A position statement from the American Medical Society for Sports Medicine. *British Journal of Sports Medicine*, *48*(4), 287-288. https://doi.org/10.1136/bjsports-2013-093299

DiStefano, L. J., Beltz, E. M., Root, H. J., Martinez, J. C., Houghton, A., Taranto, N., Pearce, K., McConnell, E., Muscat, C., Boyle, S., & Trojian, T. H. (2018). Sport Sampling Is Associated With Improved Landing Technique in Youth Athletes. *Sports Health: A Multidisciplinary Approach*, *10*(2), 160–168. https://doi.org/10.1177/1941738117736056

DiSanti, J. S., & Erickson, K. (2019). Youth sport specialisation: A multidisciplinary scoping systematic review. *Journal of Sports Sciences*, 37(18), 2094-2105. https://doi.org/10.1080/02640414.2019.1621476

Eime, R. M., Young, J. A., Harvey, J. T., Charity, M. J., & Payne, W. R. (2013). A systematic review of the psychological and social benefits of participation in sport for children and adolescents: Informing development of a conceptual model of health through sport. International Journal of Behavioral Nutrition and Physical Activity, 10(1), 98. https://doi.org/10.1186/1479-5868-10-98

Fabricant, P. D., Lakomkin, N., Sugimoto, D., Tepolt, F. A., Stracciolini, A., & Kocher, M. S. (2016). Youth sports specialisation and musculoskeletal injury: A systematic review

of the literature. *The Physician and Sportsmedicine*, *44*(3), 257-262. https://doi.org/10.1080/00913847.2016.1177476

Feeley, B. T., Agel, J., & LaPrade, R. F. (2016). When Is It Too Early for Single Sport Specialisation? *The American Journal of Sports Medicine*, *44*(1), 234-241. https://doi.org/10.1177/0363546515576899

Fergurson, B., & Stern, P. J. (2014). A case of early sports specialisation in an adolescent athlete. *The Journal of the Canadian Chiropractic Association*, *58*(4), 377-383.

Field, A. E., Tepolt, F. A., Yang, D. S., & Kocher, M. S. (2019). Injury Risk Associated With Sports Specialisation and Activity Volume in Youth. *Orthopaedic Journal of Sports Medicine*, *7*(9), 2325967119870124. https://doi.org/10.1177/2325967119870124

Fransen, J., Pion, J., Vandendriessche, J., Vandorpe, B., Vaeyens, R., Lenoir, M., & Philippaerts, R. M. (2012). Differences in physical fitness and gross motor coordination in boys aged 6–12 years specializing in one versus sampling more than one sport. *Journal of Sports Sciences*, *30*(4), 379-386. https://doi.org/10.1080/02640414.2011.642808

García-Parra, N., González, J., & Fayos, E. J. G. de los. (2016). Estado actual del estudio del síndrome de burnout en el deporte. *Cuadernos de Psicología del Deporte*, *16*(2), 21-28.

Garinger, L. M., Chow, G. M., & Luzzeri, M. (2018). The effect of perceived stress and specialisation on the relationship between perfectionism and burnout in collegiate athletes. *Anxiety, Stress, & Coping*, *31*(6), 714-727. https://doi.org/10.1080/10615806.2018.1521514

Goodway, J. D., & Robinson, L. E. (2015). Developmental Trajectories in Early Sport Specialisation: A Case for Early Sampling from a Physical Growth and Motor Development Perspective. *Kinesiology Review*, *4*(3), 267-278. https://doi.org/10.1123/kr.2015-0028

Gould, D. (2010). Early Sport Specialisation: A Psychological Perspective. *Journal of Physical Education, Recreation & Dance*, *81*(8), 33-37. https://doi.org/10.1080/07303084.2010.10598525

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

Güllich, A., & Emrich, E. (2006). Evaluation of the support of young athletes in the elite sports system. *European Journal for Sport and Society*, *3*(2), 85-108. https://doi.org/10.1080/16138171.2006.11687783

Gustafsson, H., Kenttä, G., Hassmén, P., & Lundqvist, C. (2007). Prevalence of burnout in adolescent competitive athletes. *The Sport Psychologist*, *21*, 21-37.

