UNIVERSIDADE DE BRASÍLIA

INSTITUTO DE PSICOLOGIA

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THE ROLE OF PSYCHOSOCIAL FACTORS AND PSYCHOSOCIAL SUPPORT TRAINING FOR TALENT DEVELOPMENT IN SPORTS

Luis Orione de Figueiredo Ferreira

Brasília, agosto de 2020

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ORIENTADORA: PROFa. Dra. DENISE DE SOUZA FLEITH

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So many people along the way,
whatever it is you aspire to do,
will tell you it can't be done.
But all it takes is imagination.
You dream. You plan. You reach.
There will be obstacles.
There will be doubters.
There will be mistakes.
But with hard work,
with belief,
with confidence
and trust in yourself
and those around you,
there are no limits.
(Michael Phelps)

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ABSTRACT

The purpose of this study was to investigate the role of psychosocial factors and psychosocial support training for talent development in sports. The Talent Development Mega Model - TDMM by Subotnik, Olszewski-Kubilius, and Worrell (2011) was used as a conceptual framework. Four elite Brazilian athletes, two males and two females, were interviewed. The grounded theory methodology was employed to analyze the data. Regarding psychosocial factors, four themes emerged: growth mindset (positive beliefs one person displays about her or his intelligence and abilities, and the actual possibilities of developing those characteristics); task commitment (energy used to cope with specific problems, tasks, or a performance area); opportunities taken (the ability to identify opportunities, strive to be in the right place at the right time and use these opportunities); and social support usage (the ability of interacting with people in different situations, establishing solid relationships that could help talented people in their careers). The participants evaluated the psychosocial support training as instrumental to their talent development. They highlighted the following dimensions of the training: biofeedback, mentalization techniques, and feelings of knowing what to do under pressure. In consonance with premises proposed by the TDMM, regarding the relevance of psychosocial factors and psychosocial support training for talent development, results revealed that the psychosocial factors were present during athletes' trajectories. Furthermore, findings of this study pointed out that factors associated with psychosocial support training, such as psychological strength, mastery orientation style and tactical discipline, may contribute to athletes' eminent performance. When applied to elite athletes, psychosocial support training may actually improve

performance and psychosocial development. Theoretical and practical implications of this study considering talent development in different domains are discussed.

Keywords: talent development, sports, psychosocial factors, psychosocial support.

RESUMO

O objetivo deste estudo foi investigar o papel dos fatores psicossociais e do treinamento de apoio psicossocial no desenvolvimento de talentos no esporte. Como estrutura conceitual, utilizou-se o Mega Modelo de Desenvolvimento de Talentos - MMDT de Subotnik, Olszewski-Kubilius e Worrell (2011). Quatro atletas brasileiros de elite, dois homens e duas mulheres, foram entrevistados. A metodologia da teoria fundamentada nos dados foi empregada para analisar os dados. Em relação aos fatores psicossociais, quatro temas emergiram: mentalidade de crescimento (crenças positivas que uma pessoa exibe sobre sua inteligência e habilidades e as possibilidades reais de desenvolver essas características); comprometimento com a tarefa (energia usada para lidar com problemas específicos, tarefas ou área de desempenho); aproveitamento de oportunidades (habilidade para identificar oportunidades, esforçar-se para estar no lugar certo, na hora certa e fazer uso dessas oportunidades); e uso de suporte social (habilidade para interagir com pessoas em situações diferentes, estabelecendo relacionamentos sólidos que possam ajudar pessoas talentosas em suas carreiras). Os participantes avaliaram o treinamento de apoio psicossocial como instrumental para o desenvolvimento de seus talentos. Eles destacaram as seguintes dimensões do treinamento: biofeedback, técnicas de mentalização e sentimentos de saber o que fazer sob pressão. Em consonância com as premissas propostas pelo MMDT, em relação à relevância dos fatores psicossociais e do treinamento de apoio psicossocial para o desenvolvimento de talentos, os resultados revelaram que os fatores psicossociais estiveram presentes durante a trajetória dos atletas. Além disso, os resultados deste estudo apontaram que fatores associados ao treinamento de apoio psicossocial, como força psicológica, estilo motivacional de orientação para a maestria e disciplina tática, podem contribuir para

promover o desempenho de atletas eminentes. Quando aplicado a atletas de elite, o treinamento de apoio psicossocial pode, de fato, melhorar o desempenho e o desenvolvimento psicossocial. As implicações teóricas e práticas deste estudo, considerando o desenvolvimento de talentos em diferentes domínios, são discutidas.

Palavras-chave: desenvolvimento de talentos, esportes, fatores psicossociais, apoio psicossocial.

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CHAPTER 1

INTRODUCTION

Michael Phelps is the most decorated athlete in the modern Olympic era. His amazing technique was developed, since the age of 11, under Bob Bowman's supervision, a great swimming coach, and a skillful sport psychologist as well. In fact, elite athletes demonstrate extraordinary technical abilities since the first stages in their developmental process (normally, between late childhood and early adolescence). However, to convert initial potential into effective achievements during one's career peak, regardless of the talent domain, more than technique is required. Talent development studies point out that psychosocial factors (e.g., motivation, opportunities taking, productive mindsets, psychological strength, and social skills) can favor or limit the development of talent in distinct domains (Dweck, 2014; Horn, 2018; Worrell, Subotnik, & Olszewski-Kubilius, 2018). For instance, the effective usage of opportunities (with people striving for those opportunities) was reported as a crucial psychosocial catalyst in the trajectories of Nobel Prize winners and celebrated athletes (e.g., Tiger Woods, David Beckham, Roger Federer), especially from the point their talents were identified and properly nourished (Syed, 2010; Zuckerman, 1977).

The Talent Development Mega Model, by Subotnik, Olszewski-Kubilius, and Worrell (2011), proposes that psychosocial coaching as provided by sport psychologists, is a relevant strategy that could help talented people to develop psychosocial factors in any field. Convergently, different elite athletes' biographies (e.g., Ayrton Senna, Elana Meyers, Michael Phelps) reveal they had some kind of psychological training during their careers which supported their psychosocial and technical development (Cobra, 2001; Connors, 2018; Olympic Games,

2020). Michael Phelps (as cited in Connors, 2018) constantly stated over his victorious career that his mental preparation was one of his great differentials: “I think that everything is possible as long as you put your mind to it and you put the work and time into it. I think your mind really controls everything.” Notably, psychosocial support training (PST) has been reported by Olympic athletes, in a classic study, as the most relevant differential factor to predict final Olympic rankings (Orlick & Partington, 1988).

The usage of a psychologically grounded talent development conceptual framework, as the TDMM, to explain the role of psychosocial factors in competitive settings is a recent approach to understand the phenomenon of talent development (Subotnik et al., 2011; Worrell et al., 2016). Worrell et al. (2016) state that academic productions have portrayed a historical negative viewpoint regarding competitive environments and have only over the 2010s started to investigate those contexts to conceive possible contributions derived from such stressful milieus. The authors suggest, for example, it is relevant evaluating competition’s role in developing psychological strength, a psychosocial factor associated with outstanding levels of performance which is traditionally investigated in sporting arenas. Some studies have been proposing that tools applied by sport psychologists in successful competitive environments have robust evidence supporting their usage, suggesting the translation of PST methodologies to different domains (Dixson, Worrell, & Olszewski-Kubilius, 2016; Jarvin & Subotnik, 2010; Portenga, 2018; Subotnik et al., 2011; Worrell et al., 2016). Portenga (2018) for instance, proposes that students can deal better with stressful conditions in schools if they are submitted to PST similar to the one provided by sport psychologists in successful athletic programs.

Advances in both fields indicate other relevant aspects about the intersections of talent development and sport psychology studies. Holt and Dunn (2004) consider that talent

development models can provide sport psychologists with accurate frameworks to explain the role of psychosocial factors for talent development in sports. Consonantly, Dixon et al. (2016) suggest that gifted and talented specialists seek knowledge in the methods of sport psychology, which might impact on the development of psychosocial factors, such as psychological strength, incorporating these methods into the preparation of talented people in the most diverse contexts.

Despite recent studies have indicated that psychosocial factors and PST play a key role in the promotion of sports talent, sport psychology researchers have only in the last two decades started investigating these factors using talent development concepts and frameworks (Gledhill, Harwood, & Forsdyke, 2017; Holt & Dunn, 2004; Holt & Mitchell, 2006). In this regard, Gledhill et al. (2017) point out, based on a systematic literature review , that the majority of publications about the role of psychosocial factors for athletes' talent development began to be published from 2004. According to the authors, those studies did not clarify important aspects about athletes' psychological preparation (for instance whether PST tools were really used, which were used and how they were used). Besides, only 14,4% of the articles they analyzed in their systematic review indicated soccer players' actual possibilities of making a transition to progress to elite levels.

In this regard, the TDMM (Subotnik et al., 2011) reinforces that a criterion to consider one talented person as gifted, at a career's peak, is the achievement of outstanding levels at this point. The model suggests that people should understand and accept that they need psychosocial development to achieve elite levels. At this stage, talented athletes usually decide to engage in PST that might decisively contribute with their transitions to eminent performance levels (Portenga, 2018). Although talent development studies have advocated that PST tools might also help in other domains there is a shortage of data, recording the successful usage of PST to foster

psychosocial development of actually elite professionals from non-academic domains, such as sports, translated into replicable methodologies (Subotnik et al., 2011).

Therefore, the purpose of this study was to investigate psychosocial factors associated with talent development in sports and the role of PST for talent development, according to elite athletes. The results can offer insights into: (a) comprehending the importance of psychosocial factors for talented athletes' development, (b) elaborating interventions focused on the development of psychosocial factors, (c) discussing the role of PST as a contributing tool of processes that leads to the eminence in sports, and (d) proposing the application of sport psychology methods to enhance talent development in different domains.

CHAPTER 2

LITERATURE REVIEW

This chapter introduces theoretical and empirical studies that support this research. Three main thematic points make up the chapter structure. The first, on talent development studies, explores the principal viewpoints historically used to comprehend talent development. It also introduces the Talent Development Mega Model - TDMM (Subotnik et al., 2011), a comprehensive conceptual framework that portrays different trajectories' paths to eminence, highlighting the role of psychosocial factors in talent development. This model was used as the foundation of this study. The second section describes the main historical facts that developed current sport psychology techniques, as much as practical applications of Psychosocial Support Training techniques with high performance athletes. It particularly focuses on mentalization, biofeedback and periodized interventions, as possible catalyzers of psychosocial factors development. The third section highlights the relevance of psychosocial factors for talent development in sports.

Human Talent Development

Gifted people have historically attracted attention, admiration, and sometimes envy, either for displaying brilliant performances and ideas or learning faster than others. During the last century, researchers have been trying to comprehend and explain how those outstanding people develop their talents. Contemporary conceptual models portray some degree of consensus about the importance of creativity, task commitment, opportunity, chance, specificity, complexity, motivation, mindset, heterogeneity, passion, and interest to understand talent

development. In fact, beyond intelligence or technical ability, aspects such as opportunities, environmental conditions, individual goals, motivational styles, trajectories, attitudes, behaviors, psychosocial competencies, and actual outcome are factors that should be considered to comprehend giftedness and develop mechanisms that might effectively support actions to promote talent development (Almeida, Fleith, & Oliveira, 2013; Dweck, 2012; Hertzog, 2017; Olszewski-Kubilius, Subotnik, & Worrell, 2015; Paik, Gozali, & Marshall-Harper, 2019; Renzulli, 1978; Siegle, McCoach, & Roberts, 2017; Subotnik et al., 2011; Worrell et al., 2018).

Despite some converging aspects considering conceptual frameworks explaining talent development, there are some gaps that still need to be deeply investigated in the area. Subotnik et al. (2011), for example, point out that there are at least four questions to be answered that still lack consensus:

> What are the most important factors that contribute to the acuities or propensities that can serve as signs of potential talent? What are potential barriers to acquiring the "gifted" label? What are the expected outcomes of gifted education? And how should gifted students be educated? (p. 4)

In the last two decades, talent development researchers have undergone conceptual reviews in the field proposing: to refine concepts (Ziegler, Stoeger, & Vialle, 2012), to understand who will actually become eminent and what the goals of gifted education are (Subotnik et al., 2011), as well as to consider the role of meaningful information for gifted people concerning their talent development process (Hertzog, 2017; Siegle et al., 2017).

Gifted and Talented Development Conceptual Models

Different conceptual models can be associated with different types of viewpoints that have historically emerged in the talent development domain. In the beginning of the 20st century, one of the earliest perspectives that attempted to use a psychological construct to explain talent was proposed by Terman (Ziegler, 2005). He described gifts as a synonym to intelligence, associating high scores on intelligence tests with effective potential. This perspective conceived talent as something innate and generic, that might be applied in different fields, basically related to reasoning skills, assuming intelligent people are talented. However, researchers have argued that high scores in intelligence tests are not enough to explain how people actually develop talent (Subotnik et al., 2011). For example, Terman himself has found that intelligence was not, necessarily, a predictor of eminence (Almeida et al., 2013).

Another type of conceptual frameworks used to explain talent development is also related to high-IQ individuals. This viewpoint, which is widely internalized by many people, argues that children with high scores on intelligence tests have a greater tendency to be over sensitive and, thus, emotionally fragile (Pfeiffer, 2009). Considering practical implications, those individuals would need psychosocial interventions because their gifted condition would make them more vulnerable than lower-IQ individuals (Fonseca, 2011; Karpinski, Kolb, Tetreault, & Borowski, 2018). However, not only Terman's studies but others as well conducted later have indicated that high-IQ individuals tend to have not only intellectual higher abilities, but better socio-emotional and volitional functioning during their trajectories (Guez et al., 2018; Peyre et al., 2016; Stephan, Sutin, Kornadt, Caudroit, & Terracciano, 2018).

Havighurst, in the 1950s, already defined talent as extraordinary achievements in one of the following areas: intellectual abilities, creative thinking, scientific abilities, mechanical

abilities, and artistic abilities, broadening the explanation of the phenomenon to a multitude of domains (Dehaan & Havighurst, 1957). As intelligence could not widely and effectively explain excellence, Ziegler (2005) points out: "A logical consequence was to eliminate the limitation of gifts and talents to one psychological construct" (p. 412). Gardner (1983), for instance, subdivided intelligence into several types of intelligence. Renzulli (1978) integrated various psychological and social aspects, such as being in the right place at the right time, to comprehend the manifestation of talent. The three-ring model, created by Renzulli (1978), emphasized the importance of creativity, above average abilities and task commitment, as well as co-cognitive traits (such as optimism, courage, romance with a topic, sensitivity to human concerns, physical/mental energy, and sense of destiny), as fundamental factors for talent development. His model reinforced the role of the environment in the equation, and produced a new paradigm, considering psychological factors as relevant aspects to understand giftedness. According to Renzulli (2012), abilities that can be registered in school testing and exams are different from productive and creative talent, which can be identified when people display excellent performances or come up with innovative ideas and concepts. This viewpoint has been widely focused on children's talent development in the school environment, providing great theoretical and practical methodological tools for school improvement. For Subotnik et al. (2011), "Renzulli's contribution represented an important conceptual alternative to existing ideas about what provisions should be made to potentially gifted children during the school years, although there was no special focus on the continued development of special talent into adulthood" (p. 5).

Other researchers have developed knowledge exploring talent manifestation in nonacademic environments, which primarily produced knowledge from anecdotal sources, extracted from narratives of more or less successful performers, coaches and teachers (Bloom,

1985; Bruner, Munroe-Chandler, & Spink, 2008; Gagné, 1999; Rosen & Jarvin, 2018; Worrell et al., 2018). Gagné (1999), in the Differentiated Model of Giftedness and Talent, considers chance, interpersonal and environmental variables as catalysts of the talent development process, clearly separating the potential and skills of achievements, which are developed on a sequential continuum. He suggests that studies in the field of talent should focus on domains beyond the academic, highlighting, for example, the development of sport talent as an area to be addressed and developed. He recognizes, however, two important aspects: the role of persistence as a key factor in talent development, and a definition of prevalence in higher development, within a specific population, as a criterion for selecting someone and naming her or him as a gifted individual. Bloom (1985) identified variables needed for talent development and, like Gagné (1999), arranged them in a sequence, pointing out that certain skills are more important at certain stages than at other phases in different scenarios. He also contributes by highlighting the importance of teachers, and mentors to provide children with instructions and emotional support at different stages, seeking to enhance the process of talent development.

From the 2000s, researchers have been conceptualizing talent with different focuses that basically tend to pay more attention to environmental factors and individual interactions when compared to previous research (Stoeger et al., 2016). Researchers have stressed the role of practice and differences regarding opportunities' availability as some of the main differentiating factors that predict talent development (Shenk, 2010; Stoeger et al., 2016; Ziegler et al., 2012). Siegle et al. (2017) use the Achievement Orientation Model to explore the reasons why people engage, their interests, goals and environmental perceptions as components of talent development in educational programs. Jarvin and Subotnik (2010) consider psychosocial factors as central aspects to talent development in several domains, urging talent development programs

to provide psychosocial tools to students. Subotnik et al. (2011) say it's necessary to adopt a long term perspective to comprehend how people develop their talents, with less or more opportunities being centrally related to motivation levels in attempts to understand who will actually become eminent.

The Talent Development Mega Model - Who Will Become Gifted in the Long Term?

The Talent Development Mega Model (TDMM), designed by Subotnik et al. (2011), highlights the influence of psychological literature on gifted studies, integrating various models and theories, "legitimizing this field as a topic of interest in psychology" (Prado, 2018, p. 16). The authors portray giftedness as a developmental process, domain specific and malleable, thus possibly trainable (Dweck, 2012; Paik et al., 2019, Siegle et al., 2017). In order to progress, highly talented people, under this perspective, demand psychosocial development, domain specific training, sequential training during different stages, personal decision to engage harder, motivated by a basic goal: converting potential youth talent into actual outstanding and/or innovative performance in adulthood.

According to the TDMM (Subotnik et al., 2011), giftedness: (a) reflects society's values; (b) is usually manifested in real outcomes, normally in adulthood; (c) is related to specific domains; (d) is the outcome of biological, pedagogical, psychological, and psychosocial interrelated factors; and (e) assigns not only to the ordinary (e.g., a child with above math ability compared to peers) but also extraordinary (e.g., a scientist who recontextualizes a field). The literal definition of giftedness proposed in the TDMM is:

> Giftedness is the manifestation of performance or production that is clearly at the upper end of the distribution in a talent domain even relative to that of other high-functioning

> individuals in that domain. Further, giftedness can be viewed as developmental, in that in the beginning stages, potential is the key variable; in later stages, achievement is the measure of giftedness; and in fully developed talents, eminence is the basis on which this label is granted. Psychosocial variables play an essential role in the manifestation of giftedness at every developmental stage. Both cognitive and psychosocial variables are malleable and need to be deliberately cultivated. (Subotnik et al., 2011, p. 7)

The TDMM designs a model of talent development that uses examples from multiple domains, summarizing current conceptual knowledge in the psychological sciences field, approaching almost ubiquitous premises, but also addressing not yet convergent aspects about talent development. It highlights seven consensual premises regarding the eminence definition it provides:

1. The road to amazing performance might start with some potential related to ability which is necessary for giftedness, reinforcing, however, that potential is not enough to explain how people develop their talents (Tannenbaum, 2003).
2. It is essential to present great interest and commitment to a domain to become a gifted achiever and, eventually, to achieve eminent levels (Worrell et al. 2016; Siegle et al., 2017).
3. Eminence achievement depends on effortful, time spending and adequate psychosocial skills training (Subotnik & Jarvin, 2010)
4. The percentage of children that display gifted potential is higher than the percentage of eminent adults (Subotnik et al., 2011)
5. Potential and eminence are differently recognized across domains in terms of developmental periods (Simonton, 2007).

6. The development of psychosocial skills are important in transitions across stages - especially transitions through the later stages (Subotnik & Jarvin, 2010).
7. As new domains emerge (e.g., kitesurfing, smart phones' applications design), more opportunities are created for talent manifestation and development (Subotnik et al., 2011).

According to the authors of the TDMM (Subotnik et al., 2011), there are disagreements in the field related to: (a) the causes of gifted performance, (b) the differences between gifted performance and performance, (c) the best form to convert childhood potential into actual outstanding accomplishments in adulthood, and (d) the question whether the achievement of eminence should really be a goal of gifted education.

To ground the components of the conceptual framework, the authors of the model address the following topics: contributors to giftedness, barriers to giftedness, outcomes of gifted education, and strategies to talent development.

Contributors to giftedness. The model suggests psychological sciences provide strong evidence-based studies about factors that may contribute to foster talent development. In this regard, some of the most important variables associated with outstanding achievements are: general and domain-specific ability, creativity, motivation and mindset, task commitment, passion, interest, opportunity, and chance.

For the TDMM, the role of ability in talent development is a contested issue, despite robust evidence produced in the field about the theme. Subotnik et al. (2011) point out it is almost consensual that, during childhood, some children portray more abilities than others, and that ability may indeed predict important outcomes. Nonetheless, it is not clear whether children's abilities can actually have a cause-effect relationship with future outstanding

performance. Studies have indicated general ability is necessary but not enough to predict outstanding performance or creative productivity (Howe, Davidson, & Sloboda, 1998). According to them, domain specific abilities, psychosocial skills, motivation and opportunity should also be considered to explain high achievements.

Motivation, grit and drive are centrally related to eminent levels of achievement in several studies, according to the TDMM. Motivation might impact on a person's ability to take the best of talent development opportunities. Kontoghiorghes (2016) found links between high performance and talent management, suggesting the development of high commitment and motivating work systems is related to workers' level of satisfaction with an institution. Among several achievement-motivation conceptual models, the TDMM highlights Dweck's (2012) concept of mindset, which might be described as the assumptions one person makes about her or his intelligence and abilities, and the actual possibilities of developing those characteristics. According to Dweck, these assumptions might impact the way a person reacts to mistakes, setbacks, rewards and feedback, and may affect their aspirations and goals.

