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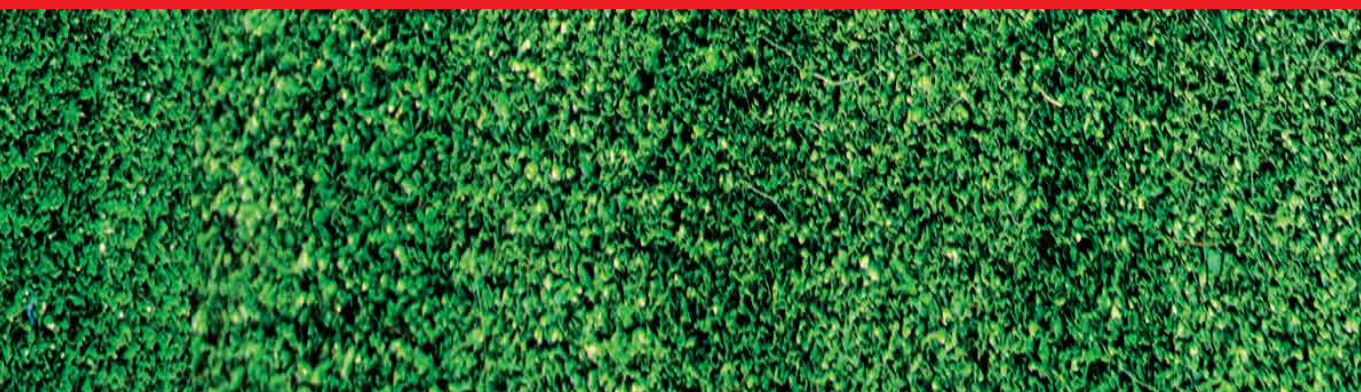
Sport Psychology in Sports, Exercise and Physical Activity

Edited by Hilde G. Nielsen



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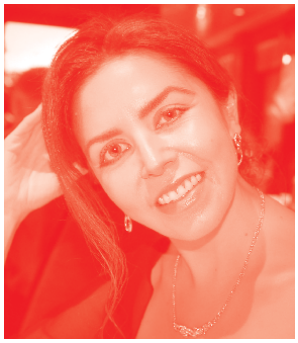

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Sport Psychology in Sports, Exercise and Physical Activity
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Edited by Hilde G. Nielsen

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Meet the editor

Hilde G. Nielsen has a Ph.D. in Exercise Immunology from the Faculty of Medicine, University of Oslo, Norway, and a master's degree in Exercise Physiology from the Norwegian University of Science and Technology. She also completed a Leadership Foundation Programme and a course in Project Management at the BI Norwegian Business School. Dr. Nielsen has been a member of several evaluation committees for Ph.D. students, a peer reviewer, and an editorial board member for three international journals. Her research interests and publications are within the fields of exercise physiology, exercise immunology, training, and physical activity and health.

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Preface

Physical activity and exercise are important for a healthy life. However, how to become physically active or how to remain physically active through a lifetime comes with several challenges. Learning to like an activity or to be a sports athlete depends on several factors. How much does personality matter? What does it take to have a physically active life at any level, and what are the theories behind changing habits to become more physically active or to start to exercise?

This book introduces readers to some topics within sports psychology with a special focus on motivation, behavior change, personalities, and what an individual, whether a coach, leader or teacher, can contribute to getting more people to be active at every level and create a habit of being physically active throughout life.

I would like to thank the authors for their excellent contributions.

I am also grateful to the staff at IntechOpen for their support during the preparation and publication of this book.

Good reading!

Hilde G. Nielsen
The Research Council of Norway
Oslo, Norway

Chapter 1

Lifelong Healthy Habits and Lifestyles

Samuel Honório, Jorge Santos, João Serrano, João Rocha, João Petrica, André Ramalho and Marco Batista

Abstract

The expression "lifestyles" describes several expressed behaviors, usually in the form of consumption and behaviors patterns, which characterizes how an individual or group fits into society. Although, with the advancement of science and the facilitation of human tasks in the daily living, there is a reduction in mortality from infectious diseases and an increase in longevity, however the appearance of chronic-degenerative diseases that negatively affect the quality of life have been found when some behaviors, defined as "good" lifestyles are not considered. The lifestyles could be defined as a set of mediating structures that reflect a totality of activities, attitudes and social values closely related and that depend on economic and social conditions, education, age, among other factors. It manifests historical and cultural experiences and emerges from a set of decisions, over which the subject assumes control, thus, the lifestyle is revealed to be fundamental in the promotion and protection of health. This chapter intends to describe how healthy lifestyles could be considered adequate through our living period since young ages, maintaining and distinguishing them during adulthood and making them useful in older ages.