Hall, R., Foss, K. B., Hewett, T. E., & Myer, G. D. (2015). Sport Specialisation's Association With an Increased Risk of Developing Anterior Knee Pain in Adolescent Female Athletes. *Journal of Sport Rehabilitation*, *24*(1), 31-35. https://doi.org/10.1123/jsr.2013-0101

Hastie, P. A. (2015). Early Sport Specialisation from a Pedagogical Perspective. *Kinesiology Review*, *4*(3), 292-303. https://doi.org/10.1123/kr.2015-0029

Hecimovich, M. (2004). Sport Specialisation in Youth: A Literature Review. *JACA*, *41*(4), 11. https://researchrepository.murdoch.edu.au/id/eprint/4422/

Heydinger, B. (2019). The Effects of Sports Specialisation and Injury Rates in Collegiate Athletes. *Williams Honors College, Honors Research Projects*. https://ideaexchange.uakron.edu/honors_research_projects/817

Hill, G. M., & Simons, J. (1989). A Study of the Sport Specialisation on High School Athletics. *Journal of Sport and Social Issues*, *13*(1), 1-13. https://doi.org/10.1177/019372358901300101

Hiremath, C. (2019). Impact of sports on mental health. International Journal of Physiology, Nutrition and Physical Education, 14-18. https://www.journalofsports.com/pdf/2019/vol4issue1S/PartA/SP-4-1-4-781.pdf

Horn, T. S. (2015). Social Psychological and Developmental Perspectives on Early Sport Specialisation. *Kinesiology Review*, *4*(3), 248-266. https://doi.org/10.1123/kr.2015-0025

Hume, P. A., Hopkins, W. G., Robinson, D. M., Robinson, S. M., & Hollings, S. C. (1993). Predictors of attainment in rhythmic sportive gymnastics. *The Journal of Sports Medicine and Physical Fitness*, *33*(4), 367-377.

Jayanthi, N., & Dugas, L. (2017). The Risks of Sports Specialisation in the Adolescent Female Athlete: *Strength and Conditioning Journal*, *39*(2), 20-26. https://doi.org/10.1519/SSC.0000000000000293

Jayanthi, N., Holt, D. B., LaBella, C. R., & Dugas, L. R. (2018). Socioeconomic Factors for Sports Specialisation and Injury in Youth Athletes. *Sports Health*, *10*(4), 303-310. https://doi.org/10.1177/1941738118778510

Jayanthi, N., Pinkham, C., Dugas, L., Patrick, B., & LaBella, C. (2013). Sports Specialisation in Young Athletes: Evidence-Based Recommendations. *Sports Health: A Multidisciplinary Approach*, *5*(3), 251-257. https://doi.org/10.1177/1941738112464626

Kaleth, A., & Mikesky, A. (2010). Impact of Early Sport Specialisation. *Journal of Physical Education, Recreation & Dance*, *81*, 29-37. https://doi.org/10.1080/07303084.2010.10598524

LaPrade, R. F., Agel, J., Baker, J., Brenner, J. S., Cordasco, F. A., Côté, J., Engebretsen, L., Feeley, B. T., Gould, D., Hainline, B., Hewett, T. E., Jayanthi, N., Kocher, M. S., Myer, G. D., Nissen, C. W., Philippon, M. J., & Provencher, M. T. (2016a). AOSSM Early Sport Specialisation Consensus Statement. *Orthopaedic Journal of Sports Medicine*, *4*(4), 232596711664424. https://doi.org/10.1177/2325967116644241

LaPrade, R. F., Agel, J., Baker, J., Brenner, J. S., Cordasco, F. A., Côté, J., Engebretsen, L., Feeley, B. T., Gould, D., Hainline, B., Hewett, T. E., Jayanthi, N., Kocher, M. S., Myer, G. D., Nissen, C. W., Philippon, M. J., & Provencher, M. T. (2016b). AOSSM Early Sport Specialisation Consensus Statement. *Orthopaedic Journal of Sports Medicine*, *4*(4), 232596711664424. https://doi.org/10.1177/2325967116644241

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., Clarke, M., Devereaux, P. J., Kleijnen, J., & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: Explanation and elaboration. *Journal of Clinical Epidemiology*, *62*(10), e1–e34. https://doi.org/10.1016/j.jclinepi.2009.06.006