Dweck (2012) has evidenced the positive outcomes of people considering intelligence as something that might be modified. Individuals with a growth mindset tend to cope with obstacles, recognition and outcomes as part of a sequentially harder trajectory of growth. Those people believe they can develop intelligence and abilities, getting better with effort. On the other hand, people with a fixed mindset don't recognize they can develop those skills. They usually look for external sources of outcomes, reinforcement and validation, tending to see setbacks and results as evidence of an unchangeable maximum level of quality that they can achieve.

Dweck (1986) also reinforces goal orientation styles are importantly related with how people get higher or lower motivated to achieve their goals. She has proposed a dual model of

goal orientation in which some people are oriented to mastery and others to the outcomes of performance. People with a performance (or outcome) oriented style measure their achievement by results, records and products. Those individuals want to show and validate their competence, to get positive outcomes, avoiding setbacks, for instance getting favorable appraisals, averting negative judgments. Conversely, the learning motivational orientation (also named mastery orientation) is directed to mastery achieving and is the most useful kind of goal orientation style, according to Dweck. Mastery oriented people do not measure their success by being better than others, but by learning strategies to constantly develop their abilities. The TDMM reinforces that mastery goal orientation is an important enhancing factor for talent development. Notably, Subotnik et al. (2011) propose that at eminent stages, the accomplishment of greater achievements, such as writing an influential book, becoming an Olympic champion or contributing to recontextualize a field (typically outcome-related factors) are types of motivators that might also support people to develop their talents to the most outstanding levels.

According to Renzulli's (1986) definition, "task commitment represents energy brought to bear on a particular problem (task) or specific performance area" (p. 69). Endurance, perseverance and hard work are usually related to the term. Several studies evidence task commitment as importantly related to outstanding performance in different scholar periods. Gledhill et al. (2017) researched 43 studies on psychosocial factors associated with soccer excellence, evaluating 14.977 soccer athletes. Similar to school environments, they found commitment as one of the most impactful characteristics of soccer players, from earlier stages to eminence.

Creativity is also quoted by Renzulli as an important characteristic in the manifestation of giftedness. The term describes the ability that allows one to create innovative ideas or to do

things in a different way. The field, according to the TDMM, usually distinguishes two types of creativity: little-c and Big-C (Csikszentmihalyi, 2000). Little-c is related to accomplishments that are uniquely innovative in narrow social contexts, as schools or families, and do not normally result in the creation of innovative products or new information. Little-c may be an important factor over earlier stages of development. It describes aspects such as independent thinking, and the creation of different perspectives, projects and products that are innovative when compared to those of others in similar contexts. Big-C, on the other hand, is associated with groundbreaking products that might impact and alter fields. It occurs in the broadest social context involving outstanding creative productivity. Big-C has been pointed out in some studies as positively related to eminence in several domains. For instance, Simonton's (1977) study with composers found creative longevity and productivity are predictors of eminence in the musical field.

Interest is a recent focus of attention in psychological sciences, regarding outstanding performances. Interest might be important to define why one engages into a career, despite ability level. Ceci and Williams (2010) have vastly investigated why females are under-represented in math-intensive fields. They strongly reinforced that women at every level of math aptitude simply do not prefer careers in fields related to math as men do (Ceci & Williams, 2010). The TDMM encourages investigating what might boost or limit talented peoples' interests as it seems relevant for career engagement. Some findings evidenced, for example, that in artistic and athletic domains interest plays a great role to determine outstanding performance. However, in the scholar field this relation is not clear. Siegle et al. (2017) stated interest "is a powerful motivator for academic achievement" (p. 6). The authors reinforce students tend to perform better the skills that they value, suggesting incorporating their interests into the curriculum. Tai,

Liu, Maltese, and Fan (2006) propose that educational programs should give attention to children's interests and specific domains, reinforcing people would find barriers in their development in case school programs do not care about these issues.

The TDMM (Subotnik et al., 2011) indicates that opportunities are relevant to talent development and highlights that talents are more frequently developed in institutions with adequate resources and financial support. However, it reinforces that the person to whom the opportunities are offered should accept the opportunities and commit to them. Zuckerman (1977) studied 92 Nobel Prize winners' biographies, describing they have counted with great opportunities, specifically from the moment their talent was recognized until the point they achieved eminence. Notably, the study revealed this support was a more important determinant factor for their development than socioeconomic origins, evidencing nurturing talent might pay off. Thus, the TDMM states that giftedness must be both pursued vigorously and nurtured appropriately. Worrell (2010) points out that without adequate environmental conditions, talents will not be developed as they could be.

Passion is also an important drive to influence a person to pursue her or his goals. It is described as something directed toward a specific domain, rather than being a general characteristic of a person. Fredricks, Alfeld, and Eccles (2010) did a comparative longitudinal study with college students who were identified as gifted children in areas such as arts, athletics and academics. Students identified as gifted athletes and artists are described as full of passion about their involvement in these domains' over college years. However, the passion was not similarly present, considering those students identified as gifted in academic domains, during the college phase. Vallerand et al. (2006) studied the role of passion in sports, suggesting

harmonious passions have a positive relationship with good affective experiences in sports. The authors of the TDMM recommend investigating the role of passion in different domains.

The TDMM (Subotnik et al., 2011) considers chance might be decisive for talent development, describing four types of chance, as proposed by Austin (1978). Type 1 chance is basically luck. Type 2 chance is the result of exploratory behaviors and encompasses a willingness to use opportunities that get to exist under particular circumstances. Type 3 chance happens just in case people are already grounded in a domain, for instance a scientist benefiting from others random remarks or article citations. Type 4 chance results from individual accidental actions, such as a fisherman who unexpectedly discovers an ancient kind of shark while fishing at a far sea. The model recognizes chance is important to increase opportunities for talent development, suggesting successful individuals should learn how to capitalize on Types 2 and 3 of chance.

Besides the main contributors to talent development, the TDMM (Subotnik et al., 2011) also presents some aspects that have been quoted as potentially or partially related to eminence manifestation by researchers: personality traits, parent's role and emotional trauma. For instance, several researchers have been pointing out that personality has relationships with eminent achievements or creative productivity. Anyway, current research has not yet been capable of stating in which way differences in personality traits might impact on the promotion of eminence (Simonton, 2008).

About emotional trauma's possible role as a catalyst to high performance, scientists have been speculating if dysfunctional families or personal tragedies might be somehow related to high performance, as many eminent people faced severe traumas in their lives (Goertzel & Goertzel, 2004). In this regard, eminent peoples' biographies have evidenced that many of them

did not really face hard traumas or lived in dysfunctional contexts. The authors of the TDMM suggest investigating if there is something in those environments that might be linked to eminence, and if so, addressing how and why it might happen.

Considering parental role in eminent outcome, Goertzel and Goertzel (2004) have studied the biographies of 20th century's eminent people in areas such as politics, music and arts, finding that parents played a great role in instructing and encouraging them. However, according to the TDMM, emotional support was not clearly present in those biographies. Considering eminent people's trajectories reveal they were intellectually and technically stimulated by families' efforts and actually achieved high levels of performance, it seems those families were successful in their endeavors. Nevertheless, as emotional support might play an important role in personal development, it seems relevant to investigate how this career development support might also match emotional support in family environments.

Barriers to giftedness. Subotnik et al. (2011) portray two important barriers to developing talents. The first quoted in the TDMM is underrepresentation. The authors of the model stress that in the United States, African American and Hispanic students are strongly underrepresented in gifted programs, considering their actual proportion in national schools. However, that's a process that is not unique in these programs. The TDMM reinforces that African Americans, Latinos, and Native Americans were, in 2011, "severely underrepresented among the top 1%, 5%, and 10% on almost every achievement measure...and at every level of education from kindergarten through professional school" (p. 22). Excellence gaps kept evident in data available from the National Assessment of Educational Progress (2017), which reinforces that the underrepresentation of lower income students and minorities occurs in different levels of

education. Some reasons pointed out by the TDMM for the educational malnourishment are: deficit on the accessibility to supplemental educational programs and technological educational tools, underprepared teachers in poor quality schools, teachers' lack of expectations, lack or low level of parental education and involvement, cultural differences, linguistic differences, harming peer influences, and lack of geographic mobility.

Psychosocial factors are listed as the second main type of barriers to talent development. The term psychosocial has been described as "the interrelation of individual psychological characteristics with social influences and to the ways in which these may shape or guide behaviors" (Gledhill et al., 2017, pp. 93-94). The term usually encompasses the relationship between psychological and physical aspects that can be influenced by social factors (Stansfeld & Rasul, 2007). Stansfeld and Rasul describe the word "psychosocial" as a shorthand term that combines the terms psychological and social and implies that the effect of social processes is mediated through psychological understanding. Multidimensional aspects as mindset, psychological strength, goal orientation styles, discipline, satisfaction, self-efficacy, self-promotion, learning how to play the game, ability to self-regulate, anxiety, chance, openness to support, socioeconomic status, commitment, education, interests, willingness to take strategic risks, ability to cope with challenges and handle criticism, competitiveness, motivation, task commitment, employment, religion, ethnicity, family, physical attributes, opportunities, locality, stereotypes, relationships with others, social support, changes in personal roles, and status have been quoted as important psychosocial factors correlated with talent development (Holt & Dunn, 2004; Gledhill et al., 2017; Subotnik et al., 2011; Stansfeld & Rasul, 2007; Siegle et al., 2017; Worrell et al., 2016).

Psychosocial factors, such as lack of psychological strength or problems with social support usage, might especially undermine one's possibility of achieving eminence. Considered one of the most important psychological factors in excellence development, psychological strength is a concept that has been historically used in sports arenas. It is defined as the ability to demonstrate a natural (or developed) psychological threshold that allows someone to be more confident, consistent and deal better with demands than her or his opponents (Jones, Hanton, & Connaughton, 2002). According to Jones et al. (2002), psychologically strong athletes would be "more consistent than and superior to their opponents in remaining determined, focused, confident, and in control under pressure" (p. 209). Psychologically strong people, in any field, tend to control stress, emotions, thoughts and behaviors under pressure and cope better with competitive situations that are present in careers, especially in stressful transitions (Subotnik et al., 2011; Worrell et al., 2016). Lack of psychological strength is considered, by the TDMM, as a fundamental barrier to talent development. This ability is particularly required when the athlete wants to make a transition to upper career levels, to deal with competitive and stressful conditions.

Social skills are tools that "enable people to communicate, ask for support, along with others, make friends and develop healthy relationships, protect themselves and generally be able to interact with everyone and anyone they meet in their journey through life" (Dowd & Tierney, 2005, p. 1). A lack of social skills might limit, for instance, peoples' effective access to social support. Despite not being a universal truth, family, teachers, peers, coaches and sponsors are essential through talented people's journey, especially for individuals from traditionally underrepresented lower socioeconomic status groups. These people should be prepared to effectively use this support and take advantage of fewer opportunities that have been normally

presented to them (Worrell et al., 2018). Openness to social support, in this context, might have a direct relationship with effective social support usage.

Several studies point out that underrepresented minorities and lower-income students are especially vulnerable to psychosocial factors such as a fixed mindset style, lack of opportunities, stereotypes or lack of social support (Horn, 2018; Kuusisto, Laine & Tirri, 2017; Worrell et al., 2018). According to Ogbu (2003), African-American students may be reticent to doing well, because developing academically is perceived by some people as abandoning black identity and acting as white people. Stereotypes might affect African-Americans' performance with effects over people who care the most about good outcomes, especially because stereotypes create tension and implicit beliefs that people's abilities are unalterably limited. Additionally, the TDMM points out that high-ability people from low-income, ethnically or racially underrepresented backgrounds, may face psychosocial stress to match their social identity with academic or achievement identities.

Several theories explain the role of disparities in society that contribute to the exclusion or underrepresentation of low-income and minority students in gifted programs, indicating that psychosocial factors might have a great limiting factor in talent development (Horn, 2018; Kuusisto et al., 2017; Ogbu, 2003; Worrell et al., 2018). For Subotnik et al. (2011), the relevance of those barriers to talent development in specific trajectories, as sports, have been understudied by scholars. Besides, they see psychosocial factors, if properly nourished, as potential enhancers of human performance.

The outcomes of gifted education. The TDMM describes two basic outcomes of gifted education in talent development programs: self-actualization and eminence (Subotnik et al., 2011). Each of those goals evidence conceptual implications about who gifted students are.

The advocates for self-actualization consider gifted children as qualitatively different from other people and with specific characteristics, that should be nourished in singular ways. Roeper School, created in 1956, is an example of a gifted school that considers self-actualization as the goal of gifted programs. This school, according to Annemarie Roeper (1996), is concerned with "creating a safe, joyful community of learning where each child can become their best self focused on fomenting individual growth and her or his responsible membership in the world community" (p. 19). Roeper (1996) portrays her opinions about the nature of gifted children:

> It is my belief that the gifted child is emotionally different from others. The self of the gifted child is structured differently. The depth of their awareness is different. The center of their inner life is different. Their view of the world is more complex in a fundamental way. That is why one cannot say the child is "partially gifted" in certain areas only and not in others. (p. 18)

From this viewpoint, successful education is related to gifted children maximizing this emotionally unique psyche's development. This perspective of giftedness is still broadly prevalent in many departments, although there is little empirical evidence that gifted people are really qualitatively different from others, according to the authors of the TDMM (Subotnik et al., 2011).

Subotnik (2003) described her surprise with an elite program for high-IQ children, who had not made unique contributions to society, beyond what is normally expected in their socioeconomic status, despite the high-quality education they received. Considering the

manifestation of giftedness to society normally occurs in adulthood, the researcher questioned if children labeled as gifted could also be labeled as gifted adults, in case they do not display markers of their abilities during adulthood. Subotnik and Rickoff (2010) got to the conclusion that the answer is no. They proposed that in order to be labeled gifted as adults, children need to become eminent producers. The premise is not that society should guarantee that people will achieve eminence, but that society should aim to provide people with education, psychosocial training and economic support in different domains, so that the contribution of talented people to society might be maximized to the most eminent levels (Worrell et al., 2018). Important to mention that advocates of eminence as the goal of gifted education do consider self-actualization important for talent development. For them, relevant contributions to society should be a crucial part of self-actualization in adult life. These contributions might inspire young people to also pursue their goals and dreams.

Strategies to promote talent development. Considering aspirations to prepare people to become outstanding adult contributors, Subotnik et al. (2011) point out four strategies that might support talent development programs. Two of them, acceleration and enrichment, are traditional in the scholar field. Psychosocial Support Training and selective institutions, though, are two aspects that are normally less applied in elite academic settings, but that have recently attracted researchers' attention.

Enrichment is probably the most used strategy in talent development programs. It focuses on fomenting students to engage more deeply with a subject, compared with what they would do in a regular classroom. This group of academic initiatives and protocols supplement and extend formal curriculum, normally including aspects not approached in the normal curriculum. Hertzog

(2017) proposes this type of initiative would be suited not only for gifted programs, and that this kind of strategy should be beneficial to all kinds of students. The authors of the TDMM (Subotnik et al., 2011) consider that enrichment strategies might indeed be useful for all students, stressing there is no evidence that gifted students would benefit more than regular students from that strategy.

The TDMM describes two premises regarding acceleration. First, that academically gifted students can learn and process information faster than their peers. Second, their condition allows them to be fast and deep in high volume knowledge acquisition, mastering advanced levels in subject areas, demanding to be placed at an above-grade-level. Acceleration might be done in different ways. Some of the acceleration strategies allow students to have an earlier access to content and classes than other people with the same ages. Other strategies accelerate the instruction pace within courses so that greater volumes of material are covered in less time (Maia-Pinto & Fleith, 2012). There is strong research evidence about the efficacy of acceleration as overwhelmingly positive (Maia-Pinto & Fleith, 2015; Rogers, 2004; Steenbergen-Hu & Moon, 2011).

Besides the strategies which are typically used in academic environments, Subotnik et al. (2011) present some less implemented strategies that might support educators to convert psychosocial factors from potential barriers into psychosocial enhancers. Those techniques might be found in elite sports methods, where people have traditional access to psychosocial training, successfully associated with outstanding performances, under stressful conditions. Researchers have been naming this type of intervention Psychosocial Support Training (PST), Psychosocial Coaching or Psychological Skills Training. The authors reinforce their trust that talent

development demands PST to promote, for instance, psychological strength, an important psychosocial factor related to coping well with stress, thoughts and competitive contexts.

As education environments might be psychologically demanding and oppressive through exams and grades, Jarvin and Subotnik (2010) suggest one of the roles of a good teacher is to provide appropriate psychological strength training. A study with 93 American students revealed that the ones who were taught, over five consecutive semesters, on how to handle stress, and that stressful situations do not necessarily impact on lower performance, reported less anxiety during math tests and had better academic performance when compared to the control group, instructed to ignore stress (Jamieson, Peters, Greenwood, & Altose, 2016). According to Jarvin and Subotnik (2010), teachers should get prepared to offer psychosocial support training to their students. However, few PST techniques used in elite sports and artistic settings have been translated to other fields using psychologically grounded talent development conceptual frameworks (Subotnik et al., 2011).

The fourth strategy quoted by the TDMM is found in highly selective institutions around the world. According to Coleman (2005), athletic training centers, conservatories, and special schools provide the most intensive kind of educational strategies for developing youth talent. Subotnik et al. (2011) urge a necessity to understand the contexts in which those programs might be beneficial, considering that evidence has been produced suggesting that in those high demanding environments actual outstanding performance can be manifested. Worrell et al. (2016) state despite stressful and competitive conditions tend to be seen historically as negative in psychological literature, psychology may provide the tools to translate knowledge from successful experiences in these fields (e.g., sport) and teach students to cope with stressful conditions as challenges and not as barriers to their development.

Components of the TDMM

The TDMM conceptual framework (Subotnik et al., 2011) points out two main stages associated with talented people's development: talent identification and talent promotion. The model questions the fact that few of the children identified by gifted development programs actually became eminent people. On the other hand, there are several eminent adults who were not identified as talented while young.

> Although substantial numbers of children with outstanding academic or intellectual ability are identified and some resources are expended on services for them, few of these children become eminent in adulthood... At the same time, there are numerous examples of eminent individuals whose abilities were not necessarily recognized in childhood. (Subotnik et al., 2011, p. 6)

According to the model, talent is a process to be developed throughout an individual's life, having eminence as the main objective to be achieved. Some key premises of the TDMM include: (a) abilities, both general and principally specific, matter and can be developed; (b) different talent domains have different trajectories; (c) opportunities should be given and taken by young people; (d) psychosocial variables are key factors in talent development; and (e) eminence is the goal of all education for talented individuals (Subotnik et al., 2011).

Making a clear difference between two types of talented people, defined as performers (as musicians and athletes) and producers (as scientists and architects), the model stresses that a person's high performance in any field portrays the following characteristics: (a) technical mastery in execution, (b) need for guided and deliberate training, (c) maintenance of motivation and dedication, (d) values related to the field of action taught in a mentoring process, and (e)

psychosocial variables as “important contributors to outstanding performance at every stage of development” (Subotnik et al., 2011, p. 40).

The TDMM also reveals differences between those categories, considering that performers’ trajectories, compared to producers’, generally imply: greater audience appreciation, current focus on psychosocial training, clearness of expected outcome of excellence, importance of physical skills, clearness of what one needs to practice, judgement of experts through the process, and diminishment of opportunities over time. On the other hand, concerning producers trajectories: judgments of experts depends on producer’s field; in academic scenarios, at least in earlier stages, objective tests are trusted as a indicators; experts’ judgements are trusted in areas like visual arts, music and playwright; physical abilities are not considered the essential aspects for talent development; psychosocial training is not a major concern in the field; people that appreciate the domain normally have insiders’ knowledge; outcome of excellence is clear only in some contexts (for instance when one gets an award or grant); greater room is available for producers, especially in areas that portray societal needs (Subotnik et al., 2011).

Besides portraying similarities and differences between performers and producers, the TDMM describes specificities in different talented peoples’ trajectories considering early or late specialization, age and domain (Subotnik et al., 2011). Although it is reasonable to expect exceptions to occur in peoples’ careers, those factors potentially influence when one will achieve eminence, or when a career's probable peak and end will be. Some careers, such as gymnastics and soprano singing, typically require early specializations, normally starting during childhood, as those careers tend to have an early peak, that ends during adolescence, in professional settings. Other musical careers, such as violin playing, can also have early specialization, starting in childhood, but might last up to late adulthood stages in peak performance. In academic fields,

such as mathematics, people might also start during early childhood, achieving peak performance during adolescence and have lifelong careers in high level. In other academic areas, such as psychology, people normally start specialization later, in late adolescence, reaching its peak in terms of performance in adulthood, that might be kept up to its latest stages. In areas that require more physical development in sport, such as soccer or football, people tend to start specialization during adolescence and have careers that normally endure up to early adulthood years, with peak performance expected in adolescence and early adulthood.

The TDMM (Subotnik et al., 2011) includes seven components that combine tendencies mentioned previously in this section.

1. Domains' developmental trajectories have differences in terms of expected start, peak, and end age phase for outstanding performance.
2. Giftedness is developed in three different stages. During the earliest stages, it is defined and mainly determined by potential. During middle stages, achievement is determinant to define giftedness. During full adulthood, giftedness is defined by eminent levels of achievement. The model also describes several important transitions over the talent development process. During those transitions, initial abilities are developed into competencies. Once people develop their skills and jump to competence, some of them decide to get experts. This transition to expertise requires more than technique to evolve (e.g., psychosocial training, insiders' knowledge) to clarify people about necessities, gatekeepers, and information about their careers' development. (Portenga, 2019). Some of the best experts will portray eminent levels of performance or revolutionarily innovative ideas and may be considered eminent.

3. Transitions are generally characterized by levels of creativity that begin with “little-c” creativity (as the one to create projects or products that are innovative, when compared with those of others), converted to “Big-C” creativity, that refers to knowledge or products that astonishingly modifies a field or culture.
4. These transitions require shifting emphasis from a personal level (which involves aspects such as creative approach or attitude), to a processual level (in which she or he will acquire skills linked to the process and develop mindsets), and finally, to productive level involved with the development of products (intellectual, aesthetic, or practical) or performances.
5. The model describes the goal of instruction in different phases of people’s careers. Initially, people need to be taught to fall in love with a field or topic by instructors. At a second moment instruction should be focused on teaching people for technical development (which includes acquiring values relative to the field). Finally, instruction should support talented people to develop their own characteristics as style, area of application or a personal niche.
6. Two basic kinds of factors are signalized as delimiters to talent development by the framework. The first are external factors related to chance, lack of opportunities or under representation. Psychosocial factors such as a fixed mindset, lack of psychological strength, low motivation (normally related to an outcome orientation instead of a mastery orientation), and lack of social skills might also undermine one's possibilities of developing talents, according to the model.
7. Progress to develop talents might be enhanced, accelerated or maintained by opportunities, social support and PST. Some of the main enhancing psychosocial

factors highlighted by the TDMM's framework are: growth mindset, opportunities effectively taking, psychological strength, optimal motivation and social skills

The TDMM (Subotnik et al., 2011) explicitly provides a comprehensive framework to understand sports' careers as a talented development issue, displaying important psychosocial characteristics in performers' trajectories, that might be enhancers or limiters to athletes' development. It also points PST, as provided by sport psychologists, as one of the four most potentially important strategies to develop talent in any field. Sports are central not only to explain talent development in the TDMM, but also to comprehend the role of sport psychologists in the process, providing solutions that might impact on the development of psychosocial factors in different areas. Thus, considering its viewpoint and descriptions of athletes' environment, athletes' trajectories, contributors to achieve eminence, limiters to eminence achievement, strategies to develop talent and the establishment of goals for gifted education, it seems a perfectly suitable framework to approach aspects as athletes' developmental trajectories and the role of sport psychologists in promoting talent.

Sport as a Talent Development Issue

Worrell et al. (2018) mention junctures that difficult athletes' inclusion as gifted people, even, for example, in countries such as the United States (US), probably the world's most traditional sports power. Worrell and colleagues stress that in spite of the fact that "MLB, the NFL, the NBA, and other professional sports organizations are the most successful talent development programs in the United States" (Worrell et al., 2018, p. 234), the US federal definition simply dropped psychomotor abilities as a gifted inclusion criterion. Likewise,

Meadows and Newman (2017) present a 2009 Texas Education Agency definition of a gifted person as someone who demonstrates outstanding potential or level of performance relative to others of the same age in the intellectual, creative, and artistic fields who are capable of exerting leadership and excellence in a specific academic field. The definition also does not mention a sports inclusion criterion. According to Bonner, Jennings, Marbley and Brown (2008), one possible explanation is the assumption that athletes were already discovered in sports programs.

Ignoring or placing sports in the background is not an exclusive approach proposed by the US federal definition or the Texas Education Agency's definition. Although conceptual frameworks, as the TDMM (Subotnik et al., 2011), explicitly quote sporting context as one of the fields of expression of giftedness, studies integrating sports methodologies and talent development frameworks are recent. Noteworthy, over the last two decades, talent development researchers have been attracted by sport psychologists' methodologies (Jarvin & Subotnik, 2010; Worrell, 2016). Some of them have been suggesting investigations regarding the usage of sport psychology techniques to promote talent development in other fields (Gould, 2002; Portenga, 2018; Wallace, Blom, & Gretton, 2017).

For Dixson, Worrell, Olszewski-Kubilius, and Subotnik (2016), as one evolves in a determined field, conditions tend to get more and more competitive, and technical abilities tend to be less differentiating than psychosocial factors. Considering that sport psychology interventions have historically provided eminent athletes with tools to support them coping better with stressful aspects of competitions, Dixson et al. (2016) suggest sport psychology tools should be applied and replicated in different fields of human performance in which the stressful competitive component is made present. Portenga (2018) proposes connecting knowledge from high performance psychology in sports with academics. According to the author, every student

might improve performance consistency and manage pressure, if she or he develops self-awareness, self-reflection and self-regulation abilities, which are typically and historically taught by sport psychologists.

Interestingly, over the last two decades, sport psychology studies have been using gifted and talented conceptual framework designs to explain sports talent development (Durand-Bush & Salmela, 2002; Holt & Dunn, 2004). Holt and Dunn (2004), for instance, adopted the Renzulli's Three Rings Model to develop a grounded theory on psychosocial competencies and environmental conditions associated with soccer success. Inspired by the Renzulli' model design, they created a four interlocked ring model to describe the psychosocial competencies related to psychosocial development of soccer athletes. The authors also emphasized environmental aspects and the role of commitment to explain athletes' progress.

Summarizing, it is possible to state, at this point, that among several different approaches on talent development and sport psychology, evidence and research indicates positive possible outcomes on approaching fields for some reasons: (a) talent development models might provide sport psychologists with robust models that explain how one develops her or his talents, and the role of psychologists in the process; (b) competition's role in developing psychological strength might be important in both fields; (c) successful translation of methodology used by sport psychologists to other fields might contribute with psychosocial development in other environments; (d) investigations about how sport psychologists and talented athletes interact through athletes' trajectories might enhance the comprehension of the psychological interventions' role in different stages of an athletes' life.

Sport Psychology

Sport psychology has been historically defined as the study and application of psychological aspects of human movement (Eklund & Crocker, 2017). For Gil, Williams and Reifsteck (2017), "it involves the scientific study of human behavior in sport and exercise as well as the practical application of this knowledge in physical activity settings" (p. 6).

Interventions involving psychological components are considered important differentiating factors in sports. Weinberg and Gould (2017) mention that coaches in some sports, such as tennis, see it from 80% to 90% as a mental game. Similarly, Olympic athletes (Orlick & Partington, 1988) and professional golfers (Mattsson, Hassmén, McCullick, & Schempp, 2007) have quoted psychological preparation as a crucial feature in their training cycles. Likewise, Subotnik et al. (2011) have highlighted the role of psychological training as an important factor to talent development. This subsection presents the historic landmarks that molded sport psychology, how sport psychology is applied to high performance teams and athletes, as well as approaches relevant aspects about psychosocial support training (PST).

Sport Psychology's Development

Sport psychology today is at its most developed level ever. A common misconception is to consider it a recent field of scientific explorations. Strutt, in 1801, already described a number of British recreational habits, including hunting sports and fighting, without explicit rules. This was one of the earliest records of the relationship between behavior and sports in the modern era, years before the establishment of the Sport Psychology field, and even before sports with current rules were born. In fact, the development of institutions stablishing rules to sports and promoting international level competitions is historically associated with important landmarks that molded

the current competitive sports field (Platonov, 2008). Cambridge Dictionary (2020) describes sports as a game, competition, or activity needing physical effort and skill that is played or done according to rules, for enjoyment and/or as a job. It was not until 1872 that in England, The Football Association Challenge Cup, an annual soccer competition in men's English soccer, was created, being the first competition of the modern era with rules actually maintained to this day. In 1877, Wimbledon became the first tennis tournament under current rules, and in 1896 the Athens Olympic Games reopened the era of Olympism, a key factor in sports sciences' development (Platonov, 2008). Nowadays, the word sport used in Olympic terminology refers to events sanctioned by IOC, the International Olympic Committee.

Noteworthy, Coubertin, considered the father of the Olympic Modern era, was an early great promoter of sport psychology as a scientific field. In 1909 he presented the idea of creating an event that he named Sport Psychology Congress, which was held in 1913, and considered by him, despite some criticisms, as being the birth of sport psychology (Andriets & Andriets, 2017). Two decades before the conference, seminal studies on the reaction time of athletes conducted by Fitz (1893), at Harvard, and Scripture (1984), at Yale, were some of the actual pioneer initiatives to relate sports and behavior (Kornspan, 2012).

Remarkably, the development of sport psychology at the turn of the 20th century is greatly related to research developed by some of the most celebrated psychologists ever as Jung, Triplett and Wundt. Jung's research confirming the relationships between body's electricity signals and psychological states was one of the studies that supported the development of psychophysiological tools, currently used to control stress, as biofeedback galvanic responses machines (Thorson, West, & Mendes, 2018). Triplett's (1898) classic experiment exploring if cyclists would cycle faster if riding against opponents or alone is quoted by many researchers as

the birth of the social psychology discipline (Hertz & Wiese, 2017). Wundt, considered by many scientists as the father of experimental psychology, influenced several of his disciples to work with physical activities and sports (Kornspan, 2012). After World War I, physical education courses in Germany began introducing sport psychology into their curriculum. The *Deutsche Hochschule für Leibesübungen* (DhfL) implemented in Berlin, in 1920, was one the world's first sport psychology laboratories, created under the command of R. W. Schulte, one of Wundt's former disciples. Notably, in 1936, at the Berlin Games, Germany dominated the medal table, a clear result of the first major national sports policy project ever reported (Platonov, 2008).

Systematic research in the field points out that, besides Germany, other sports powers such as Soviet Union, United States and Japan were the main pioneer examples of countries that developed sport psychology laboratories during the 1920s. In the Soviet Union, after the end of the Russian Revolution, the Higher Council of Physical Education was created. Puni, in Leningrad, and Rudik, in Moscow, led the departments of psychology. In 1930, the Central Institute of Scientific Research for the Study of Physical Education in Moscow was created to centralize, organize and coordinate local research. Led by Rudik, the center has registered several studies, with special emphasis on three aspects: (a) athletes' motivations and interests, (b) athletes' psychological strength, and (c) precompetitive tensions. In the United States, Coleman Griffith is considered to be the forerunner of modern sport psychology. Created in 1925, the Athletic Research Laboratory was one of the few laboratories in the world entirely devoted to sport psychology studies. Griffith's work focused on learning, personality, and motor development. In Tokyo, 1924, The National Institute of Physical Education was established with a specific department devoted to the study of psychology applied to sport and physical education, under the management of Dr. Mitsuo Matsui (Oye, 2017; Takasuna, 2016).

Sport Psychology Applied to High Performance Teams and Athletes

From the 1940s to 1965, sport psychology had a transition in its status from a mostly theoretical area to an applied field. Some examples can be highlighted as pioneer initiatives to apply psychology in competitive sports over those years. Brazilian National Soccer Team, in 1958 (Salmela, 1992), was one of the first worldwide successful teams to use sport psychology as a main feature. Feruccio Antonelli, from the Italian National Committee, was the first president of the International Sports Psychological Association (1960) and supported athletes for the Melbourne Games in Australia (1956). Consonantly, Bruce Ogilvie and Burt Giggs from the United States, started working individually with athletes, in private clinics (Simons, 2000).

A determinant junctural aspect of the scenario, that positively influenced sports people's opinion about applied sport science, is that it played a major role in Soviet preparation program, the most successful sports program ever seen up to that period. The Soviet Union achieved first place in the medal table of the Melbourne Olympics (1956) and the Rome Olympics (1960). The Soviet Union also won the first Euro Cup (soccer) in 1960. In the same competition, Yugoslavia and Czechoslovakia achieved respectively the second and the third places, highlighting the excellent level of development of high-performance sports in those years in eastern Europe, especially in the Soviet Union.

Studies reveal that the Soviet methodology has attracted worldwide attention (Kornspan, 2012) influencing sport psychology development in other countries. Payton Jordan, the track and field coach of Stanford University, for instance, kept correspondence with Gabriel Korobokov, the national coach of Russian track and field team. Korobokov introduced several psychological techniques, reinforcing that the Soviet national teams counted with psychologists, specifically focused on performance. Basically, soviet sport psychology had its central focus on: (a) the

research on how athletes could achieve an optimal state of activation in order to achieve peak performance in competitions, and (b) the need to control the variables collected in the field for laboratories. During this period, the findings indicated that each athlete had a different level of activation (mental and physiological activity geared while preparing to execute a deliberate movement). Experiences revealed it was possible to manipulate and adjust the condition of psychological training in order to reproduce, as reliably as possible, the actual characteristics of competitions (Oye, 2017; Rodionov & Ulyaeva, 2011).

Stressing the high development of Soviet sport, K. Wilson, president of the United States Olympic Committee, from 1953 to 1965, demanded actions in the American Congress, in 1962, so that the country could regain hegemony in sport. Discussions in the Congress made it possible to create long-term programs, benefiting athletes, encouraging research and sports in academia, providing material and creating a budget to run the area in the United States. These actions enabled the development of reference centers such as Colorado Springs and Squaw Valley (Platonov, 2008).

The favorable scenario fomented the development of applied sport psychology research, highlighting the importance of assessing the validity of direct interventions provided by psychologists to high performance teams and athletes. In 1966, Bruce Oglivie and Thomas Tutko wrote the book Problem Athletes and How to Deal with Them. Since then, Ogilvie has been considered the father of American applied sport psychology. At this point, psychology became to be considered a major component of sports preparation in the United States. In 1972, Richard Suinn, who later became the president of the American Psychological Association, was hired to be the first Olympic American psychologist. In 1977, Jerry May was appointed as Squaw Valley's first sport psychology director (Kornspan, 2012). Since then, the United States regained

the hegemony in the Olympic Games, winning seven of the next 10 editions, developing the most successful sports program in the modern Olympic era.

In subsequent decades, sport psychology has undergone a process of specialization and has been gradually inserted into high-performance teams around the world. From this point on, the idea of psychological preparation as a differential in international level competitions became widespread in sports, considering all the individuals involved in this process (Weinberg & Gould, 2017).

Psychosocial Support Training

Factors such as a refinement in quality of care, market demands and the assumption that psychological preparation is a predictor of high performance have fostered research in the field of sport psychology, revealing the effectiveness of using psychological interventions to promote sport performance enhancement (Bell, Knight, Lovet, & Shearer, 2020). Psychosocial Support Training (PST) approaches aspects such as: relaxation, self-talk, mindsets, concentration, breathing, goal orientation styles, music relaxation, mentalization (visualization), biofeedback, and reaction time readiness. PST is focused on improving psychosocial skills, such as emotional control or concentration, that might impact psychosocial factors' development. For instance, the manifestation of psychological strength during competitions, an important psychosocial factor, is intimately related to the development of psychosocial skills, such as stress control, concentration and tactical discipline – the ability to stick to the game plan (Barwood, Corbett, Wagstaff, Mcveigh, & Thelwell, 2015; Bell et al., 2020; Jones et al., 2002; Lim & O'Sullivan, 2016; Stewart & Hall, 2017).

Extensive research has been registering athletes' perceptions of PST over the last 30

years. Orlick and Partington (1988), for example, conducted a classic study with 235 Olympic athletes concluding that of the three readiness factors rated by athletes (mental, physical, technical), mental readiness provided the only statistically significant association with final Olympic rankings. Noteworthy, other studies on athletes' and coaches' perceptions about the importance of Psychosocial Support Training display similar results. Elite Swedish golf athletes, for example, reported psychological preparation as a more important factor to determine performance than physiological preparation, at a rate of 2:1 (Mattsson, et al., 2007). Additionally, eminent athletes such as Michael Phelps, Tiger Woods, Jimmy Connors and Chris Evert narrated psychological preparation as a key factor for their talent development during their successful trajectories. Weinberg and Gould (2017) state that most coaches consider sport to be "at least 50% mental when competing against an opponent of similar ability, and certain sports (such as golf, tennis and figure skating) are consistently perceived as 80 to 90% mental" (p. 232).

Although Psychosocial Support Training is recognized as an important factor for talent development by several athletes and coaches, sports environments have been primarily focusing on physical development, relegating psychological components to a second plane (Afonso, Nikolaidis, Sousa, & Mesquita, 2017). Besides, some athletes and coaches do not adhere to professional PST interventions when presented to them (Portenga, 2019). Basically, studies indicate three aspects that might be related to this lack of adherence: lack of information, perception of lack of time, and the idea that psychosocial skills are innate and not trainable (Gould, Medbery, Damarjian, & Lauer, 1999). Some misconceptions about sport psychology are also considered factors that might undermine sports people's adherence to PST interventions: people think sport psychology is only for problematic athletes, PST is useless, PST is only for elite athletes, and PST solutions do not provide long-term effects.

Despite athletes' and coaches' perception and acceptance of PST, research on its effectiveness highlights three important points: psychosocial skills are learnable and should be incorporated into athletes' routine (Bell et al., 2020), successful athletes differ from underachievers in terms of psychosocial skills development (Krane & Williams, 2010; Portenga, 2019), and psychoeducational PST promotes both sports performance and psychosocial development (Jarvin & Subotnik, 2010; Worrell et al., 2018).

Programming psychosocial interventions in sports. Considering the importance of the psychological factor as a performance differentiating component and that sports psychosocial development is a multifactorial issue, researchers have been proposing the incorporation of PST techniques in systematic programs that join various techniques that might support athletes in multiple dimensions. Slimani et al. (2016) analyze studies comparing the usage of isolated PST techniques with bundled PST packages (based on training, mentalization and psychoeducational counseling). The findings report that the use of combined psychological techniques impacted better on motor acuity, and also in psychosocial factors, as psychological strength, and sense of self-efficacy, when compared to the usage of isolated techniques.

PST programs usually have three different stages: educational, acquisitional, and practical (Weinberg & Gould, 2007). The educational stage is fundamental to familiarize athletes, staff and coaches with the psychologists' approach and the PST tools that will be used in the program. It's also an important step to know athletes and their perceptions about main problems to be approached, in order to program the next steps (Vealey, 2019). Ravizza (2010) considers that one of the main goals of this step is to make athletes aware of the importance of psychosocial skills for sports performance. Additionally, it is important to reinforce that athletes

can and should develop those competencies, stressing PST programs are perfectly suitable for that goal. Some points that might be approached in this step: explanation of psychosocial skills and the most common PST techniques, evaluation of athletes' main problems, establishment of athletes' pledge to participate and learn, measurement of athlete's ability to mentalize, introduction of athletes to the PST, and psychological approach used in the program.

Acquisitional stage is the step in which athletes start to train their psychosocial skills. At this point, strategies should be individualized and adapted to each athlete's needs (Balague, 2000). Maynard, Smith, and Warwick-Evans (1995) indicate that stress reduction tools should be contextualized in the specific problem one athlete is facing. Some of the most common problems that need interventions in this step are: lack of concentration, lack of stress control, low comprehension of strategies, actual competition performance lower than training performance, lack of tactical discipline during competitions, and fear.

Practical stage is the step in which athletes incorporate knowledge into routines that will be used in training sessions and competitions. Basically, the goals of the stage are, according to Weinberg and Gould (2017): teaching people how to systematically integrate psychosocial skills in performance situations, simulating abilities the athlete will need in real competitions, and fomenting automatization. Noteworthy, several studies reinforce that the main goal of this stage is athletes' development of self-regulation which is expressed by thought, emotional, physiological and behavior control, transferring what they trained to competitions (Beauchant, Beauchant & Harvey, 2012; Blumenstein & Orbach, 2018; Portenga, 2018).

An essential goal of PST programs is to provide athletes with efficient tools during all stages. One of the most critical outcomes expected of those tools is that they support athletes learning how to program motor and self-regulation skills that should be ready at target dates.

Among several useful tools that help athletes learn how to control the most varied aspects of performance, two seem to be especially efficient to promote psychophysiological and motor control: biofeedback (a technological approach to train inner states) and mentalization (probably the most used sport psychology techniques).

Biofeedback. A central premise of sport psychology advocators is that self-regulation differs elite athletes from non-elite athletes (Gledhill et al., 2017). Self-regulation is reflected by an individual's ability to control psychological and physiological aspects autonomously in training and on target dates (Blumenstein & Orbach, 2018; Dupee, Forneris & Werthner, 2016; Tedesqui & Young, 2017). In recent years, studies have described techniques that provide self-regulation through stress control, concentration control, and the recognition of a personal subjective optimal performance zone. Besides, they have been highlighting that psychophysiological control is something that impacts on superior performance (Jiménes-Morgan & Mora, 2017; Portenga, 2018; Rijken, Soer, & de Maar, 2016).

Due to some degree of complexity to understand, explain or verbalize aspects such as stress control and an optimal psychophysiological state, Moss (2004) suggests the incorporation of biofeedback techniques into PST programs to facilitate athletes' comprehension of internal states. These technological resources are used to monitor and train human psychophysiological activities (Jiménes-Morgan & Mora, 2017). A widely used example of gadgets used for this purpose are devices that monitor galvanic skin responses to train stress control.

Jung was one of the first scientists to investigate correlations between the body's electric currents and psychological factors. In a case study, Petersen and Jung (1907) monitored the dermal electrical response of eleven patients by means of a galvanometer, checking reaction

time, breathing, and intensity of responses to emotions, coughs, expectations, whistles, scares and questions. From this study, Jung registered that expectations had a correlation with galvanic responses increment, confirming a hypothesis previously proposed by Tarchanoff, considered by Jung as the first scientist to record influences of mental states on the galvanometer, in 1890. Currently, galvanic skin response is considered a sensitive indicator of a body's responses related to emotional and attentional state changes.

One major contribution regarding machines that can read body's electric signals was given by Kamiya (Peper & Shaffer, 2010). He demonstrated human brain patterns could be operantly conditioned. In 1969, the term biofeedback was coined to describe techniques using machines that did not only read electric signals, but could also help people understand those signals, and train them. The same way, sport psychologists have been proposing the usage of biofeedback machines to facilitate athletes' comprehension that they can control their levels of autogenous activity (such as stress). Once athletes recognize how those machines might read their internal states, athletes get open to train and develop the ability to control stress with the aid of these machines (Rijken et al., 2016). Afterwards, they can transfer knowledge to training sessions and test competitions, dropping the help of technological resources. After gaining confidence in the process, they might have the tools to transfer knowledge to target competitions (Beauchant et al., 2012; Pusenjak, Grad, Leskovsek, & Schwarzlin, 2015).

Despite some studies reporting the effectiveness of using biofeedback as a consistent tool to promote stress control and muscular tension control, not all of them have proved biofeedback's role in performance enhancement. Studies portraying biofeedback on successful sports contexts suggest that the issue should be investigated, considering the potentially positive usage of sports self-regulation techniques in several fields in which the competitive component is

present (Dixson et al., 2016; Dupee et al., 2016; Jiménes-Morgan, & Mora, 2017; Rijken et al., 2016; Tedesqui & Young, 2017; Worrell et al., 2016).