Malina, R. M. (2010a). Early Sport Specialisation: Roots, Effectiveness, Risks. *Current Sports Medicine Reports*, *9*(6), 364-371. https://doi.org/10.1249/JSR.0b013e3181fe3166

Malina, R. M. (2010b). Early Sport Specialisation: Roots, Effectiveness, Risks. *Current Sports Medicine Reports*, *9*(6), 364-371. https://doi.org/10.1249/JSR.0b013e3181fe3166

Martínez, S.-A., & Javier, B. (2014). Prevalencia del síndrome de burnout en tenistas según su orientación motivacional. *Revista Iberoamericanaa de Psicología del Deprote: 9*, 12.

McDonald, C., Deitch, J., & Bush, C. (2019). Early Sports Specialisation in Elite Wrestlers. *Sports Health*, *11*(5), 397-401. https://doi.org/10.1177/1941738119835180

McFadden, T., Bean, C., Fortier, M., & Post, C. (2016). Investigating the influence of youth hockey specialisation on psychological needs (dis)satisfaction, mental health, and mental illness. *Cogent Psychology*, *3*(1), 1157975. https://doi.org/10.1080/23311908.2016.1157975

McGuine, T. A., Post, E. G., Hetzel, S. J., Brooks, M. A., Trigsted, S., & Bell, D. R. (2017). A Prospective Study on the Effect of Sport Specialisation on Lower Extremity Injury Rates in High School Athletes. *The American Journal of Sports Medicine*, *45*(12), 2706–2712. https://doi.org/10.1177/0363546517710213

McKay, C. D., Cumming, S. P., & Blake, T. (2019). Youth sport: Friend or Foe? *Best Practice & Research Clinical Rheumatology*. https://doi.org/10.1016/j.berh.2019.01.017

Merkel, D. L. (2013). Youth sport: Positive and negative impact on young athletes. *Open Access Journal of Sports Medicine*, *4*, 151-160. https://doi.org/10.2147/OAJSM.S33556

Moesch, K., Elbe, A.-M., Hauge, M.-L. T., & Wikman, J. M. (2011). Late specialisation: The key to success in centimeters, grams, or seconds (cgs) sports. *Scandinavian Journal of Medicine & Science in Sports*, *21*(6), e282-290. https://doi.org/10.1111/j.1600-0838.2010.01280.x

Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, P., & Stewart, L. A. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews*, *4*(1), 1.

Mojena, G. M., & Ucha, F. E. G. (2002). Burnout, locus de control y deportistas de alto rendimiento. *Cuadernos de Psicología del Deporte*, *2*(2). https://revistas.um.es/cpd/article/view/111791

Mosher, A., Fraser-Thomas, J., & Baker, J. (2020). What Defines Early Specialisation: A Systematic Review of Literature. Frontiers in Sports and Active Living, 2, 596229. https://doi.org/10.3389/fspor.2020.596229

Moseid, C. H., Myklebust, G., Fagerland, M. W., & Bahr, R. (2019). The association between early specialisation and performance level with injury and illness risk in youth elite athletes. *Scandinavian Journal of Medicine & Science in Sports*, *29*(3), 460-468. https://doi.org/10.1111/sms.13338

Myer, G. D., Jayanthi, N., Difiori, J. P., Faigenbaum, A. D., Kiefer, A. W., Logerstedt, D., & Micheli, L. J. (2015a). Sport Specialisation, Part I: Does Early Sports Specialisation Increase Negative Outcomes and Reduce the Opportunity for Success in Young Athletes? *Sports Health: A Multidisciplinary Approach*, *7*(5), 437-442. https://doi.org/10.1177/1941738115598747

Myer, G. D., Jayanthi, N., Difiori, J. P., Faigenbaum, A. D., Kiefer, A. W., Logerstedt, D., & Micheli, L. J. (2015b). Sport Specialisation, Part I: Does Early Sports Specialisation Increase Negative Outcomes and Reduce the Opportunity for Success in Young Athletes? *Sports Health*, *7*(5), 437-442. https://doi.org/10.1177/1941738115598747

Myer, G. D., Jayanthi, N., DiFiori, J. P., Faigenbaum, A. D., Kiefer, A. W., Logerstedt, D., & Micheli, L. J. (2016). Sports Specialisation, Part II. *Sports Health*, *8*(1), 65-73. https://doi.org/10.1177/1941738115614811

Normand, J. M., Wolfe, A., & Peak, K. (2017). A Review of Early Sport Specialisation in Relation to the Development of a Young Athlete. *International Journal of Kinesiology and Sports Science*, *5*(2), 37-42. https://doi.org/10.7575/aiac.ijkss.v.5n.2p.37

OHAT. (2015). *Handbook for Conducting a Literature-Based Health Assessment Using OHAT Approach for Systematic Review and Evidence Integration*. 98.