Mentalization. One of the most widespread and historically reported types of PST technique is visualization or mentalization training (Ridderinkhof & Brass, 2015). In this type of activity, athletes mentally simulate the execution of training sessions, competition routines and situations, reframe past experiences or get prepared for future competitions. A US Olympics report, from 1990, reinforces that mentalizations are widely used to prepare high performance athletes (Murphy, Jowdy, & Durtschi, 1990). The authors revealed that 100% of sport psychology consultants, 94% of coaches of Olympic athletes, and 90% of Olympic athletes used mentalization tools in some stage of their training programs. Notably, 97% of the interviewed athletes believed that it supported their performance and 20% of them reported using it in all training sessions.

Case studies have also indicated the effectiveness of mentalization as a performance enhancement tool (Morais & Gomes, 2019; Post, Muncie, & Simpson, 2012; Quinton, Cumming, Allsop, Gray, & Williams, 2018). An investigation involving Korean Taekwondo Olympic athletes pointed out mentalization's contributions to confidence, critical state performance control, and emotional control (Lim & O'Sullivan, 2016). Callow, Jiang, Roberts, and Edwards (2017) suggest performance in slalom, a kind of alpine skiing and alpine snowboarding, might be enhanced by visualization techniques during simulations.

Scientific experiments also suggest mentalizations might be valuable for motor learning and accuracy improvement in clinical settings, as much as in sports and artistic settings (Morris, Spittle, & Perry, 2004; Ruffino, Papaxhantis, & Lebon, 2017). Dana and Gozalzadeh (2017)

found that the performance of tennis players improved using this type of technique on the serve, forehand, and backhand strokes, after 12 sessions of 15 minutes of mentalization, followed by 15 minutes of actual physical activity.

Considering the cognitive and motivational functions of imagery training in human performance, Pavio (1985) proposes that each function has specific and general goals. As a specific cognitive goal for athletes, he suggests imagining perfect moves to develop those skills. Generic cognitive goals of mentalization include to imagine competition outcomes. General motivational goals involve imagining situations in which athletes control stress.

There are two visual perspectives used when athletes perform mental rehearsals: internal and external. During external mentalization, athletes use their "mental eyes" as a TV camera to register the event. During internal mentalization sessions, athletes are asked to experience situations using their own viewpoint, using a first-person perspective. Normally, internal visualization sessions tend to stimulate athletes' other mental sensations. For instance, tennis players might train to feel the weight of their racquets while mentalizing a serve they want to improve. Research on mentalization in sports registers that none of the styles, internal or external, has evidence supporting it as being better than the other (Hall, 2001). Additionally, Olympic athletes reported using both styles during their mental routines (Murphy, Fleck, Dudley, & Callister, 1990). Callow et al. (2017) provided neurological evidence indicating that a combination of different modalities of mentalization increases performance better than using only one type of mentalization technique.

Several factors might influence the efficacy of visualizations and should be taken into consideration when developing mental rehearsal strategies: the nature of skill, the athlete's level, the athlete's capacity to mentalize, the association of mental rehearsal to physical training, and

personality traits. For instance, literature registers researchers developing different self-report measures and scales to evaluate people's capacity to mentalize (Gagliardini & Colli, 2019). A challenge for sport psychologists is to systematically use those scales to help them assess how and when a mentalization tool should be introduced to a specific athlete.

Considering practical applications of mentalizations, some goals highlighted by contemporary researchers are: concentration improvement (Munroe-Chandler & Guerrero, 2017), motivation improvement (Gregg & Hall, 2018), confidence development (Quinton et al., 2018), control of emotional responses (Munroe-Chandler & Guerrero, 2017; Quinton et al., 2018; Van Raalte, Brewer, Cornelius, Keeler, & Gudjenov, 2019), motor learning and performance enhancement (Dana & Gozalzadeh, 2017; Ridderinkhof & Brass, 2015; Ruffino et al., 2017), strategies development (Portenga, 2018; Weinberg & Gould, 2017), and capacities to cope better with pain and injuries (Ievleva & Orlick, 1991; Slimani et al., 2016).

One of the main challenges for the implementation of effective mentalization, and other principles of sciences associated with sport psychology in PST programs, is to translate knowledge from a multidisciplinary field to coaches and athletes so that they increase their adherence rates. Proposing sports is a multidisciplinary field, Afonso et al. (2017) urge to integrate aspects such as psychology, nutrition and biomechanics in sports physical periodization spreadsheets, so that every professional that is essential to athletes' development might have a programmed and coordinated action during cyclical training periods.

Periodized sport psychology procedures. Since ancient Egypt and Greece, coaches have been dividing sports training into periods. The major goal of these divisions is to program athletes' evolution so that they gradually develop a range of technical and physical abilities

enabling them to be at their maximum level of fitness on the target dates. Historically, training programs have been designed based on successful coaches' experiences, traditions and even folklore. Research registers, however, a shift in the beginning of the 20th century, as coaches and athletes started to recognize the relevance of a scientific approach to the sports training process, influenced by articles registering the physiological aspects of sports performance (Mujika, Halson, Burke, Balague, & Farrow, 2018).

Matveev is considered to be the first scientist to summarize and organize scientific concepts that describe the conceptual framework of the most widely adopted method of periodized training programs Presenting a model that divides one sport season into smaller periods and training cycles, his proposal keeps influencing several scientists and coaches. Although since the 1950s different approaches have emerged, suggesting different systems and subdivisions to program the physical and technical loads (e.g., undulating, block) of high-performance athletes' preparation, it is usual to adopt four basic steps in a linear classic style: general preparation, specific preparation, competitive cycle, and the rest phase (Platonov, 2008).

In the general phase, physical, psychological and technical abilities are trained, with an emphasis on strength, endurance, and motor acuity. Those aspects are extensively trained during the general phase, and athletes are submitted to higher volume (in terms of hours and repetitions) and lower intensity sessions when compared to the next phases. In the specific phase, tactical patterns are improved, training intensity is increased, and volume is decreased. Several coaches work with maximal or submaximal loads during part of this phase, which is extremely demanding for athletes in terms of energy, motor control and risk of injuries. The next phase, the competitive period, is often characterized by a reduction in loads, marked by short training sessions, focusing centrally on the target competition. During the rest phase, athletes should

replenish their energies, keeping active during free periods and, preferably, monitoring aspects such as food intake, since energy expenditure in this period is much lower than in the other cycles (Matveev, 1997).

Some other aspects which are usually common in contemporary periodization programs, according to Pyne (as cited in Mujika et al., 2018), are: (a) training stages adopt a logical sequence, (b) training loads follow a cyclical and progressive increment, (c) periodization program is designed according to the most important goal of the season, (d) structured program is supported by scientific monitoring, (e) emphasis is on the skill development throughout the program, and (f) recovery and regeneration techniques are systematically and intensively adopted.

Researchers have been criticizing the fact that periodization plans are systematically focused on the athletic aspects of preparation, not integrating factors as nutrition, biomechanics and psychology, which are fundamental for sports performance (Afonso et al., 2017; Balague, 2000; Bompa, 1999). Afonso et al. (2017), for example, criticize, in a robust review article on conceptual and methodological topics about training periodization, the fact that 95,2% of papers were mostly unidimensional - that is, focused almost exclusively on the physical components of performance (Afonso et al., 2017)

In sum, despite the obvious importance of psychological components for athletic performance, the periodization of PST is still poorly addressed in literature. Some of the reasons for the lack of studies on psychological aspects of sports periodization might be: (a) lack of consensus about what psychosocial skills really are; (b) lack of consensus about goals, tools, and skills to be implemented; (c) lack of knowledge about the best sequence to introduce the PST techniques (e.g., is mastering one psychosocial skill a prerequisite for the other? If so, should it

be thought beforehand?); (d) lack of information about the ideal balance of psychological and physical loads in terms of intensity and volume; (e) scarcity of conceptual models proposing programs that periodize the PST; and (f) lack of studies regarding the effects of proposed models.

According to Miçooğullari (2016), Bacon designed one of the first models of periodized psychological training in 1999. Bacon described some important qualities a psychologically well-trained athlete should have – focus on the present, determination, confidence, optimism – using PST tools to increase the performance of five individual aspects: relaxation, positive self-talk, energization, visualization, and concentration. He also suggested psychosocial training should be individualized and integrated into athletic training, matching psychological training goals with other training components.

Balague (2000) designed a model that reviewed the sequence in which psychosocial skills should be taught. It recommends competencies should match training phases, sports specificities and athletes' needs. Balague's sequence starts with basic components: motivation, productive thinking, self-awareness, and self-confidence. Next step, performance abilities should focus on: attention, energy management, and cognitive-perceptual skills. During a third stage, personal developmental factors should be considered: identity formation, interpersonal functioning, and media management. In the last one, the author points out the team functioning skills: focus on communication skills, cohesion, leadership, and team confidence.

Another model, developed by Hammermeister and Von Guenthner (2005), suggests considering specificities, such as volume, intensity and rest, to develop a PST program. The authors used a list of exercises for the progressive use of several mental skills, proposing an adaptation of a program to specific individual needs of athletes and coaches.

According to Holliday (as cited in Mujika et al., 2018), periodization is the "backbone" of PST. The model suggests PST programs should have the following stages: understanding, acceptance, utilization, and integration. Under this perspective, an athlete's openness to PST is a primordial step. Some important principles of this model are: (a) to become strongly familiar with the team's long-term training cycle, (b) to match psychosocial skills with specific stages' demands, and (c) to systematically manipulate the volume and intensity of PST during each training phase. A great contribution of this model comes from its approach about volume and intensity of PST. According to this model, PST should be introduced in high volume and low intensity in the first phases of psychological periodization, increasing intensity and diminishing volume in the last phases.

Evidence supports the importance of periodization in PST programs for high performance sports (Beauchant et al., 2012; Blumenstein & Orbach, 2018). Blumenstein and Orbach (2018), for instance, described a successfully applied periodized PST program, reinforcing that periodized psychology might indeed be related to excellent outcomes in some of the most demanding competitions in the world.

> The psychological programme was provided to athletes who competed in four Olympic Games, four world championships, and six European championships, in which 38 athletes from 14 different sport disciplines achieved medals. A major reason for the positive results is due to the integration of PP [psychological preparation] within the athletes' training process based on the periodization principle. (p. 8)

Compiling aspects which are common in the existing models of periodized Psychosocial Support Training programs, Mujika et al. (2018) highlight:

1. An athlete's psychological needs determine which skills she or he should train.

2. Athletes and coaches are strongly motivated to learn the psychological factor. Therefore, psychologists should identify the psychological demands of the specific modality and training phase and teach athletes psychosocial skills that will help them do better in each step. This could promote engagement.
3. Athletes should be taught about psychosocial skills and how to develop them. Preferably it should be done since earlier career stages. Besides, at a point in athletes' trajectories, the training should be individualized, to provide best results.
4. Some athletes may simply think that they do not need to develop psychosocial skills.
5. Psychosocial skills are not universally comprehended and accepted in sports environments.

Psychosocial Factors in Trajectories of Talented Athletes

The access to opportunities has been considered a fundamental psychosocial factor for talent development (Subotnik et al., 2011). Syed (2010) describes the trajectories of talented people as Mozart, Federer, Picasso, and Beckham, reinforcing that talent development should not only be considered as an individuality issue, but also a matter of circumstances. Syed highlights that eminent people, in different fields, tend to systematically have powerful opportunities in their trajectories. Research conducted with young golfers pointed out that athletes tend to decide to develop their mastery only after having opportunities to get in love with sports, with coaches and family playing important roles in supporting them and nourishing this passion (Hayman, Polman, Taylor, Hemmings, & Borkoles, 2011).

Social support usage is also a relevant factor to promote talent development. Family and coaches' support are quoted as important factors to help young athletes develop competencies

that will be necessary in their trajectories. Analyzing a golf development program that was not producing good results, Henriksen, Larsen, and Christensen (2014) pointed out disorganized coaches, who did not care for psychosocial skills and only did the minimum necessary to keep their positions, as a possible explanation for the fact that the program was not being able to promote athletes' transition to higher professional levels. Grolnik (2009) reinforces family might influence the amount of time a person engages in autonomous talent developing practices or coping with stressful conditions associated with talent development.

As athletes fall in love with sports and have conditions to develop basic skills, their initial abilities are developed into competencies. Then, some of them decide to become experts, and start to realize they will need something more than technique to evolve (Portenga, 2019). Portenga portrays a study where all the interviewed athletes recognized the importance of analyzing their game and learning self-regulated planning and practice. The author reinforces that athletes who want to transit from competence to expertise normally understand that some experts' knowledge will be necessary to learn skills, such as how to regulate their performance. At this point, athletes start taking responsibility for their future careers, recognizing they should commit and work on their weaknesses. Engaging in self-regulated strategies is a form of getting aware of their training process and learning how to develop and control their performance in training sessions and competitions (Blumenstein & Orbach, 2018).

Psychosocial factors play a key role in self-regulated high performance in several fields, such as education (Siegle et al., 2017) and sports (Portenga, 2019). Athletes who want to become experts recognize they need to develop psychosocial skills to succeed. Holliday (as cited in Mujika et al., 2018) reinforces athletes' openness to PST training is fundamental in this context. In fact, athletes' openness toward their own abilities also seems to be fundamental for talent

development. Dweck (2014) signalizes an open mindset, which indicates one believes she or he can develop talents, is a powerful drive to develop competencies in any field. Dweck (2014) points out, for instance, that Billy Beane, general manager of The Oakland Athletic, recognized growth mindset style as fundamental for the outstanding performance of his team, one of the lowest budget teams in the Major Baseball League. Further, Shaw (2020) found out, in a research with 114 Canadian hockey players, correlations between growth mindset, athletes' openness to PST and confidence in sport psychology. Openness to social support, as described in the TDMM, is one of the important social skills that might have psychosocial impact on performance in several domains.

Dweck (2014) also highlights the potential relevance of converting a fixed mindset into growth mindset, for athletes that lost their joyful perception of sports:

> It would be fascinating to see how a growth mindset intervention works in the domain of sport - to see the impact that it has on the desire to practice, the enjoyment of sport, and the ability to cope effectively with setbacks, especially for those who have been turned off the joy of sport. (Can Mindsets be Changed?, para. 7)

Important to notice that motivational aspects are fundamental so that people effectively take opportunities. The TDMM (Subotnik et al., 2011) proposes future investigations should consider the relations of opportunities' availability with motivational styles and intensity. The model indicates that people with less opportunities, for instance, should be highly motivated to take advantage of the few opportunities they have. The same way, they consider people with high opportunities, but low motivation, are susceptible not to succeed, even with higher opportunities, social support and financial support.

Several athletes drop off sports in the transition from competence to expertise in teams that provide them with good opportunities to develop their talents (Jayanthi, Pinkham, Dugas, Patrick, & Labella, 2013). Early specialization is pointed out by Jayanthi et al. (2013) as a potential barrier for athletes to keep motivated, after years of hard load practice, during childhood or early adolescence. The authors highlight that early specialized athletes are systematically submitted to situations that might exacerbate psychological stress or the risk of injuries. Therefore, considering that some sports do require early specialization, and fully motivated athletes, it seems relevant to investigate how PST might contribute to help athletes to cope in a better and healthier way with stressful situations. It is also important to investigate the psychologists' role in monitoring stress levels and providing feedback to athletes.

Likewise, goal orientation style is quoted as a determinant aspect about talented people's mentality to achieve success in their careers. Mastery oriented athletes tend to focus on learning and constant evolution. Athletes with this type of mentality, which researchers indicate is highly associated with top performers, tend to face less pressure during tough moments, seeing failures as learning opportunities and victories as part of a developmental process. Different from that, performance-oriented athletes, who are focused on achieving results (e.g., breaking records, winning a medal, beating an opponent), or not losing, tend to have higher psychological pressure during key competitions and even during some training sessions. Øvretveit, Sæther and Mehus (2019) studied 12 Brazilian jiu-jitsu fighters, finding associations of mastery goal orientation with training effort, suggesting a mastery oriented style may increase not only involvement during training, but also long-term adherence to sport.

A main feature of elite sports environments is that athletes, in order to succeed and perform a transition from expertise to eminence, have to be competitive and display better

performances than others (Worrell et al., 2016). According to Dixson et al. (2016), competition rises in every field in which talented people develop their skills, reinforcing that psychosocial aspects might be a more important differentiating factor than technique for talent development, as competition level progressively increases. Analyzing competition's role in developing outstanding performances and psychological strength, Worrell et al. (2016) reinforce sport psychologists have a historic path investigating and developing methods that might promote one's ability to cope with stressful aspects of competition better than opponents. Additionally, the authors propose appropriate psychological training for stressful situations "pays off in superior performance when it is called for" (p. 265), suggesting psychologists should investigate the contexts in which psychological strength is developed in several arenas. Jones et al. (2002) interviewed 10 international level athletes (that took part in Olympic or Commonwealth Games) to find components associated with psychological strength development (which they labeled as mental toughness in the study). Some of the most important characteristic those athletes quoted as fundamental to be psychologically strong are: great concentration, ability to handle pressure, desire, compatible life style, technique under pressure, acceptance of the fact that anxiety is part of sports, knowledge to cope with stress, great capacity to deal with set-backs becoming stronger after them, great belief they can make better than others, and a great belief they have the skills to achieve their goals (this self-confidence was reported as the most important aspect, according to their perceptions).

Research also indicates that some kind of professional psychosocial assessment, mentorship and even contact with more experienced people might support talented people learning, for example, fundamental strategies to cope better with the stressful aspects of competitive settings and getting able to do a transition to upper stages in their careers (Dixson et

al., 2016; Jarvin & Subotnik, 2010). Important to mention that psychological preparation has been registered as the most important factor to differ Olympic rankings and that Olympic athletes have massively recognized a PST tool (mentalization) as contributor to their performances (Murphy et al., 1990). Murphy et al. (1990) revealed Olympic coaches are also aware of the importance of the psychological factor, despite a lack of adherence to PST in professional sports teams. Misconceptions (Weinberg & Gould, 2017) and lack of knowledge about the role of psychology in sports environments (Fortin-Guichard, Boudreault, Gagnon, & Trottier, 2018) are pointed out by researchers as possible reasons for this lack of adherence. Fortin-Guichard et al. (2018) indicated athletes and coaches revealed another barrier for PST acceptance: psychologists should demonstrate a deep knowledge of a sport modality as a prerequisite for them (athletes and coaches) to engage in PST, despite considering interventions provided by psychological consultants as positive factors to promote sports development. In the same study, coaches pointed out that lack of information about PST was indeed a main barrier to the acceptance and usage of PST in professional clubs in different countries and athletic modalities.

Considering the recognition of the importance of Psychosocial Support Training does not necessarily reflect an openness of sports environments to sport psychology methodologies, which might have negative impact on athletes' appropriate psychosocial preparation to achieve higher career levels, it seems reasonable to propose sport psychologists should develop the most attractive and effective PST programs, to broaden their possibilities of implementing such potentially important interventions in the sports scenario. Facilitating knowledge transfer from sport psychologists to athletes, parents, sports decision makers, coaches and even researchers in other fields appears to be an essential step to foment people's interest in PST. This recognition

might provide useful psychosocial development tools in different contexts in which human talent is being nourished to the upper levels.

Additionally, the usage of currently accepted talent development frameworks as the TDMM, for instance, might support sport psychologists with a trail to explain which the most important psychosocial barriers and enhancers in athletes' trajectories are and how talented people evolve in such a specific field, compared to talented people in other fields. Subotnik et al. (2011) propose that investigating those conceptual models' adequacy to explain athletes' road, from earlier stages to eminence, might be beneficial not only to understand how athletes develop their talents, or to understand the role of Psychosocial Support Training in developing sports talents, but also how effective a conceptual framework might be in the sports domain.

CHAPTER 3

RESEARCH QUESTIONS

Human abilities and creative productions have been inspiring people and arousing the interest not only of researchers and professionals from different areas, but also of decision makers, grant agencies and legislators worldwide (Eklund & Crocker, 2017; Prado, 2018). Reinforcing it is essential to prepare people for a dynamic and diverse world, Prado (2018) describes human capital as

> the most precious asset and, in this sense, preparing people for a world of uncertainty and diversity in democratic societies, which advocate equality, the possibility of developing a potential or competence is something that should be accessible to all individuals. (p. 60)

However, abilities and innovative ideas are not enough to determine who will effectively achieve eminence. Underrepresentation and psychosocial factors, as striving for opportunities, might limit one's possibilities of actually developing talents to the most eminent levels: "Eminence, although not guaranteed, will never develop if talented individuals do not take advantage of the opportunities they are afforded, nor will eminence be possible for individuals who never get opportunities to develop their talents" (Worrell et al., 2018, p. 254). Syed (2010) stated that powerful opportunities were extremely important enhancers in the trajectories of eminent people such as Michael Phelps, David Beckham, Pablo Picasso and Wolfgang Mozart. Kuusisto et al., (2017) pointed out that students with lower socioeconomic status, minority backgrounds, or less opportunities, were "especially vulnerable to the effects of a fixed mindset about intelligence" (p. 7).

Individuals from low-income and underrepresented minority groups normally constitute

what the TDMM portrays as a lower opportunity group, which will require high motivation, growth mindset and a mastery orientated mentality to take advantage of few opportunities, that might be crucial for their development (Subotnik et al., 2011). Noteworthy, talent development conceptual frameworks have been historically applied to school environments, where low opportunity groups are traditionally less represented in talent development programs (Worrell et al., 2018).

Worrell et al. (2018) specially quote sports and arts as fields where underrepresented populations have been flourishing in America, pointing out the NBA and NFL as elite groups where the majority of top players are African-Americans. The authors also list several artists and athletes as Serena and Venus Williams, Tiger Woods, Michael Jordan, Michael Jackson, Mariah Carey, Cristina Aguilera and Jesse Norman to describe how eminence, as the goal of talent development, is not a privilege of majority groups members or should be restricted to academic domains. Quoting Viola Davis, the first African-American woman prized with an Emmy award for best actress in drama, Worrell et al. (2018) propose eminent trajectories would inspire other people and increase the number of students in talent development trajectories, if useful opportunities are provided to them in the most diverse domains: “The only thing that separates women of color from everyone else is opportunity. You cannot win an Emmy for roles that are simply not there” (p. 254)

For Worrell et al. (2016), it is a great challenge to conduct studies about how psychology might produce knowledge in competitive contexts, because people still have a negative view of competition. Also, some researchers have only in the last decade conceived the hypothesis that competition might be, under some circumstances, constructive and a useful field of study out of sport and artistic arenas. Worrell et al. (2016) describe several studies in which competitive

contexts, under fair conditions, might be positive, rather than negative, even for people that happen to lose, in academic settings. Those findings evidenced students displayed excellent levels of performance in academic competitions, as in robotics and mathematics olympiads, and recognized their outstanding performances were a result of their efforts to learn, being actually proud because they did well, despite results. Gunderson (as cited in Worrell et al., 2016), portrayed his debut in a robotics competition, as knowing his team was not going to win, but also knowing that his robot was a representation of the best his team and mentors had done. For Worrell et al. (2018), it is relevant to teach young people how to cope with competition across the academic domains, as people do in performance fields such as athletics, music or dance, promoting forms to see the competitive stress as a challenge, not a threat. Jarvin and Subotnik (2010) urge teachers to be prepared to provide this type of preparation in school environments. Likewise, the TDMM suggests it should be systematically done, since the earliest stage of talent development (Subotnik et al., 2011).

However, few talented development studies have investigated how to convert psychosocial factors barriers into enhancers in competitive environments. Gledhill et al. (2017) pointed out, in their analyses of 48 articles that mentioned psychosocial factors associated with talent development in soccer, that only three of them have proposed analyzing players' actual chance of making a transition to progress to elite players. Notably, there is also a lack of clarity defining who are talented athletes in those studies, ranging from adolescents from an English professional 3rd division club (Holt & Mitchell, 2006), through international youth (Holt & Dunn, 2004) to UK female youth soccer players (Gledhill & Hardwood, 2015). Despite providing useful athletes perceptions about the development of psychosocial factors in their trajectories, the three studies, identified by Gledhill et al. (2017), did not interview eminent

athletes and did not focus on exploring the sport psychologists' role in the talent development process.

Recently, Gledhill and Harwood (2019) interviewed English female soccer players, investigating the contribution of sport psychologists to talent development programs in sports. Although the results revealed athletes' perceptions about their talent development environment, and the importance of psychologists as contributors to athletes' psychosocial development, the study did not explore how psychologists might do that. It also does not mention if those athletes really did a transition to eminent levels. Considering frameworks as the TDMM set eminence as the goal of talent development programs, it seems relevant that research on talent development in sports also includes athletes that actually reached outstanding performance in their cohorts, exploring athletes' evaluation about different PST tools and interventions (Subotnik et al., 2011).

Furthermore, considering the role of psychosocial factors in talent development, as advocated by the TDMM (Subotnik et al., 2011), and of the PST as a relevant strategy to promote psychosocial development in several fields, it seems coherent to investigate elite athletes' trajectories to understand which psychosocial factors were relevant to their development in sports. Their narratives about psychologists' methods, periodization plans and approaches, can support researchers to understand how systematic PST usage might have contributed to their talent development.

Therefore, this study interviewed elite athletes (ranked at least once as # 10 in their continents) submitted to PST programs, addressing the following research questions:

1. What psychosocial factors are associated with talent development in sports?
2. What is the role of PST for talent development in sports?

CHAPTER 4

METHOD

Research Design

This study has a descriptive and exploratory design of qualitative nature, based on the Grounded Theory (Corbin & Strauss, 2008). It investigated the role of psychosocial factors and Psychosocial Support Training (PST) associated with talent development, according to four elite athletes who practice individual sports modalities.

Participants

Four talented Brazilian athletes, two males and two females, submitted to periodized PST programs were invited to take part in this study. The inclusion criteria were: (a) being ranked at least once in the top 10 athletes in their continents; (b) being trained by periodized PST programs; (c) having used biofeedback and mentalization; (d) being trained over at least two years in the same program; (e) being specialized in individual sports modalities. The participants were identified by letter M for males and F for females, as much as by the numbers 1 and 2.

Male 1 (M1). M1 (25 years old) is a high-performance athlete. He started practicing when he was 8 years old. He is an Olympic finalist, a world champion, and broke a world record in 2016. During his childhood, he faced financial restrictions. He described his mother as instrumental, because his father did not participate in raising his son. Only after the age of 11 he got to have closer contact with his father, who lived in a far city. At the age of 13, he decided to dedicate himself to sports, training for more than five hours a day. When he was 15 years old, he was given the opportunity to train in a team, which enabled him to run for a place in a Brazilian

national team. He qualified, as a 15-year-old teenager, for the London Olympics, in 2012. During the beginning of the PST Program, in 2014, the athlete portrayed a lack of psychological routine, although he had already taken part in some psychotherapeutic sessions, focused also on sports performance. According to his narratives, one of the focuses of the analyzed PST program was the establishment of psychological routines to support him in training sessions and competitions. He won his first medal in the Rio Olympics, 2016, and in 2017 he won the first individual major world championship gold medal. Nowadays he keeps at this national team, maintaining performance levels and is trained by the same team of psychologists.

Male 2 (M2). M2 (30 years old) practiced different sports modalities as skateboard and basketball during childhood, before choosing the sport he practices nowadays, when he was at the age of 12. He took part in three Olympic Games. He is a world champion, an European champion, a national champion in Europe and an Olympic finalist. He had financial difficulties to develop his career. His family was not wealthy, and his father had two different jobs to support him in sport and pay for family's bills. At one point in time, he thought about quitting the sport to follow his studies. However, he remained in the modality and took part in the Olympic Games, in Beijing, 2008, when he was 19 years old, and obtained excellent results. Despite the prominence in this competition and the good results at the London Olympics, 2012, he complained, in the beginning of the PST program, in 2014, that he did not feel psychologically strong in London (2012) and, as consequence, the results in England were disappointing. Therefore, he felt he needed to invest in his psychological preparation, in order to cope better with pressure at the Olympic Games to be held in Rio de Janeiro in 2016. He had been previously submitted to psychological preparation which, according to him, did not teach him anything applicable but was enough to make him understand he needed psychosocial

training. During the Rio Olympic Games, he obtained the results he wanted. In 2017, he won the first major world championship gold medal. M2 and M1 have been trained in the same national team in Brazil. He keeps training with the same team of psychologists increasing performance levels.

Female 1 (F1). F1 (28 years old) has been engaged in swimming since childhood (6 years old). She has portrayed great potential which attracted older experts' attention, at a local club in the beginning of her career. Facing socioeconomic disadvantages, she had to move to a big city to blossom. After moving to one of the biggest cities in Latin America, when she was at the age of 14, she started training in one of the best clubs in the continent. F1 represented Brazil in the Youth Olympics, in Singapore, when she was at the age of 17. She was ranked world top 9, as a juvenile, Youth Olympic also top 9, and world top 16, as a professional. She was a national champion in 2015, as a professional, and vice South-American champion in her modality, as a juvenile in 2011. She took part in the Brazilian National adult swim team in international competitions, being a finalist in Australia, 2014. When she was 18 years old, she looked for psychosocial support training because she was facing competitive stress and not performing well. According to her, the club where she trained had a psychologist who did not provide individual sessions of PST to athletes. The PST program was done, initially, at a private clinic, with the group of psychologists who worked in the same national team as M1 and M2. Six months after starting the PST program, she was hired by another major Brazilian sports club, where those psychologists worked. There, she increased her performance levels during all six subsequent international and four national competitions. She did not achieve her goal of participating at the Rio Olympic Games, despite having results which were very close to her planned ones. She evolved 1,5 seconds during two and a half years in the club and got only .3

seconds from the time she wanted. Nowadays she is a professional athlete in one of the Brazilian biggest clubs, finishing graduation at college and programming to retire soon.

Female 2 (F2). F2 (22 years old) was a precocious tennis player talent discovered at a local suburbs club, when she was 5 years old. She came from a non-privileged family, in terms of socioeconomic status, and always had difficulties to pay for expensive travels and equipment. When she was at the age of 9 she was given the chance to play at a club where she developed her international potential, which was helpful during her trajectory, as she plays a very expensive sports modality. For 7 years she had partial financial support at this club. As a juvenile, F2 was ranked the number 1 athlete in Brazil, and one of the top 10 athletes in Latin America. When she was 14 years old, she looked for PST for having panic attacks during competitions. She had expressive international results in prestigious competitions and was also Brazil's number 1 player from 14 years old through 16 years old. She was considered a great talent in Brazil, getting great nationwide media attention, but did not have substantial financial incentives afterwards, which somehow led her to choose to play at the college level in the United States. Nowadays she is 22 years old and is close to obtaining her college degree. She intends to be a tennis coach in the United States. Notably, despite her efforts to have a career as a coach, she revealed that she keeps planning and dreaming to reach a professional career as a tennis player. She is playing her best tennis so far. She and her partner have been selected as USA's First Team All-Conference Doubles and closed the 17/18 season winning 18 of their last 19 double matches. She also won her last 11 singles matches.

Psychosocial Support Training Programs

The participants were submitted to similar PST programs, implemented by the same group of three sport psychologists. The same group of psychologists worked in a national team, a major club and a private clinic in Brazil. M1 and M2 trained in a national team that also had one nutritionist, two doctors, three psychologists, two biomechanical specialists and two physiotherapists. The PST program with M1 and M2 was carried over four and a half years. At the national team, the PST interventions were done once a week and the multidisciplinary team had periodic meetings to evaluate the work, set up goals and establish eventual adjustments.

F1 was trained in a Brazilian major national club, that had the same group of psychologists of the national team, a nutritionist, a doctor, and two physiotherapists, but not a biomechanical specialist. She underwent the club's PST program for two and a half years. She was submitted to PST once a week. Important to mention that F1 had already been assessed by one of the club's psychologists in their clinic over 6 months before, coincidentally moving to the same club where the three psychologists worked.

F2 was trained in a local tennis club and her PST program was conducted by one of the three national team's psychologists, once a week, at their clinic and at the training venue for two and a half years. She had a doctor and a nutritionist but did not count on a biomechanical specialist on a regular basis. The psychologist had periodic meetings with her coach to adjust goals, plans and watch training sessions and competitions.

The duration of a macrocycle (a classic periodization cycle) varies from months to a year, depends on how many target competitions one athlete has in a year. In the studied case, athletes had, basically, two six-months macrocycles per year. All investigated athletes had target competitions in July and December. The programs were designed using a linear classic model of

periodization (Platonov, 2008), characterized by a high volume and low-intensity work during first stages, followed by a decrease in volume and increase in intensity at posterior stages.

During the first macrocycle with each athlete, educational and acquisitional PST was done. At the educational stage, the PST program goals were to comprehend athletes' major needs and to teach them that: (a) psychosocial factors might be trainable, (b) that PST tools are suitable for the purpose, (c) and to introduce athletes to the most important techniques to be used in the program. Therefore, the PST educational stage was focused on mapping athletes' reality, developing rapport, introducing athlete's and staff to PST tools (e.g., biofeedback, mentalization) and teaching athletes basic sport psychology concepts on aspects such as stress control, concentration, self-regulation and game plan development. Afterwards, over the acquisitional stage, athletes started to use the PST tools, basically biofeedback and mentalization. At this stage, athletes used the tools out of training sessions, to comprehend how they work before integrating them into competitive routines.

As athletes got aware of basic components of PST and started training with biofeedback and mentalization techniques in the first cycle, the second macrocycle and all the others done in the next years were focused on practical applications of PST, which are described in Table 1, proposed by the psychologists, inspired in Beauchant et al. (2012)'s model. The main focus of the interventions was that athletes effectively integrated the PST tools into the routines they used in training sessions and competitions.

During the practical stage, biofeedback was mainly focused on stress control. Mentalizations were used to foster motor control and the development of at least two different strategies, improving athletes' confidence that they were prepared for different situations. Different physical and technical phases implied different usage and goals of PST.

Table 1

Periodization Training Goals Table

Phase	Weeks	Volume	Intensity	Physical Goal	Technical Goal	PST Goals
Adaptation	1	Very low	Very low	Free	Free	Evaluate athlete after breaks and set goals
Endurance	5-8	High	Low/ moderate	Increase endurance	Motion acquisition and accuracy	Use biofeedback focused on stress control, and mentalization on motor awareness
Force	5-6	From high to moderate	From moderate to high	Increase force	Motion flow	Deepen stress control, mentalization focused on flow, and grouped moves
Power	3	Moderate	High	Reach maximum power	Establish strategies and keep flow under heavy pressure	Develop game plans, mental tests, test game plans and keep training stress
Pre/ competition	4	Moderate	High	Potency	Maintain strategy and motor accuracy with potency	Choose a game plan, keep the game plan, choose a plan “B” and mentalize both/ Final biofeedback usage
Polishing	1	Low	Moderate/ high	Rest before competitions and keep potency, as much as possible.	Keep motor control, train specific and short situations	Mentalization focusing on game plans “A” and “B”
Competition	1	Low	High	Best performance	Execute game plan “A”. If not possible, go to plan “B”	Autonomy and confidence. Mentalize both game plans and perform the same as practice.
Rest	1-3	Very low	Very low	Keep active	Free	Free

Adaptation was primarily a phase to analyze athletes' needs and value, introduce them to basic concepts and tools while endurance phase is when athletes have heavy long sessions (lasting at about one hour) to train stress and movement precision in mentalization procedures (Beauchant et al., 2012). During the force stage, periodized PST focused on deepening stress controls and the mentalization of movement combos (e.g., a tennis player imagining her/his serve followed by a volley). Over the power phase, psychologists programmed mental tests with coaches and athletes, simulating competition situations in training sessions (Weinberg & Gould, 2017). During the pre/competitive phase, strategies were defined, and game plans were established. Polishing was a very light period in terms of PST volume (20 to 30 minutes session) as athletes were supposed to be already prepared in this step. Few interventions were done over the competitive phases, reinforcing athletes' autonomy.

The four athletes had similar periodization cycles, which despite small differences, had training goals as presented in Table 1. Important to mention that Olympic coaches currently use different models of periodization (e.g. classical, block, undulating) and psychological loads should be adapted to the actual physical periodization model proposed by coaches (Mujika et al., 2018). Thus, although the usage of a psychological periodization model inspired in Matveev's classic design seems suitable to explain how interventions were used in the present context, it appears relevant to consider that different tables (with different steps) should be designed to integrate PST tools with loads proposed by coaches to match each athletes' training program.

During weekly PST sessions, athletes were given explanations about each periodization phase's requirement in terms of technical, physical, psychological, nutritional and biomechanical needs. Data was provided to the psychologist by the athletes' team. Athletes F1 and F2, who didn't count on biomechanical specialists, were asked to study videos with ideal moves and

strategies, to mentalize them, following their coaches' indications.

In other words, regarding the educational stage, psychologists have focused on providing athletes with useful information and understanding athletes' perceptions, values, interests and curiosities toward sports in their trajectories. Goal setting and tools were subsequently designed in order to be coherent with individual needs and aspirations matched with periodization plans. Therefore, a timetable with short, medium and long-term goals was planned to guide actions to be developed throughout each cycle. Acquisitional stage was centrally focused on athletes' first usages of PST tools, to foster their comprehension of how the tools could be used to control aspects that might develop their performance and psychosocial aspects (e.g., motor accuracy, stress control). Practical steps of the PST program used tools as mentalization, skin conductance biofeedback, mental tests, psychosocial interventions and competition assessment implemented in order to: (a) establish mental routines for technical improvement, (b) promote stress control, (c) foment athlete's autonomy, and (d) develop game plans to be used in target competitions. The PST tools were used in high volume (in terms of hours) during earlier stages and low volume in latest stages. For instance, sessions during the endurance phase tended to have at about one hour. During the polishing phase, they lasted no more than 30 minutes.

Instruments

This study used a semi-structured interview, conducted in two phases, to collect the data. The first phase analyzed athletes' trajectories in sports. The second investigated how they evaluated biofeedback, mentalizations and periodized PST. Finally, athletes provided their overall impressions about the PST program. The protocol was prepared based on studies on talent development and sport psychology (Holt & Dunn, 2004; Holt & Taminnen, 2010; Mujika

et al., 2018; Portenga, 2019; Prado, 2018; Subotnik et al., 2011, Siegle et al., 2017; Worrell et al., 2018) and submitted to three experts with Ph.D in sport psychology, physical education and talent development for analysis. Some questions were revised, and the final version of the interview protocol consisted of six axes:

Sport Trajectory

1. Can you tell me the most important moments in your trajectory in sports? Give as much detail as you can. Where you started...the most remarkable competitions...how you got to your current job...etc.
2. What were the factors that contributed mostly to your talent development? Can you describe them in detail?
3. Who were the most relevant people that helped in the process? How did they do that?
4. What were your highest sports competitive achievements? Describe those competitions in detail and how you qualified for them.
5. What were the greatest challenges you faced in your trajectory? Would you describe each one?
6. Is there something else you think would contribute to explain how you developed your talents?

Biofeedback Evaluation

7. Was biofeedback useful for you?
8. If so, describe how.
9. Have you learned something from it? Give me examples.
10. Have you applied it in practical situations? How?
11. Were there difficulties using the machines? If so, which?

Mentalization Evaluation

12. Did you engage in mentalization training? How often? Where?
13. Did it help you improve any technical, emotional or tactical aspects? How?
14. If so, describe why you used it and what your goals were.
15. Were there difficulties to mentalize? Explain.
16. Do you keep doing it?

Evaluation of Periodized PST Programs

17. Did periodized PST procedures focused in different training phases help you? How?
18. How did you comprehend your athletic periodization before the PST program? Were training sessions meaningful?
19. Did PST help you understand your training phases' goals? How? Give me examples.
20. Do you think it is relevant to understand training requirements and goals? Why?
21. Did periodized PST help you in any practical way? How? Provide details.

Overall Perceptions about the PST Programs

22. What do you think of programs that integrate different methodologies, as biofeedback, mentalization and periodized frameworks?
23. Did the program really support your psychological evolution? How?
24. What were the most important contributions of the PST program four your talent development that you haven't quoted yet? Describe them, please.
25. Is there something else you would like to comment about the PST?

The choice for semi-structured interviews is fully grounded on the assumption that people understand reality based on their own values, and individual beliefs. The best people to describe

eminent athletes' roads to eminence are eminent athletes themselves (or at least athletes that got to a high expertise level). They know best each step they took from childhood to develop their psychosocial, physical and technical skills. They have the full authority to describe their opportunities, support (or its lack), passions, interests, goals, accomplishments and setbacks over their trajectories. Researchers have been stressing that one of the advantages of conducting interventions based on biographical narratives is that they generate opportunities to identify individual singularities, especially in research with lower samples (Prado, 2018).

Prado (2018) points out it is difficult to make longitudinal studies with eminent people, because it is hard to preview who will actually become eminent, and also because eminent people usually have less available time for long term interventions. In this sense, interviews were chosen to collect data with elite athletes.

Procedures

The four athletes were chosen based on the inclusion criteria. After inviting each athlete who met the research criteria, the research sent an invitation letter by email to the athletes, asking them about their interest and availability to participate in the study. All four agreed to contribute with the research.

Then, an appointment was made to conduct the first interview. F2 asked to answer the protocol questions online, via Skype, as she was in the United States. M1, M2 and F1 were interviewed face to face in São Paulo. Each interview lasted approximately 1 hr with each athlete. After analyzing the first interview, a second interview was scheduled with each athlete. This turn, M1 and M2 were interviewed face to face in São Paulo, and F1 and F2 asked to be interviewed online, F1 via Skype, and F2 via FaceTime. The second interview endured

approximately 40 min with each athlete. The total recordings encompassed 6 h and 40 min of narratives and were fully recorded and transcribed. The face to face interviews were conducted at a sports club (M1) and at a private office (M2) in São Paulo. The researcher conducted all the interviews with F1, F2 and M2. The interviews with M1 were conducted by a Ph.D. specialized in PST.

Data Analysis

In accordance with the Grounded Theory (Corbin & Strauss, 2008), chosen to support the present study, this investigation used constant readings during the whole process and a rigorous codifying system in order to construct a theory on the role of psychosocial factors and psychosocial support training (PST) for talented athletes' development. This analysis is based on three types of data coding present in the discourse: open coding, axial coding, and selective coding (Kenny & Fourie, 2015).

During the open coding phase, concepts were developed through data examination and comparison, searching to identify similarities and discrepancies. The categories and subcategories, designed subsequently, were grouped based on similarities. The labelling and usage of sentences was done in order to clarify the fundamental aspects about each concept during further steps. In order to refine concepts, approach substantial theoretical reference and avoid, as much as possible, conceptual misunderstandings, the labels were designed consistent with terminology previously proposed by academic sources (Holt & Dunn, 2004).

Afterwards, this study identified elements that were present in each theme and established a relationship between them, engaging into the axial codification of the elements

present in each category. This interaction was fostered by questions such as: when it occurs, where it occurs, why it occurs, who causes it and what the consequences are (Prado, 2018).

Subsequently, through the selective coding phase, observed categories were integrated and organized around a central explanatory concept. Coding was submitted to three experts with Ph.D in sport psychology, physical education and talent development for analysis. After considering the inclusion and exclusion of the proposed aspects and refining some concepts, the conceptual framework was delineated (Corbin & Strauss, 2008).

In order to develop such a model, some steps, during coding, were essential for this study. A timeline, which was kept in the final framework, was designed to comprehend when things were happening (Holt & Dunn, 2004). In order to explore possible relationships between categories, this study designed graphics. Other tools used to support the analyses were based on reviewing notes and memos, always comparing elite athletes with other athletes and talented people from other domains.

Additionally, the author of this study kept constant contact, personally and by phone, with participants, in order to clarify eventual doubts while analyzing the transcriptions. Finally, a graphically represented grounded theory model was developed and presented to seven experts (two sport psychologists, one world champion coach, two world level athletes and two gifted and talented psychology experts) searching for feedback on the theory presented.

CHAPTER 5

RESULTS

This chapter focuses on the results of this study which investigated psychosocial factors associated with talent development in sports (research question 1) and the role of PST for talent development of elite athletes (research question 2).

Research Question 1: What Psychosocial Factors are Associated with Talent Development in Sports?

The interview results related to psychosocial factors associated with talent development in sports were organized into four categories: (a) Growth Mindset, (b) Task Commitment, (c) Opportunities Taken, and (d) Social Support Usage.