Padaki, A. S., Ahmad, C. S., Hodgins, J. L., Kovacevic, D., Lynch, T. S., & Popkin, C. A. (2017). Quantifying Parental Influence on Youth Athlete Specialisation: A Survey of Athletes' Parents. *Orthopaedic Journal of Sports Medicine*, *5*(9), 2325967117729147. https://doi.org/10.1177/2325967117729147

Pasulka, J., Jayanthi, N., McCann, A., Dugas, L. R., & LaBella, C. (2017). Specialisation patterns across various youth sports and relationship to injury risk. *The Physician and Sportsmedicine*, *45*(3), 344-352. https://doi.org/10.1080/00913847.2017.1313077

Pipe, A. (1993). Sport, science, and society: Ethics in sports medicine. *Medicine & Science in Sports & Exercise*, *25*(8), 888-900.

Post, E. G., Bell, D. R., Trigsted, S. M., Pfaller, A. Y., Hetzel, S. J., Brooks, M. A., & McGuine, T. A. (2017). Association of Competition Volume, Club Sports, and Sport Specialisation With Sex and Lower Extremity Injury History in High School Athletes. *Sports Health*, *9*(6), 518-523. https://doi.org/10.1177/1941738117714160

Post, E. G., Trigsted, S. M., Riekena, J. W., Hetzel, S., McGuine, T. A., Brooks, M. A., & Bell, D. R. (2017). The Association of Sport Specialisation and Training Volume With Injury History in Youth Athletes. *The American Journal of Sports Medicine*, *45*(6), 1405–1412. https://doi.org/10.1177/0363546517690848

Post, E. G., Trigsted, S. M., Schaefer, D. A., Cadmus-Bertram, L. A., Watson, A. M., McGuine, T. A., Brooks, M. A., & Bell, D. R. (2019). The Association of Sport Specialisation, Overuse Injury, and Travel With Daytime Sleepiness in Youth Athletes. *Athletic Training and Sports Health Care*. https://doi.org/10.3928/19425864-20190219-01

Rathbone, J., Carter, M., Hoffmann, T., & Glasziou, P. (2015). Better duplicate detection for systematic reviewers: Evaluation of Systematic Review Assistant-Deduplication Module. *Systematic Reviews*, *4*(1), 6. https://doi.org/10.1186/2046-4053-4-6

Rose, M., Emery, C., & Meeuwisse, W. (2008). Sociodemographic Predictors of Sport Injury in Adolescents. *Medicine & Science in Sports & Exercise*, *40*(3), 444-450. https://doi.org/10.1249/MSS.0b013e31815ce61a

Russell, W., & Molina, S. (2018). A Comparison of Female Youth Sport Specializers and Non-Specializers on Sport Motivation and Athletic Burnout. *Journal of Sport Behavior*, *41*(3), 330.

Sheridan, D., Coffee, P., & Lavallee, D. (2014). A systematic review of social support in youth sport. *International Review of Sport and Exercise Psychology*, *7*(1), 198-228. https://doi.org/10.1080/1750984X.2014.931999

Sluder, J. B., Fuller, T. T., Griffin, S. G., & Mccray, Z. M. (2017). Early vs. Late Specialisation in Sport. *GAHPERD Journal*, *49*(3), 9–15.