Growth Mindset

It reflects people's beliefs regarding their own possibilities to develop psychosocial and technical abilities, which affect how they see errors and success. Growth mindset is considered a powerful enhancing psychosocial factor for talent development and involves two subcategories: Ability Development Beliefs and Optimal Perception of Mistakes. All four elite athletes demonstrated they believed in their talent development potential since earlier stages, portraying, for instance, great ability to trust they might accomplish achievements in times of transitions and rely on their technical and psychological evolution. Additionally, according to the participants, they not only considered that they could develop psychosocial and technical skills, but also displayed the ability to convert mistakes in their preparations into opportunities to learn useful skills that might mitigate their weaknesses.

Ability Development Beliefs. An important common characteristic of the four athletes is that all of them trusted they could evolve and learn to develop their talents up to eminent levels. F2 revealed that when she was 12 years old she realized her potential: "I saw that I had the potential to be among the best players, for sure, and I really wanted to be among the pros" (F2). F1 stated that she always believed she could make it to the Youth Olympics, and she actually qualified for it, even knowing the task would be very difficult. M1 revealed positive beliefs regarding the development of his abilities since childhood, reinforcing his openness to develop skills, especially highlighting his desire to learn and develop psychosocial factors. Similarly, M2 revealed he was open to constantly developing abilities: "Every time my coach mentions I should make something better, I've probably already thought about it before. I normally try to discover what to do to fix my performance before being warned to do so" (M2).

> Participating in an adult championship gave me the chance to qualify for the World Cup's national adult team. I was very young, and thought, "Oh how cool!". I was aiming at the Youth Olympics. They were the 1st Youth Olympics ever and I thought I had the ability to qualify for the competition, even though I knew I was far away from it. But I always believed that I could do it. (F1)

> Since when I started in sport, I knew that mental preparation was an important weapon and I wanted to know how to use it. The difference is that I did not have, until this training, the total knowledge about how to use this weapon correctly. (M1)

Optimal Perception of Mistakes. This subcategory describes how athletes handled mistakes and converted them into opportunities, to learn aspects that would support them to increase performance. Noteworthy, M2 and F1 portrayed, in a similar way, their lack of trustful psychosocial tools and routines, during key competitions, as an error in their previous preparations. They saw those errors as indicators that they should get better prepared and learn PST tools to handle pressure and develop routines, converting those mistakes in their preparations into learning opportunities. F2 used her panic attacks as an opportunity to look for psychosocial support. According to M1, his lack of psychological routines in previous training sessions, and competitions, was replaced by constant mental routines, especially when wanting to fix a new movement: "I didn't have this mental discipline before. Now, when I feel I need to improve a movement that is not OK, I visualize it!" (M1). Athlete M2 reported that a bad experience, during the London Olympics, in 2012, fomented him to look for PST to be psychologically strong in Rio 2016.

> After London, I talked to the psychologist: "If today I were to compete in Rio 2016, I would despair. London did not do me any good!". I asked him to prepare me, to pressure on, I wanted to be stronger. (M2)

F1 reported mistakes for training extra hours earlier in the year to reach the Youth Olympics. She revealed changing all her training systems in six months, having to learn how to cope with new routines to qualify for her dreamed competition.

> I started training earlier that year and started an overtraining process. Then, they [coaches] changed all my training and I had to learn how to train in a totally different way. My training was adapted and I had my Olympics Youth qualifiers at the end of the year, my dream so far. I had to do well. And I swam very well. (F1)

Task Commitment

Task commitment is considered a fundamental psychosocial contributor in several talent development conceptual models, which was present in the report of all four athletes, when describing their trajectories. F1 portrayed task commitment, struggling to follow her dreams and to convince her mother and father to move to a megalopolis, so that she could train at a major international club. She also faced anxiety and a tough lifestyle in a big city, to keep practicing sports and increase her level over years. F2 mentioned her great task commitment by keeping training well, and studying hard, simultaneously, while facing constant financial difficulties. She arrived in the United States having the conditions to pass the college admission exams and still win every single match she had during her first semester in college. M1 also demonstrated task commitment by facing daily challenges to reach the training venue, as well as by being ready to deal with any challenges that may still arise. M2 revealed commitment in the pursuit of the sport that captivated him, from competition to competition, seeking to constantly challenge himself.

> I went to train in one of the biggest clubs in the world, left the countryside, from my house, and went to live in the capital and train at this club at juvenile level. I was 14 years old. I started training there, and kept studying. It was very tough, because I was very young. I had to do it all by myself then, to solve everything, to live alone and my school

was far away. My life was busy and training was my main goal. So it was a very difficult time, because of my age and because I was far from my family. Then, business started to get more serious. Getting to the national team was always a dream for me. (F1)

In 2012 and 2013 I became vice champion of an important tournament in Argentina. I was also a semifinalist in Bolivia and vice in Guatemala. I had some nice results. I was number 1 in my country when I was 14, 15 and 16 years old. I didn't get much help, much financial support. In my senior year I had played a few tournaments, without financial conditions to travel. In 2015 I had no sponsorship. I wish I had played at least 4 or 5 tournaments in the year, but I had no money for that... The situation made me want to come to a college in the USA, but I had another barrier to overcome: English. I didn't speak English at all. Until then I had never done long-term studies. I always stopped, had tournaments and couldn't keep up with classes. I had to do TOEFL and SAT to move to the USA. It was complicated. As in 2015 I ended up not playing any tournaments, I lost positions in the ranking. It was a very complicated year. I had to train and study hard! With the situation I came to the USA. When I arrived in the USA, I didn't miss a single game in the first semester here. (F2)

I faced almost six hours of transportation a day to train for years. Bad installations...Poor food...With the psychological aspects well trained I can dribble these things. Of course I don't want to sleep on the floor and eat rocks before a major competition, but these things are less important than psychological preparation. (M1)

> I started practicing sports following a physiotherapist's recommendation. I was about 6 years old. I started training for leisure and physical therapy. I tried several sports: swimming, skating, volleyball and basketball. Between one sport and another I would go back to the current one. When I was at the age of 12, I started in regional and national championships and won a medal soon, training in a local club. Arriving at a larger club, the routines became tougher, and I enjoyed it. I was a state champion and began to challenge myself and see where I would go. In the following years, I won medals in national games. (M2)

Opportunities Taken

Opportunities Taken is described by three subcategories: (a) Opportunity Identification, (b) Opportunities Converted Into Success and (c) Striving for Happenstance. The first subcategory refers to events in which the participants had identified fundamental opportunities for developing their careers. The second one points out events when they dedicated themselves to convert the identified opportunities into achievements. The third subcategory characterizes the efforts to be in the right place at the right time or how they struggled to effectively take those opportunities.

F2 revealed that she wanted to play for a first division college in the United States. She identified the opportunity to play for a 2nd division club and performed well there, which gave her the opportunity to go for a first division college team, where she currently plays.

> When I arrived in the USA, in the first semester, I didn't miss a single game. In doubles I lost three games and was honored as All-American athlete in division 2 in the USA. My

> goal has always been to play at Division 1, as close to a professional level as you can get in the USA. My partner from Germany and I got this top ten in division 2. Then, I came from this university to a 1st Division team. (F2)

M1 mentioned the moment when he recognized and took the opportunity to join a club that led him to the national team: "At one point I had the chance to train in a club that could lead me to the national team. When I had the opportunity, I took advantage of it" (M1). M2 evidenced that he identified the opportunity he effectively took to reach the Beijing games, although he acknowledged that he only realized the real magnitude of what he was doing when he achieved a significant result in the finals.

> In my only opportunity to participate in a qualifying competition for the Beijing Games (2008), I performed well. I have left this competition with a good contract signed and a high world ranking. So, I thought: "Now it's good for me to keep competing". Because of that, I got a college scholarship in England. Arriving in Beijing I was under no pressure. I competed in the first race and had an excellent result. When I saw the result, I thought: Wow! This is serious! (M2)

F1 points out that she had always believed in the possibility of reaching the Youth Olympics. She struggled to be ready in the right competition even after a finger fracture and overtraining.

> Wow, I remembered that I had participated in an adult Brazilian championship with a broken finger. I broke my finger a week before it. It was not actually my target competition, because I was not an adult. But I had put importance and expectations in this competition. I really wanted to go, because I was one of the few athletes in Brazil at this age [17] who had the opportunity and the rankings to take part in this adult competition. So, for me it was very important. Then I broke my finger. I saw it in my x-ray exam. The doctor said I had not broken my finger, but I had broken it. And I didn't get it fixed until today. That occasion I just got bandaged and kept training. I got in pain, I went to competition and I have it broken until today, because I was told that I would have to stop training for months to fix up my finger. And I did not fix it until today because I'm competing to this day. I qualified for the Olympics [Youth] ! I swam well on other tests, besides the one in which I succeeded. It was one of the best competitions of my career. I ended up getting a spot in the national team because I had taken my risks swimming a modality [butterfly] that I had never swam before. If I had not taken this opportunity I would not have reached the Youth Olympics. (F1)

Social Support Usage

Social Support Usage describes how one can actually use the several kinds of social support that might be offered to her or him. Two subcategories describe it: Social and Financial Support and Openness to Social Support, which reflects whether athletes had financial, emotional or informational support from coaches, families, staff and institutions. Different sources of social and financial support (from coaches, families and sponsors, mainly) were

fundamental to the athletes interviewed in this study. Additionally, they portrayed that they did not only accept this support, but struggled to effectively use this support.

Social and Financial Support. The availability of social and financial support is considered a primary factor for talent development. Those aspects might seriously determine who will have the opportunities to develop potentials into actual eminence. All the four athletes counted on expert coaches, during earlier stages, who identified their talents and supported their transitions to upper level clubs, providing useful informational support. Support from their families, especially over earlier stages was fundamental in different narratives.

> Convincing my mom to allow me going there was a fight! My mother was a little afraid: "I'm not going to let her live at 14 in such a huge city". And I kept saying: "Hey mom, that's what I want! That's what I want! That's what I want!". Then, she let me go and I went there. After six months there, I called my mother crying: "Mom I don't want to be here anymore!". And she said: "No way! Now you'll stay there! You can do it". She gave me the psychological support and I started adapting to it. (F1)

> My mother always helped me in the process. She raised me. When I was sick, she was the one who took me to the hospital. Since my birth day, I was raised by my mother. I began to have greater contact with my father from 11 years old on, as he lived in another city. (M1)

Notably, F2 did not have enough financial support yet to make a transition from expertise to eminence, and decided to dedicate herself to college, where she can nowadays keep training,

not at a professional level, but as close to the level as she can. She revealed her familial support was instrumental over the process. When she was a child, she got to be trained by her brother on several occasions. Further, F2 revealed having received a diagnostic of epilepsy. Her mother was a pharmacist and did not agree to see her daughter being medicated for something that both believed could be related to stress. She and her mother believed that the stress could be managed with psychosocial support training and looked for PST to solve her problems.

> The only thing that stopped me were financial issues, unfortunately. I didn't get much help, much financial support...Before I started working with the psychologist, I have had some panic attacks and some doctors thought I was epileptic. I did all the possible exams. My mom didn't think it was good for me to take that dose of medicine. My mother is a pharmacist and influenced me looking for psychological treatment. No medicines! (F2)

M2 stated that in the beginning of his career he also faced financial restrictions, highlighting the supportive role of his father in the process: "It was hard for my father to pay for the costs of my travels and competition equipment. My father had two jobs to support the family and keep me competing. Very expensive!" (M2).

Openness to Social Support. Besides having support, people should accept that support to develop her or his talents in order to achieve eminent levels of performance. All the four athletes revealed great openness to social support since childhood. All of them were identified in local clubs and counted with coaches that encouraged them to go to stronger teams to develop their talents. M1 and M2 athletes have revealed an open attitude toward different sources of

support throughout their careers. Both reported their relationships with the head coach as very positive and revealed constant proneness to listen to trustworthy sources of information, as staff, and take their advice as guiding clues for their development. M1 said: “I trust my coach! Very much. I have a very good relationship with him.” (M1). Convergently, M2 narrated:

> I always had a very good relationship with the current coach, regardless of the psychological work, which helped me as well. But, I have an excellent relationship with my coach! I communicate well with him. He trusts me and I trust him. (M2)

F1 described how she was invited by a coach, that was one of her peers’ parents at her first club, to train with him on a more professional basis. She did not only accept the invitation, when she was at the age of 12, but used the opportunity to develop her level. F2, similarly, describes accepting the opportunity to train at a big club as a fundamental step to develop her skills and aspirations.

> There were two boys who used to train with me. Their father picked them up to train them separately. And then he invited me and said: “I will train my children to go further”. I accepted it and wanted to go. He arranged for me to swim for a club near my city, so we could start the first harder competitions. I had already competed for my city in a younger category. At this time, we were already registered in the children’s federated category. I went to regional competitions, started to stand out and started to win. I grew up. And we [the athletes] always followed his point of view: “Now we will go for the next step. There is no structure to evolve here. We will look for bigger clubs”. (F1)

> I started playing at the age of 5 on the courts of my condo until I was 9 with a coach, sometimes with my brother. There was another athlete there, who ended up in the USA with me today. At 9 I was invited by a big club in my city. From 9 to 14 years old I had several opportunities. They were years in which I grew a lot, and I started to like it more. It was nice playing national and international tournaments, knowing the level of the professional people. (F2)

Research Question 2: What is the Role of PST for Talent Development in Sports?

The interview results related to the role of PST on talent development were organized into three categories: (a) Biofeedback, (b) Mentalization Techniques, and (c) Feelings of Knowing What to do Under Pressure

Biofeedback

This category focuses on athletes' evaluation about the usage of biofeedback in their preparations. The results were organized into two subcategories: (a) Psychological Strength, and (b) Meaningful Value of Biofeedback.

Psychological Strength. Psychological Strength is a main ingredient for talent development in different fields, especially in the transition from expertised through eminent levels. Psychologically strong athletes demonstrate a great degree of self-confidence, ability to handle stress under pressure and follow their game plans in those contexts. Those characteristics are fundamental in sports competitive scenarios when one should be better than opponents to

achieve her or his goals. Psychological Strength emerged in two dimensions: Stress Control and Self-confidence.

Stress Control. One of the main points commented by athletes, regarding biofeedback usage, was that all of them learned and incorporated tools to control emotions during hard training sessions and competitions. Notably, all the four athletes in this study reported a previous lack of emotional control, before learning how to control it. Besides, they described how biofeedback supported them in this endeavor. F2, for example, which looked for PST exactly searching to control stress, stated that: "For two and a half years being supported by that psychological training I did not have any single stress attack. I controlled stress and had my best international juvenile results." (F2).

M1 said that biofeedback helped him to incorporate knowledge into real competitions, and to relax while mentalizing different strategies.

> Biofeedback helped me to apply in actual competitions what I had learned in mental training. It has also helped me relax and learn how to apply the visualization, for example, to improve some strategic detail. To prepare my mind for different situations. (M1)

Convergently, M2 described how he transferred knowledge learned with biofeedback into a successful Olympic Final, in Rio 2016, in which he controlled his stress levels. He reinforced he had different perceptions in London 2012, when he reported he was afraid.

> I have learned a lot from several of these training sessions. We often measured stress. I already knew what to do and the little machine confirmed that I knew how to control stress, really. I learned how to control my feelings, my moment, with biofeedback. Often, after a few months training the stress level, I could control stress in a minute. After using this machine, a lot, I went to the Rio 2016 Games finals and thought: "Is that what I was afraid of?". I stayed in my personal best zone, in my bubble. I followed the game plan. I did exactly what I planned and got the result I wanted. (M2)

F1 revealed how she incorporated knowledge in a practical way, during an important competition.

> I do not remember the theory so much, but I remember the practice. There was one occasion in a competition in Rio de Janeiro in which I was very nervous, and I told the psychologist: "Oh my God! Stress is killing me!". He asked me to repeat one of the exercises he had done with the machines, staring some balloons that were on the podium and relaxing! I learned to control stress with practical examples and it worked during competition! I looked at the balloons and thought: "Yeah! I'm better now!". (F1)

Self-confidence. The four athletes interviewed in this study revealed confidence in their capacities to overcome obstacles, while asked about skin conductance biofeedback's role in their talent development. F2 commented biofeedback helped her to comprehend how to deal with fear attacks in court, even after stopping being submitted to the PST program. "Different [from before], I learned that it [stress] was not going to kill me, I had already learned it!" (F2).

F1 described how controlling stress with biofeedback machines supported her beliefs that she would increase performance. Besides, she reported that she actually always increased performance while using techniques learned with the machines:

> I already controlled stress using the machine! And I believed that I could do it! During competitions as well! You see? I have always improved in all work cycles with this psychologist. It was two and a half years in which I had 10 target competitions! In all of them I improved my marks! (F1)

Athlete M1 mentioned biofeedback increased his confidence that during competition day he would have the quality to succeed, mirroring other athletes that were mentally prepared, according to his impressions.

> I myself think that an athletes' preparation is made of several things. In a competition, until proven otherwise, it's sixty percent mind, and forty percent body. I've seen a lot of athletes that are not so good winning. People say they are lucky, but now I know they beat the best athletes because they are mentally prepared! Confident! They control their nervousness! That's what we learn, you see? Training your stress you can become lucky, too! (M1)

M2 stated that biofeedback tools were useful to teach him how to control stress, trusting he could repeat it easily:

> It was using this little machine that I learned how to control my stress levels. It gave me a degree of confidence that I can repeat that. Very easily! No doubt it impacted on performance. I had the best records using these machines. (M2)

Meaningful Value of Biofeedback. Athletes similarly stated that biofeedback helped them not only to understand the role of PST in their development, but also how to meaningfully use psychosocial skills and tools to increase performance. F1, for example, described how she learned, by using the biofeedback equipment, to understand how her thoughts could be related to stress control.

> I remember that, with the machine, I thought of things that made me happy, people I liked. Thinking about these things helped me to lower stress with the aid of the stress machine. The psychologist used to say during biofeedback training sessions "Get over there! Try to lower stress". And I thought of things and people that made me happy and that calmed me down. I realized that these things made me happy, gave me confidence and helped me to lower the stress on the machine. I trusted that I could transfer it [knowledge] to competition! (F1)

M1, M2 and F2 were convergent on stating that before biofeedback usage they didn't actually know how to control stress or how PST worked. Something that changed over the process.

> Before doing biofeedback sessions I was not sure about what to do before the race or how to train mental aspects. I arrived in the Rio 2016 finals very quiet, knowing what to do, not feeling pressured, feeling well, with the mental side fully aligned. (M1)

> At first, I did not know what to think, or not think, to lower my stress levels. Incredibly, this machine made me learn how to think of nothing. I have learned that one thought affects the other, and that this can increase my stress. (M2)

> Until then, I didn't know how sport psychology worked. I thought it was a psychological assessment similar to the ones in which you go to the psychologist to tell your whole life. At first I was a little: "I don't know what will happen. What will I have to do?" I learned that the focus was not only on my perceptions about life but also about my sport, you know? So, having someone who understands what's going on in the sporting world, next to you, working with you, with a connected mind, helps you see a lot of things about your sports evolution. With practical tools! Rapidly, I saw I had a form to train stress in court using machines, with no medicines. (F2)

Mentalization Techniques

This category focuses on athletes' evaluation of the usage of mentalization techniques in their preparations. The results were organized into three subcategories: (a) Mastery Orientation, (b) Sticking to the Game Plan, and (c) Meaningful Value of Mentalization.

Mastery Orientation. It is considered one of the main characteristics of optimal levels of motivation in talented successful people's developmental trajectories. Mastery orientation in sports is characterized by one athlete's beliefs that success is the outcome of efforts and the usage of the appropriate strategies to develop competence and skills, rather than aspiring to obtain results. Athletes interviewed revealed a focus on the movement execution and efforts to learn how to control their performances, a clear demonstration of a mastery orientation style, also labeled learning orientation. M1 revealed a commitment to train mentalization on all training sessions and a focus on learning and doing his best every day.

> This is a kind of job that has many contributions to give to athletes. Mental training helps me in technique, a lot in motivation and emotional control. After learning how to do it, for me, visualization should be done every day in training sessions! It's no use doing it only during the competition, because then I'll be faking it. (M1)

Similarly to M1, athletes F2 and F1 have also demonstrated that a focus on doing their best helped them when commenting mentalizations' role in their preparations. F2 indicated that mentalizations focusing on her best game has helped her learn to experience the moment and to diminish stress, which used to come from exterior sources of pressure for results, done by her coach and parents. F1 mentioned that when she started doing mentalization training she started to reach her best preparation and performance again, also reinforcing her commitment to do her best as a prerequisite for results to flow again.

At that time [when she was trained using a PST program] I was still growing up and discovering a lot. I was still learning. There were a lot of things going on in my head. It was a stress that I created, because I was discovering a lot of things. Mentalizations made me focus and stop, searching to see what I was doing at the time. At first, I was very concerned about results, testing myself a lot. I was starting to engage in tennis, to play important tournaments and at a high level! So, I was pushing myself a lot. I also had my parents' out-of-court worries about the entire financial part, because they were investing, they wanted to see results, you see? And my coaches also wanted it. Learning to experience the moment was an important point for me. Training my breath, simply doing my best, not focused on pressure or results. I always remember it. Close your eyes and imagine yourself hitting your best right stroke, your best left stroke. I always remember that. The best game! Mentalize your best game. I learned to see the court, but in my mind. I also think that the weight of losing and winning has decreased. After all these years of learning, I am sure that whether I win or lose will not define my personality. That's not what matters! I know who I am, I know who I'm representing, man. If I lose, no problems, man! I lost. I know I'm always there to give my best and to play my best. If I don't make it one day, it happens. Nobody plays the best every day. Everyone has bad days. (F2)

At this time [when the athlete started using mentalizations, I started to get in the best shape and prepare myself well for the Olympic trials. I improved and received a proposal to return to one of the greatest clubs in Latin America. At the club, training was very heavy because of physical and mental loads. I started to improve my performance, which

> I haven't improved for a long time. The more I improved it the more I was motivated. My goal was to reach the Rio 2016 Olympic team. I was very focused. Doing all the things I had to do. Swimming, mental preparation, physical training, diet, I had a well-regulated discipline in this regard. Focused on doing the best daily, the results flowed again. (F1)

M2 has demonstrated mastery orientation reporting that he feels that he might increase the quality of his movements, even being considered to be the best in the world in some of those skills, reinforcing the importance of mentalization as a psychological tool that might help him in developing his motor abilities and learning warm-up routines.

> Today, for example, I am considered the best in the world to perform some skills and I still want to improve them. Mental training has helped, and greatly helped! Now I realize that, for me, technically, this work of the psychologist has helped me a lot. Helped me to seek and find the best performance. Focusing on mastering skills, and not on results, has helped me to perform well. I'm cold. I have to do it, I do it. It's the biggest difference, considering years ago, when I left London crying. Today, I do mental training three times a week, about 30 min a day. And being in a world finalist obviously motivates me differently! An Olympic final. I've done thousands of warm-ups in my life. I learned how to do a warming routine for this special moment. (M2)

Sticking to the Game Plan. Another similarity in athletes' reports is that all of them revealed they developed tactical discipline during key competitions. This important characteristic of psychologically strong elite performers describes an ability to maintain

behavior control and keep up with previously designed strategies (game plan A or B) even while facing pressures. M1, M2 and F2 used the term game plan, and F1 strategy while describing benefits of mentalizations. M1 revealed the importance of mentalizations for his tactical discipline transfer from training sessions to competitions: “I believe that if I do this type of visualization during training sessions, the time of the competition will be easy, understand? I will keep up with the game plan I’ve already imagined! That’s something I always keep for myself.” (M1).

> Feeling good on D day is 80% for me. I learned to always use the game plan previously worked with the coach and the psychologist. Having the game plan ready also helps me with the 20% that I still need. I have the game plan for the days when I think I’m not well. It helps me to stay cool and pursue the plan. (M2)

> Previously, I couldn’t focus on the moment. The psychological preparation was essential for me to relax and experience the present. I learned not to get to the court desperate to play. Having a game plan before and reflecting about it in my head helped me a lot. (F2)

> It was much better to have a reference. I saw videos of the best athlete in the field in the world in my area, several times, and I don’t know why, but whenever I did it, I felt better. I felt so much more confident, since I was really right about the techniques and strategies I wanted to do. I totally related my consistency with the mentalizations. (F1)

Meaningful Value of Mentalization. All four athletes revealed that assigning a meaningful value to mentalization increased their adherence to it. M1 emphasized that he never used breathing techniques because he didn't feel he actually needed it, different from mentalization techniques, which became a routine: "Breathing techniques, I've never actually used them. I saw no need for that. But, I want to repeat that I need to do mentalizations during every training session! I really feel it's something that contributes to me!" (M1). Athlete F2 mentioned she considers mentalization as very useful, but only in moments of their career that she feels it is meaningful to use it. F1 pointed out that it is important to know why she does mentalizations, in order to engage. M2 reinforced that practical examples, using famous athletes to inspire him to mentalize competitions, were more meaningful than using technical terminology.

> I know why I mentalize! It helps me have a reference! That's why I do it! But if a professional doesn't explain to me why I'm doing something, doesn't explain the importance of training, or doesn't justify me why doing a very different training, these times I can think: "Man, this training doesn't have anything to offer. It doesn't give me confidence!". I go there, and I still do it, but that question remains. It's different when someone explains what you're going to do. (F1)

> In my transition from Brazil to the United States, I didn't think about tennis so much and I was very focused on the academic area, I was very focused on English. I lost some of my mentalization work. Anyway, the previous mental preparation helped me not to be so stressed with tennis. I arrived on the court in the USA and played, but it was also not a

priority for me. When I made the transition to Division 1, things changed, the load was under higher pressure. Then, I went back to working with the techniques. Now I have psychological counseling but to work on things outside the sport. I have a mentor, a physical coach, who has been helping me with many things related with breathing, mentalization, thinking before the game, and visualizing good things. Not just with me, but with the whole team, actually. I created a very good relationship with her because she has a story similar as mine. Many things that happened this year are helping me to do mentalization. I did it again, I'm keeping the things she has been teaching me in my head and inside the court. We use the same mentalization techniques that I used before. Sometimes, she proposes something to me and I think: "Wow! I already know how to do it !". (F2)

The environment influences a lot. Undoubtedly. It was useful to use the example of famous athletes to inspire me mentalizing during tough days and give me strength. It is difficult for us, the athletes, to understand, if you rely only on the scientific terms. Cristiano Ronaldo, that we used a lot ... He is the personification of decision. He takes his chances. These examples are even better than telling me: "Let's imagine such an aspect". It is easier to assimilate by examples than by a scientific term. Using scientific terms, if the athlete is not curious, he will not go after it. (M2)

Feelings of Knowing What to do Under Pressure

This category describes athletes' positive feelings about knowing what to do during competitions and hard training sessions. Athletes' narratives revealed that information provided

by the PST was meaningful and supported them to understand better what to do in different stages of periodization and how they could control stress (using biofeedback) or program game plans (using mentalizations). They revealed increasing knowledge about the prerequisites of different phases of their programs, something that changed their attitudes toward behaviors necessary to be successful in daily challenges. According to athlete F2, information about periodization supported her with useful and meaningful information regarding different aspects in her preparation (not only psychosocial) allowing a mental comprehension of what to do. F1 mentioned that she prefers democratic environments, and that the information provided by her psychologist about training requirements helped her feel better. Similarly, M2 reinforced that the information about periodization, provided by the PST, made him feel better for paying the price to be ready, especially during hard training sessions. M1 has revealed comprehension of different training phases, describing how the psychologist instructed him to do so.

> Depending on the training phase, these loads that make you more or less tired end up interfering with the mental aspects. There are times when it is difficult to concentrate. Not all stages deplete you because we already expect these loads. In the heaviest difficult moments, and those moments were few, mental work helped me to understand the training system. Because these days I couldn't even concentrate. I arrived tired in the psychological session and left it wanting to go to a competition. Hyper motivated. I wanted to train and use what I've just learned in my target days. The psychologist gave me lectures on periodization, citing several authors and training principles. He taught me what I really needed to know to swim better. I remember that I had a notebook to write down the things that helped me. I feel good in democratic training environments. I have

affinity with places where I feel people listen to me. I get along better with coaches that have this profile. Anyway, it's my thing [characteristic]. I don't know if everyone is like that. (F1)

When I know the training spreadsheets I can prepare myself. If I know: "Wow, there is a high-volume training today!". I already know that I will have to prepare my head to hit a hundred balls. It will be a long and tough training session. If I know that today is a game day, the preparation is different! This focus will reflect on confidence at the right time. What to do, where to play, why to do things. It is important knowing what will be done during physical preparation. If I'm going to work on the court or gym, what they expect from me, etc. It makes a great difference if I know the training session beforehand. This way, I already have in mind what to do, before doing it. (F2)

The endurance phase is terrible for me. Often, I would come home tired and remind myself of the importance of relaxation to recover both mentally and physically. Often, before the beginning of the psychological program, I would get angry. With each cycle passing by, I would understand better what I needed in each phase and how to cope with that phase. Before I got used to the periodization, I shook my head a lot. Afterwards, I learned what was needed. Knowing more about each phase made sense, I felt better paying the price in training sessions. I could be broken, tired, but I would think: "I have to go through a physiotherapy session, to be well the other day." I learned [from the periodized psychological work] to have a goal at each stage. In the endurance season, which is very hard to me, my main focus was to become technically good. In the force

phase I wanted to be strong, not specifically fast. In the polishing phase, I put all that together. Psychological work has helped me a great deal in raising awareness of what I need for the kind of competition I dispute, and of the physical and psychological needs I have, to perform the best. (M2)

The specific clarifications about each phase of the periodization helped me to understand what to do at each stage. For instance, during the force phase, the psychologist used to ask me to focus on flow and technique. During polishing he asked me to be calm and to relax. During competition, also to relax and to be sure everything to be done was already built. (M1)

CHAPTER 6

DISCUSSION

This study investigated the role of psychosocial factors and PST for talent development of Brazilian elite athletes. The Talent Development Mega Model – TDMM (Subotnik et al., 2011), that highlights the relevance of psychosocial factors and psychosocial support as important components of talent development, provided the framework for the research.

With respect to the results related to psychosocial factors associated with talent development in sports, the four most mentioned by the athletes are pointed out in the TDMM (Subotnik et al., 2011): Growth Mindset, Task Commitment, Opportunities Taken, and Social Support Usage. The relevance of those factors converges with studies published in the last decade that reinforce the decisive role of psychosocial factors regarding the talent development or inhibition of people in different fields (Almeida et al., 2013; Dixson et al., 2016; Dweck, 2014; Gledhill et al., 2017; Horn, 2018; Jarvin & Subotnik, 2010; Prado, 2018; Portenga, 2019; Schroder et al., 2017).

This study has evidenced athletes' positive beliefs about the possibility of improving their skills and performance, with commitment and engagement, even under difficult conditions. Besides, the athletes recognized they needed to strive to develop those skills to get better prepared during their careers. This attitude reflects the phenomenon described by Carol Dweck (2014) as growth mindset. People face constant obstacles during careers that tend to be sequentially harder in terms of technical, psychological, physical and financial demands. The recognition that it is possible to develop the necessary skills to overcome those obstacles seems to actually broaden people's possibilities to develop talents in different fields (Portenga, 2018).

Research indicates that a growth mindset is associated with resilience in sports (Albert, Petry & Moore, 2019) and in academic fields (Kuusisto et al., 2017). Athletes' development to top 10 continental rankings was associated with beliefs that they could and had to develop technical, physical and psychosocial skills that helped them to advance to elite levels. The athletes' beliefs that they could develop their capacities to evolve were in fact confirmed by the excellent levels they achieved during their journeys.

Also, in this study, athletes portrayed a constant promptness to convert mistakes (e.g., in training and psychological preparation) into learning opportunities. Their narratives revealed the importance of mistakes as aspects that were consciously scrutinized. After analyzing mistakes, athletes seemed eager to change aspects such as training systems and mental routines. Those attitudes highlight another central characteristic of people with a growth mindset: a personal openness to convert aspects perceived as setbacks and mistakes into opportunities, so that one can learn tools to cope with those potential problems (Dweck, 2014).

Recent studies have compared the neurological activity of adults that have a growth mindset style with ones that have a fixed mindset style (Mangels, Butterfield, Lamb, Good, & Dweck, 2006; Moser, Schroder, Heeter, Moran, & Lee, 2011; Schroder et al., 2017). In one of those studies, fixed and open mindset students answered some questions, followed by instructions about how to respond to the incorrect ones (Mangels et al., 2006). Brain activity patterns evidenced that people with a growth mindset demonstrated higher left-temporal activity for longer periods of time during those instructions. In a posterior surprise retest with the same individuals, results revealed better performance of the growth mindset adults' group, compared to the fixed mindset group, while answering the same questions. Schroder et al. (2017) state that those studies revealed people with fixed mindset styles tended to show attentional disengagement

patterns after 250ms, something that could explain their post-error poor performance compared to growth mindset individuals. Those findings seem to converge with the ones of the present study as interviewed athletes had a positive attitude toward mistakes. Instead of seeing errors as potential barriers they seemed challenged to spend several hours to learn the necessary skills to cope with them.

The participants of this study have used great energy not only to deal with problems, but also to develop their physical and technical skills. Their perseverance and hard work were described in the psychosocial factor named as Task Commitment. The factor has been historically cited as a central contributor to talented people's development by different conceptual models (Renzulli, 1986; Gagné, 1999). In sport, the factor was also considered as a main contributor to talent development. For example, studies have pointed out that task commitment is a fundamental psychosocial contributor to athletes' talent development in soccer (Gledhill et al., 2017; Holt & Dunn, 2004). Similarly, athletes in the present study demonstrated hard working and commitment during all stages in their careers. The sport field tends to be over competitive since the first stages of development and its peak is normally achieved during adolescence or early adulthood. Therefore, it seems reasonable to infer that efforts are ubiquitous in sports contexts, to meet the demands of a career that requires several hours of physical, technical and psychosocial training since childhood, as proposed by Jayanthi et al. (2013).

The emergence of the Opportunities Taken factor highlights one of the most critical aspects to predict talent development, as without opportunities people might simply not have the appropriate conditions to develop their talents. In fact, opportunities play a relevant role for talented people in different stages and domains, sometimes enhancing their possibilities of developing their talents, other times diminishing these possibilities (Worrell et al., 2018). For

instance, in sports careers, which tend to have an earlier peak, opportunities to take part in good teams must be soon and properly identified and used by athletes to develop technique and competence during earlier stages. According to Horn (2018), the availability of opportunities is essential to enhance the likelihood of eminent manifestation. Notably, the TDMM (Subotnik et al., 2011) suggests that opportunities are relevant for talented people since earlier stages. The authors of the model also indicate that during expertised and eminent stages, less opportunities are available. Therefore, talented athletes should struggle harder for opportunities to be in the best clubs or national teams that could offer the best conditions for talent development to eminence in sports contexts. Biographies of eminent athletes (Syed, 2010) and Nobel Prize winners (Zuckermann, 1977) have revealed those people counted with great opportunities to develop their talents, especially from the point their talent was "discovered" and nurtured by institutional and financial support.

Opportunities did not simply happen to appear in athletes' lives, as a result of unintentional or accidental facts that triggered their occurrence. The four athletes have consciously pursued their opportunities with great commitment and endurance. In fact, in order to effectively identify and convert opportunities into success, it is important that talented people actively engage in getting to the right place at the right time (Renzulli, 1986), as described by the Striving for Happenstance subcategory that emerged in the present study. The TDMM's framework (Subotnik et al., 2011) proposes that talented people should struggle to create conditions for opportunities to flourish, before using them. Biographies of elite athletes (Syed, 2010) evidence that they had to struggle to identify and use opportunities, independent from their original socioeconomic status. Athletes in this investigation revealed, since earlier stages, not only the ability to identify and use opportunities, but also a promptness to dedicate themselves to

be in the right clubs, competitions and colleges at the right time, to see the chances of developing their careers increase. It is relevant in sports-the ability to early recognize opportunities and use them if one wants to succeed. Besides, considering the outcomes of performance are clearer in sports, it is easier to conceive goals and follow them in the field. Those goals are normally related to evident opportunities in high level competitions, supported by clubs, sponsors, national teams and institutions that might promote athletes' talents to eminent levels.

Social Support Usage was another main psychosocial factor that emerged in a consistent way in athletes' development. Athletes revealed the ability to interact with different people in different situations, establishing solid relationships that could help them during their careers. According to Portenga (2019), parental support, coaches' support, peer support, sponsorship, or mentoring from psychologists, older athletes and other experienced personnel might play a significant role in molding youth sport behaviors during talented athletes' development. Analyzing 73 articles related to social support usage in sports, from 1990 to 2013, Sheridan, Coffee, and Lavallee (2014) pointed out that coaches are the most prevalent actors in providing athletes with social support "through offering unique forms of tangible, informational, emotional and esteem support" (p. 1). This result seems to converge with the present study findings. All the athletes in the present study were "discovered" in local clubs by coaches who nourished their talents and promoted their transitions to better structured clubs. It seems reasonable to say that the kind of support provided by coaches, that prepared athletes to transit to upper levels and achieve the top 10 continental rankings, is a fundamental contributor for talent development in sports.

Parents were mentioned by the participants as another powerful source to support athletes' development. Their role as providers of financial, emotional and informational support

was highlighted by the athletes. For Grolnick (2009), parents are a fundamental source of support, and might influence, for instance, young people to cultivate important psychosocial skills. In sports contexts, Hayman et al. (2011) reinforced that athletes' passion for sports was in fact highly related to parental nourishment. Notably, the four athletes in the present study pointed out support from parents and coaches as contributing factors during their journeys. On the other hand, peers and psychologists were not mentioned as important sources of support. Athletes practiced individual sport modalities and that is a possible reason why they did not quote peers as highly contributing for developing their talents. The fact that athletes did not indicate psychologists as contributors to their talent development might be related to the fact that sport psychologists tend to work with athletes during stages in which psychological preparation is more accepted as a greater differential to predict performance: from expertise to eminence.

It is relevant to highlight that athletes' openness to different sources of support was also a main factor that contributed to their talent development. They were avid for financial, informational, technical and emotional support from different sources, in different stages of their careers. Portenga (2019) points out that a performer should be prone to accept social support and strive to use this support, as a prerequisite to achieve eminence. According to the author, athletes' acceptance that they need something more than technique to evolve is usually accompanied by the recognition that they need qualified information from more experienced people to develop talents to ultimate levels. This recognition is correlated with a decision to engage (Subotnik et al., 2011). Athletes' decision to engage is normally accompanied by an openness to several sources of support, especially if one decides to transit from expertised to eminent levels. In the present study, all the athletes have portrayed constant openness to social

support, since the first stages in their careers, accepting and striving for support from coaches, families, and sponsors in clubs and national teams.

It is important to draw attention to the fact that one of the female athletes did not have enough financial support from a great club or national team, something that made her move to a foreign country and that somehow delayed her evolution to eminent levels, up to this moment. Horn (2018) emphasizes support might be especially critical for a part of the population that comes from underrepresented or low-income groups. In this regard, relevant junctural aspects present in Brazilian reality, might undermine female athletes' talent flourishment in the Latin American country: (a) women are historically underrepresented in Brazilian sports contexts; (b) women's wages are lower than men's wages in the country, even while performing similar tasks; and (c) Brazil is one of the top 10 most unequal countries in the world, in terms of financial distribution (Programa das Nações Unidas para o Desenvolvimento, 2017; Proni & Proni, 2018). The reasons that impelled the athlete to look for better conditions to develop her talent out of Brazil probably might be correlated with environmental aspects such as lack of opportunities, financial inequalities and gender underrepresentation in the country.

The second research question investigated the role of PST in elite athletes' talent development. The results revealed the following factors that emerged as contributors to develop their talents: Biofeedback (subcategories: Psychological Strength – Stress Control and Self-confidence – and Meaningful Value of Biofeedback), Mentalization Techniques (subcategories: Mastery Orientation, Sticking to the Game Plan, and Meaningful Value of Mentalization), and Feelings of Knowing What to do Under Pressure.

The athletes mentioned an increment in their self-confidence levels when they started using biofeedback. In the beginning of the PST program, the athletes were already top ranked in

their continents but did not have a trustful tool to promote self-regulation. Their narratives revealed, for example, a lack of confidence in their capacity to control stress. Notably, this gap in their preparation was the trigger to foster their curiosity to work with a sport psychologist. Studies (Dixson et al., 2016; Worrell et al., 2016) have pointed out psychological strength as a main factor for talent development in different fields, especially in the transition from expertise to eminence. At this stage in a career, technical aspects are less differentiating than psychological strength, reflected in talented people's abilities to control stress, behaviors and emotions, to be self-confident and perform better than others. In sports contexts, self-confidence has been pointed by elite athletes as the most important characteristic of a psychologically strong athlete (Jones et al., 2002). Noteworthy, athletes in the present study revealed that self-confidence was built over a process in which they repeatedly trained stress levels with the aid of machines before transferring knowledge to training sessions and competitions. One probable reason for this self-confidence development seems to be related to the fact that biofeedback training increased their beliefs that they could autonomously control their emotions, thoughts and behaviors during training sessions and, especially, during competitions.

The athletes' lack of abilities to control stress was pointed out by them as a barrier for their development during earlier stages. Therefore, the adoption of tools that promote athletes' acquisition of abilities to self-regulate autonomously was a main focus of the PST program. Studies suggest that self-regulation techniques, as biofeedback, might impact on stress control in different environments (Dupee, 2016; Jiménes-Morgan & Mora, 2017, Kotozaki et al., 2014). Beauchant et al. (2012) has registered that biofeedback was successfully used to promote stress control by victorious teams and athletes, as part of their preparations for some of the most difficult and selective competitions in the world such as the Winter Olympic Games and the

Union of European Football Associations' Champions League. Similarly, in the present study all athletes have mentioned episodes in which they effectively used biofeedback knowledge to cope with stress in different situations to deal with panic attacks, competitive tensions, and pre-competitive tensions.

The four athletes have also reported biofeedback as a meaningful didactic tool. Interventions provided them with the knowledge that their inner states could be read by biofeedback machines and translated into stress levels. Besides, their experiences with these machines evidenced that they could develop routines to control stress. They could repeat the self-regulation routines later, with or without the aid of machines. This scenario was labeled as Meaningful Value of Biofeedback factor. Siegle et al. (2017) reinforce that self-regulation tools should be meaningful as a prerequisite for people to engage in using them. Basically, besides knowing how and what to do, people need to understand why they are using the tools that are supposed to develop their talents. Athletes demonstrated a great change in their comprehension of stress control, after being submitted to biofeedback training, when compared to their previous experiences. If first they didn't engage in self-regulation tools, they happened to understand and accept, over the PST program, that biofeedback could teach them how to cope with one of the main barriers in their careers: the lack of stress control. It seems, in fact, that the engagement in self-regulation techniques only becomes meaningful after one accepts that those tools might be useful. Two hypotheses may explain why the findings in the present study regarding biofeedback seem to corroborate previous research about its beneficial role to control stress (Pusenjak et al., 2015; Rijken et al., 2016). First, it appears that biofeedback actually helped athletes to understand how to control stress, teaching them what they had to do to control it. It provided visible evidence (through computer screens and monitors) that what athletes were doing was in

fact impacting on the responses provided by the machines. Second, a process that is difficult to verbalize (as controlling stress) became meaningfully tangible through machines that they recognized as reliable sources of information about their stress levels.