Smith, A. D., Alleyne, J. M. K., Pitsiladis, Y., Schneider, C., Kenihan, M., Constantinou, D., & Webborn, N. (2017). Early Sports Specialisation: An International Perspective. *Current Sports Medicine Reports*, *16*(6), 439-442. https://doi.org/10.1249/JSR.0000000000000425

Smucny, M., Parikh, S. N., & Pandya, N. K. (2015). Consequences of Single Sport Specialisation in the Pediatric and Adolescent Athlete. *Orthopedic Clinics of North America*, *46*(2), 249–258. https://doi.org/10.1016/j.ocl.2014.11.004

Soberlak, P., & Cote, J. (2003). The Developmental Activities of Elite Ice Hockey Players. *Journal of Applied Sport Psychology*, *15*(1), 41-49. https://doi.org/10.1080/10413200305401

Strachan, L., Côté, J., & Deakin, J. (2009). "Specializers" versus "Samplers" in Youth Sport: Comparing Experiences and Outcomes. *The Sport Psychologist*, *23*(1), 77-92. https://doi.org/10.1123/tsp.23.1.77

Torres, C. R. (2015). Better Early Than Late? A Philosophical Exploration of Early Sport Specialisation. *Kinesiology Review*, *4*(3), 304-316.

Vaeyens, R., Güllich, A., Warr, C. R., & Philippaerts, R. (2009). Talent identification and promotion programmes of Olympic athletes. *Journal of Sports Sciences*, *27*(13), 1367–1380. https://doi.org/10.1080/02640410903110974

Vertommen, T., Schipper-van Veldhoven, N., Wouters, K., Kampen, J. K., Brackenridge, C. H., Rhind, D. J. A., Neels, K., & Van Den Eede, F. (2016). Interpersonal violence against children in sport in the Netherlands and Belgium. Child Abuse & Neglect, 51, 223-236. https://doi.org/10.1016/j.chiabu.2015.10.006

Walters, B. K., Read, C. R., & Estes, A. R. (2018). The effects of resistance training, overtraining, and early specialisation on youth athlete injury and development. *The Journal of Sports Medicine and Physical Fitness*, *58*(9), 1339-1348. https://doi.org/10.23736/S0022-4707.17.07409-6

Watson, A., Kliethermes, S., & Brickson, S. (2018). Sport Specialisation Is Associated with Impaired Sleep and Well-Being in Female Adolescent Athletes. *Pediatrics*, *142*(1 MeetingAbstract), 420-420. https://doi.org/10.1542/peds.142.1MA5.420

Watts, J. (2002). Perspectives on Sport Specialisation. *Journal of Physical Education, Recreation & Dance*, *73*(8), 32-37. https://doi.org/10.1080/07303084.2002.10608327

Weekes, D. G., Mattson, M., Campbell, R. E., Tjoumakaris, F. P., Pepe, M. D., & Tucker, B. S. (2019). The Effect of Single Sport Specialisation in Youth Sports: Does It Increase

the Risk of Injury? A Prospective Study. *Orthopaedic Journal of Sports Medicine*, *7*(7_suppl5), 2325967119S00408. https://doi.org/10.1177/2325967119S00408

Whitley, M. A., Massey, W. V., & Wilkison, M. (2018). A systems theory of development through sport for traumatized and disadvantaged youth. *Psychology of Sport and Exercise*, *38*, 116-125. https://doi.org/10.1016/j.psychsport.2018.06.004

Wiersma, L. D. (2000). Risks and Benefits of Youth Sport Specialisation: Perspectives and Recommendations. *Pediatric Exercise Science*, *12*(1), 13-22. https://doi.org/10.1123/pes.12.1.13

Wilhelm, A., Choi, C., & Deitch, J. (2017). Early Sport Specialisation: Effectiveness and Risk of Injury in Professional Baseball Players. *Orthopaedic Journal of Sports Medicine*, *5*(9). https://doi.org/10.1177/2325967117728922

Witt, P., & Dangi, T. (2018). Why Children/Youth Drop Out of Sports—Journal of Park and Recreation Administration. 36, 191-199. https://doi.org/10.18666/JPRA-2018-V36-I3-8618

Wojtys, E. M. (2013). Sports Specialisation vs Diversification. *Sports Health*, *5*(3), 212-213. https://doi.org/10.1177/1941738113484130

Zoellner, A., Whatman, C., Read, P., & Sheerin, K. (2021). The association between sport specialisation and movement competency in youth: A systematic review. International Journal of Sports Science & Coaching, 16(4), 1045-1059. https://doi.org/10.1177/1747954121998456