Athletes' narratives revealed they had an outcome orientation style before being introduced to the PST program. They were previously stressed by results, something that changed over the PST program. Notably, all of them stated that mentalizations had fomented them to get psychologically prepared for training sessions and competitions, in which the focus was no longer to win, to break records or to beat opponents. Mentalization techniques challenged them to do the best in every single training session, in which they sought to repeat the same perfect routines they had mentally rehearsed during constant visualizations. Dweck's dual goal orientation model describes two types of styles in the pursuit of evolution: mastery orientation and outcome orientation style (Dweck, 2014). Mastery oriented people benefit from getting focused on doing their best and learning strategies to cope with demanding situations, rather than people with an outcome orientation. According to Dweck (2014), athletes with an outcome oriented motivational style tend to feel pressured to obtain results and try to hide their mistakes to avoid criticism. Recent research in academic (Funken, Gielnik, & Foo, 2018) and athletic (Healy, Tincknell-Smith, & Ntoumanis, 2018; Øvretveit et al., 2019) environments have been reinforcing the beneficial role of a mastery oriented style in terms of long term adherence, task engagement, career development and perceptions of difficult situations. Funken et al. (2018) analysis of data collected with 168 students found evidence that mastery orientation development was related to a shift in students' perceptions. According to them, students who developed mastery orientation turned their perceptions of problems into something good. In sport contexts, for example, Øvretveit et al. (2019), analysing Brazilian jiu jitsu fighters, have reinforced that

mastery orientation is associated with more engagement in training sessions and longer career adherence. The main focus of visualization in PST programs is to provide athletes with tools that can increase motor accuracy, as much as strategic comprehension and execution, and not exactly to develop a mastery orientation style. The shift from an outcome orientation to a mastery orientation seems to be a positive side effect of using mentalization techniques. A probable explanation for this change in mindset styles might be credited to the fact that mentalizations help athletes program what they have to do in advance. When athletes focus on their mentalized routines during training sessions and competitions, they simply try to transfer what they have previously visualized to competitions and training sessions. As they confirm this kind of focus is less stressful than trying to break records or to obtain impressive results, they understand that a focus on mastery is actually more beneficial for them to control performance.

Another aspect regarding PST, mentioned by the participants of this study, is the increment of the factor Sticking to the Game Plan. They revealed mentalizations helped them to visualize different game plans and choose the best ones they actually used in competitions and training sessions. Weinberg and Gould (2017) reinforce that one of the main functions of mentalizations is to support athletes preparing different strategies prior to competitions. According to Portenga (2018) the establishment of strategic plans might enhance the likelihood that eminent performance outcome occurs in the most demanding competitions, as "a clear performance plan allows them [athletes] to better stay focused on achieving the sequences of goals that lead to the objective" (p. 159). Stewart and Hall (2017) have found evidence that mentalization techniques impacted strategic performance in curling, a winter sport in which players slide stones toward a target area on a sheet of ice. It appears that the athletes in this study had great improvements in terms of sticking to their game plans, a demonstration of strategic

performance development, when using visualizations. In this sense, all of them mentioned gains in terms of developing and using strategies (game plans). The findings of the present investigation and previous ones suggest that visualization as a mental reference supports athletes with an organized trail to be followed in their target competitions.

Mentalization techniques are the most used PST tools in the sports field. In spite of that, elite athletes, participants of this study, did not reveal any systematic usage of mentalization techniques prior to being submitted to the PST program. The Meaningful Value of Mentalization factor emerged as athletes revealed the development of a deep comprehension regarding the usage of these tools over the program. Weinberg and Gould (2017) point out that lack of information about PST tools is one of the main barriers to undermine athletes' adherence to interventions proposed by sport psychologists. In this regard, Portenga (2018) suggests knowledge must be the first component approached by sport psychologists. A study conducted by Way, Jones and Slater (2012) on adherence to sports, with 17 elite athletes, revealed that all of them changed their attitudes to training after receiving, for 2 hours, useful information about time management in their fitness programs, provided by experts, including a sport psychologist. Noteworthy, all the participants specifically described situations in which information about how mentalizations should be used in different stages helped them to think of different strategies for competitions and hard training phases. The athletes have also revealed that mentalization became an important and constant tool to help them to acquire movements as much as to develop strategies and execute game plans. Considering the findings of the present investigation corroborate previous ones regarding peoples' adherence to programs in sports, it is possible to question whether this study's conclusions about the meaningful value of mentalization could be

transferred to other contexts. Will people in any domain adhere to training programs' tools and methods, if they don't feel it is useful and meaningful to do it? Probably, the answer is no.

Siegle et al. (2017) consider that talented people's need for cognition might influence achievement. Consonantly, it is reasonable to state that the participants of the present study were fully interested in learning aspects of the PST they were submitted to, before achieving their best records. Also, they have pointed out that information provided by psychologists about periodization requirements and PST tools worked as an important contributor to enhance their adherence to the PST program. As athletes understood the possible contributions the PST program could offer, they accepted that it could actually help them to develop psychosocial factors. After constantly using tools presented by the PST program during training sessions, they confirmed those techniques supported performance control. Finally, they integrated the PST tools into their competition routines. Remarkably, the four steps described (understanding, acceptance, utilization and integration) were quoted by Holliday (as cited in Mujika et al., 2018) as the ideal stages of a periodized PST program. It appears this process has promoted the sensation that they knew what to do during difficult moments. This factor was named Feelings of Knowing What To Do Under Pressure. For Jones et al. (2002) the ability to feel confident under pressure is something that might be natural or developed by PST in sports contexts. Records reveal that successful periodized PST programs have considered providing information about mentalizations and biofeedback as a main component of their designs, especially during earlier phases of the programs (Beauchant at. al., 2012). Coherent with previous research (Siegle et al., 2017; Way et al., 2012) the participants of this study seemed to have engaged in techniques that actually improved their abilities to self-regulate only after those interventions became something meaningful for them, aligned with their interests about training programs and goals. Those

techniques were systematically used and athletes became aware and confident that they could transfer routines they repeated weekly to competitions. One explanation why athletes described a feeling they knew what to do under pressure might be related to two main factors: (a) athletes received information they understood and accepted as useful to help them cope with demanding contexts, and (b) they actually trained what they had to do under difficult training conditions and confirmed they could control their performance under pressure before target competitions. Basically, the feeling they knew what to do under pressure matched their effective knowledge levels regarding the issue.

This study created a grounded theory of psychosocial factors associated with talent development in sports, identifying factors associated with psychosocial support training. Findings suggest that psychosocial factors are developed all through athletes' trajectories. Elite athletes demonstrate since the first stages, to actively count on social support, to identify opportunities and strive to use them, to have positive beliefs about the development of their abilities, and to display great task commitment. Overall, it appears that, especially from the transition from expertise through eminence, psychosocial development might be enhanced by PST programs. It seems beneficial if PST programs consider the factors biofeedback, mentalization techniques and feelings of knowing what to do under pressure in their designs. This study evidenced those factors have a relevant relation with the development of three aspects that are fundamental for elite performers in sports: psychological strength, mastery orientation and the ability to stick to game plans. It appears that the transition from expertise to eminence might be easier if supported by psychosocial support that not only helps athletes to feel they know what they are doing, but also enhances the likelihood of outstanding achievement, as proposed by Subotnik et al. (2011).

The theory framework and previous research findings were useful for building this grounded theory in four ways. First, there was a general support for each of the reported psychosocial factors in the talent development and sport psychology literature (Albert et al., 2019; Almeida et al., 2013; Dweck, 2014; Gagné, 1999; Henriksen et al., 2014; Horn, 2018; Jarvin & Subotnik, 2010; Olszewski-Kubilius et al., 2015; Prado, 2018; Renzulli, 1986; Subotnik et al., 2011; Worrell et al., 2018). In other words, psychosocial factors are important for talent development in sports.

Second, the idea to incorporate psychosocial factors as enhancers for athletes' development and consider psychosocial support training (PST) a relevant contributor to talent development was inspired and supported by the Talent Development Mega Model - TDMM (Subotnik et al., 2011). Besides, the emerging psychosocial factors in this study (Task Commitment, Growth Mindset, Social Support Usage and Opportunities Taken) were explicitly mentioned in the TDMM as key factors if someone wants to achieve eminence.

Third, the usage of PST tools (e.g., biofeedback, visualizations and psychosocial interventions) to enhance the development of psychosocial factors has been recently described as a relevant aspect of sports high performance development (Dupee et al., 2016; Jiménes-Morgan & Mora, 2017). Additionally, grouping the techniques in program designs has been described in sport psychology research as more potentially beneficial to athletes' development than the usage of isolated techniques (Beauchant et al., 2012; Blumenstein & Orbach, 2018; Slimani et al., 2016).

Fourth, periodized PST frameworks and psychosocial interventions to enhance athlete's knowledge of periodization stages have been recently registered as important aspects of sports high performance development to ultimate levels (Blumenstein & Orbach, 2018). The present

study registered that athletes' utilization and integration of PST tools into their routines were preceded by athletes' comprehension and acceptance that the tools might be useful in different ways, during different training stages. Athletes' feelings of knowing what to do under pressure emerged exactly when athletes described being instructed on how and why to behave in determined ways in different stages of their periodizations' spreadsheets.

At this point, it seems important to reinforce that different talent development studies in the 2010s have been suggesting that students in academic environments would also benefit if they receive PST to prepare them to cope better with stressful contexts (Dixson et al., 2016; Portenga, 2018; Worrell et al., 2016). For Worrell et al. (2016), these studies are reverting a historical trend in academic departments, which have traditionally ignored the possible benefits of investigating competitive settings. The authors advocate that psychology might translate knowledge from competitive contexts, like sports, to other fields.

> Psychology offers a framework for translating what we can learn from the study of competition's contribution to outstanding performance and to more widely improving the human condition in a wide range of arenas from schools and the workplace to athletic and artistic venues. (Worrell et al., 2016, p. 267)

Finally, reliable information provided by psychologists might work as cues to action, something fundamental to plan athletic behaviors (Portenga, 2018; Way et al., 2012). It seems reasonable to infer that PST tools might also contribute to talent development in different fields (Dixson et al., 2016; Jarvin & Subotnik, 2010; Olszewski-Kubilius et al., 2015; Portenga, 2019; Subotnik et al., 2011; Worrell et al., 2016). PST can be evaluated, applied and replicated in the most varied areas of human performance in which the competitive component is made present. Therefore, it is worthwhile to consider that PST programs, in different professional contexts,

would be more suitable if they consider a periodized framework to schedule the usage of psychosocial tools (e.g., biofeedback and mentalizations) aligned with spreadsheets that consider different strategies, phases and instructions to prepare talented people to cope better with stressful conditions, especially in important target days during their trajectories (e.g., exams, auditions, job interviews).

This study has some limitations. First, there was a considerable amount of information provided by the participants that should be kept anonymous. Dealing safely with such data imposed limits to this research. For instance, not revealing the sports that two of the participants practiced, or which was their final positions in the Olympic rankings, was done to preserve the identities of the participants. Second, the information obtained by the participants could be subject to memory selectivity bias (Bloom 1985). Third, the sample size of this study may be considered insufficient to explain the development of talents on a scale. Fourth, a relevant limiter to investigate the road to eminence in athletes' trajectories derives from difficulties to predict who will actually become eminent in the long run. In this regard, it seems challenging to carry out classic longitudinal studies that are ideal to predict how one develops her or his potential from first stages to elite levels. A study with this design generally involves a long-standing data collection, something not feasible to be done considering the duration of a 2-year masters program.

CHAPTER 7

CONCLUSIONS AND IMPLICATIONS OF THE STUDY

By comparing current findings with existing theory and research, this study created a grounded theory addressing the role of psychosocial factors and psychosocial support training (PST) for talent development of athletes. Findings suggest that:

1. Psychosocial factors are developed through athletes' trajectories.
2. Elite athletes revealed that since the first stages they had already developed psychosocial factors such as social support usage, opportunities taken, growth mindset and task commitment.
3. Psychosocial factors were considered significant for athletes' talent development.
4. Athletes have constantly portrayed a growth mindset style during their trajectories, believing that they could develop psychosocial and technical abilities and convert mistakes into learning opportunities or challenges.
5. Parents and coaches were quoted as the main sources of support in athletes' development providing them with informational, emotional, technical and financial backing.
6. Financial support is a critical juncture in Brazil and might seriously undermine a person's possibility to develop her or his talents to eminent levels, especially in the case of females.
7. Task commitment seems to be a ubiquitous psychosocial factor in sports development programs, and is required since earlier stages, as sports careers tend to have an early peak (normally during late adolescence or early adulthood).

8. Athletes should have the ability to take advantage of opportunities which are relevant for their development. It is important that they identify opportunities and strive to be in the right place at the right time to convert those opportunities into success from earlier stages on.
9. The transitions (especially from expertise through eminence) involve psychosocial development that might be enhanced by PST.
10. Factors that were not present in athletes' talent development before the beginning of the PST program (biofeedback, mentalizations and feelings of knowing what to do under pressure) have blossomed during the program. It seems those factors have special importance in the transition from expertise through eminence when hard tasks and competitiveness require more engagement, comprehension and confidence.
11. It appears that career transitions might be eased if PST not only supports athletes to feel they understand what they are doing, but also fosters performance improvement.
12. It seems that athletes will adhere more and better to PST programs if they receive useful information about the PST techniques, fomenting athletes' acceptance that these tools might actually promote development. In this regard, one of the primary roles of PST is to teach athletes that psychosocial factors might be trainable, and that PST is suitable for the endeavor.
13. Athletes' openness to PST and the acceptance that they needed psychosocial training support to evolve to upper levels seem to be prerequisites to the usage and integration of the tools into their routines during training sessions and competitions.
14. The usage of biofeedback-based PST tools might facilitate the control of anxiogenic variables which impact on psychological strength development.

15. Self-confidence and stress control emerged as important characteristics of psychologically strong athletes.
16. Athletes' engagement in mentalization protocols can contribute to developing factors that might impact on performance: (a) the acquisition of movements, (b) the elaboration of game plans (and sticking to these game plans in major competitions), and (c) the development of a mastery orientation style.
17. Athletes had a great increment in mastery orientation after the PST program, considering their trajectories that previously evidenced an outcome focus, which was changed to a learning focus during the process.
18. The four participants discussed the beneficial effects of periodized interventions highlighting episodes in which they displayed: (a) a meaningful comprehension of the process of sports training in different dimensions (physical, technical and psychological), (b) a greater clarity of what should be accomplished in different training phases, and (c) a deeper knowledge about the actual goals of each stage designed by their coaches.
19. Athletes' feelings of knowing what to do under pressure was positively influenced by information about training requirements, something that reinforced the meaningful usage of biofeedback and mentalizations and provided cues for their actions with different purposes during different periodization phases.

Practical Implications

Talent development can be fostered or impaired by several factors and differ in its forms of expression in distinct domains and stages of an individual's life. Giftedness is initially manifested or identified as a potential in the early stages of a talented person's journey. The

development of such a potential depends on environmental and personal factors to result in high achievements during a career's peak. Among the factors that may be important limiters or enhancers for the development of talents, psychosocial factors seem to be crucial in sports contexts, as revealed in this investigation.

The grounded theory developed in the present study identified psychosocial factors that were relevant for the talent development of athletes that reached high levels of expertise and benefited from psychosocial support training, seeking to transit from expertise to eminent levels. Additionally, this research identified which factors were nurtured by PST and which of them were in progress over athletes' trajectories, even before being introduced to a PST program.

The framework designed in this study (see Figure 1) proposes that athletes are passionately involved with sports since their first developmental stages. Coaches and families foment their love for sports and support their transition from ability to competence. From this initial stage to eminence, social support usage is an essential aspect to develop athletes' abilities. From competence to upper levels (expertise and eminence), psychosocial factors such as task commitment and the promptness to be ready to identify and use the most relevant opportunities in athletes' careers play a great role in talent development. Besides, athletes' beliefs that they can achieve higher levels of performance are important motivational aspects associated with a growth mindset during their development. That mindset is also related with athletes' perceiving setbacks and errors as challenging learning opportunities and not as potential threats. The development of those psychosocial factors might support athletes to transit from competence to expertise.

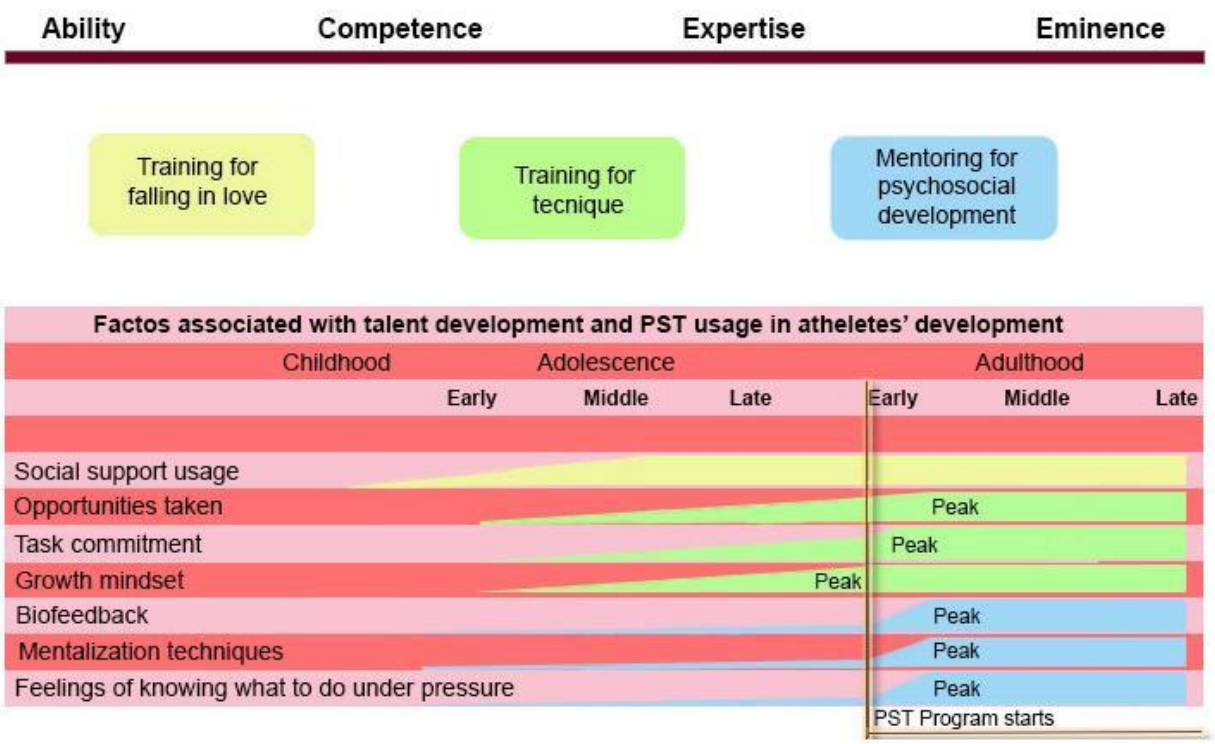

Figure 1. A grounded theory of the role of psychosocial factors and psychosocial support training (PST) in the development of talented athletes.

The graphically designed grounded theory also proposes that from expertise through eminence athletes generally recognize they need something more than technique to evolve. At this point in their careers, athletes get open to psychosocial support which might be provided by expertised personnel (e.g., sport psychologists, experienced athletes) to promote their psychosocial development. PST tools as biofeedback and visualizations may be a differential in their preparations, if athletes understand that psychosocial factors are trainable and if they accept that PST tools might be perfectly suitable to be used and integrated into their routines to improve important psychosocial aspects. The development of a meaningful comprehension, and integration, of biofeedback and mentalization tools into their routines is related to increments in factors such as psychological strength (revealed by characteristics as self-confidence and stress

control), mastery orientation and the ability to stick to game plans. Those aspects play a decisive role in athletes' evolution at this phase and might be influenced by the adoption of PST programs that use biofeedback and mentalization-based tools.

This grounded theory also suggests that PST tools that promote self-regulation should be meaningfully aligned with athletes' physical and technical periodization plans. One of the main functions of the PST programs, in elite contexts, is to clarify athletes about different training requirements in terms of physical, technical and psychological aspects, as this kind of information helps them as cues to action (which might impact on performance). Basically, useful information promotes athletes' adherence and positive behavioral adaptations regarding PST and training sessions (physical and technical), fomenting athletes' feelings of knowing what to do under pressure in different periodization stages.

In other words, this framework displays some of the main psychosocial factors for athletes' talent development and suggests the adoption of PST programs as contributing factors to foster this development in sports trajectories. It also proposes that these programs should consider the inclusion of self-regulation techniques, periodization phases and information about training requirements in their periodized designs. This grounded theory is the result of integrating current findings with previous sports talent development research, as much with sport psychology findings and periodization principles. For instance, the design and components used to represent the grounded theory (e.g., psychosocial factors, three transitions, four talent developmental phases, PST as a main contributor to talent development) were adapted from the Talent Development Mega Model (Subotnik et al., 2011). Notably, talent development studies suggest that PST might also contribute to the development of psychosocial factors in different

contexts, one of the relevant aspects to be investigated in future studies about the issue. Future studies may provide more empirical evidence to support the proposal.

Implications for Future Research

This study sought to produce theoretical, methodological and practical insights to the sports talent development domain. However, additional research is needed in order to broaden academic comprehension about important points that might describe sports talent development to eminent levels and the role of psychosocial support training in this endeavor. Furthermore, the adoption of PST tools in different contexts in which the stressful components might limit peoples' development is also a point that requires deeper investigations. Therefore, this research highlights some aspects that are relevant to be investigated in future studies about athletes' talent developmental process as much as about the usage of PST (as provided by sport psychologists) in different domains and contexts. In this regard, some investigations in the talent development and sport psychology fields could make robust contributions to both areas in case they:

1. Conduct longitudinal studies to evaluate how psychosocial factors evolve in different phases of athletes' trajectories.
2. Investigate the adequacy of biofeedback and visualization tools' usage in other domains, such as the academics.
3. Evaluate the associations between competition and outstanding performances/ productions in different domains.
4. Consider the role of gender in athletes' talent development from first stages to eminence, comparing women and men.

5. Analyze if sports psychological periodization principles might be applied in other domains.
6. Compare the efficacy of biofeedback and mentalization tools usage with other self-regulation tools (e.g., self-talk, hypnosis, yoga) in sports talent development programs.
7. Replicate this study with larger samples.
8. Compare individual and group sports modalities with respect to the usage effects of PST.
9. Study the suitability of PST programs' applications to support people that should perform well in traditionally stressful conditions (e.g., aerospace and military missions, Graduate Record Examination – GRE – preparatory groups, labor forces in nuclear facilities, intensive care units and prisons).
10. Develop an instrument to measure athletes' meaningful comprehension of PST for their talent development.
11. Compare how PST tools might contribute to talent development in different stages of athletes' careers.

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