Keywords: Lifestyles, Habits, Exercise, Physical Activity

1. Introduction

Healthy lifestyles constitute an obstacle to disease [1] and include preventive health, good nutrition and weight control, leisure, regular physical activity, periods of rest and relaxation, the ability to face adverse conditions or situations and to establish affective and solidary relationships, adopting a posture of being and being in the world with the objective of living well [2]. Historically, the study of healthy lifestyles can be marked until today by three major periods: a first period beginning in the 19th century, until the middle of the 20th century; a second period, which closes the second half of the twentieth century and a third period which focuses on the present. During the first period, studies stand out [3–5] that healthy lifestyles, dependent on a sociological view and individual factors, of the individuals who were part of the social strata that could keep. In the second period [6, 7], several authors reported an incorporation of healthy lifestyles in health and studies on what are isolated, seemingly condoning or conducive to a style or a healthy lifestyle. In the third period, there was a development up to the present [8, 9], that reflect healthy behaviors integrated in different contexts, or even the relationship of

different dimensions with healthy lifestyles, such as motivation or basic psychological needs, seeking to perceive self-determination for a given practice and the adoption of healthy behaviors.

In relation to healthy lifestyles, we use the terms healthy lifestyles and health-related lifestyle synonymously, encompassing both behaviors that enhance health (practice of physical activity, adequate eating habits and resting habits), such as those that harm it (drug use) [10]. Considering that the behavioral patterns acquired in the early stages of life are likely to be maintained during adulthood [11], those adolescents who finish their educational stage integrating a healthy lifestyle will tend to be adults with less probability of exposure risk factors [12]. A study conducted [13] showed the prevalence, throughout life, of healthy and unhealthy behaviors, initiated in childhood or adolescence. Of these, healthy behaviors stood out: eating habits, physical activity habits, resting habits, accidents and their prevention and the practice of free time activities. As unhealthy behaviors, the study showed the consumption of alcohol, tobacco or medication. Currently, the healthy lifestyle construct has a close relationship with the modern food pyramid and is investigated according to multivariate models, which involve quality of life or the absence of disease [13]. There are several examples of programs to promote physical activity as a mean of promoting a healthy and active lifestyle, namely The Sports Play and Active Recreation for Kids (SPARK); Health Behavior in School-aged Children (HBSC); Healthy Lifestyle in Europe Nutrition in Adolescence (HELENA); Strategy for Nutrition, Physical Activity and Prevention of Obesity (NAOS); Lifestyle Education for Activity Program (LEAP); Adolescents' Nutritional Status and Valuation (AVENA); Forum Ghana Salud; Global Movement for Active Aging; Health is in the Movement; The Ever Active Adults (EAA); The Exercise "Take Care" in the province of Extremadura; Physician-based Assessment and Counseling for Exercise - PACE; Peso program, the latter two, both in Portugal.

These studies reflected in this chapter will demonstrate the importance of a healthy lifestyle, which should be started very early and continued throughout life. It presents the main actions and behaviors related to a healthy lifestyle, as well as control parameters for metabolic and bio-feedback variables. However, certain adaptations can be made as to the instruments for assessing and quantifying lifestyle, as there is still no standard and unalterable method that provides maximum fidelity for the assessment of a healthy lifestyle. It also becomes evident that some investments must be made in terms of public health, since the practice of physical exercises is a habit that must be part of the daily life of the human being and that age should not interfere when it is desired to have a healthy life.

2. Historical perspective

The globalization of social activity was a worldwide process for developing genuinely ties that relates an involvement of events and social relationships with the contexts of each location [14]. On the other hand, we should also not neglect the environmental dimension because the problems that exist in it have repercussions on the level of the global lifestyle, reflected in the awareness and extent of the potential risks of an ecological crisis that induce practices and lifestyles, and thus, new forms of culture, which can both contribute to new social alignments, as well as to reinforce individualization processes in the social insertion of its individuals [14].

Another aspect that had a great impact on the social changes and lifestyles of more contemporary populations was, without a doubt, the access of women to the world of work outside their homes. The woman who, for many generations, has been mainly engaged in domestic activities, starts to work outside, side by side

with her husband, in equal circumstances, making this phenomenon a clear sign of emancipation. Home life is transformed, there is a need for more direct help from husbands in household chores and the education of children, the economic capacity of families improves and they have a better purchasing capacity that will be reflected in the acquisition of goods and services that would otherwise be prohibited [14]. Lifestyles correspond to a set of standards of conduct that characterize the general way of life of an individual or group. It is also mentioned that the concept of "lifestyles" when related to health, should be understood in a broad dimension, encompassing different living standards of citizens, as well as the cultural context in which they live and social dynamics, psychological and historical aspects of that environment [15].

Lifestyles were interpreted as "the material expression of the way of life, personal ideas, intentions and vital projects, in short, they are the way in which each individual organizes his life. Ways of life based on identifiable patterns of behaviour determined by the interaction between the individual's personal characteristics, social interactions and socioeconomic and involvement conditions" [16]. The behavior patterns mentioned in the definition are, frequently tested and interpreted in social situations, and are therefore subject to frequent modifications. The term "lifestyle" is somewhat diffuse, because different sociological ideas coexist that, although starting from homogeneous premises, present different approaches:

- The psychological-evolutionary approach starts from the idea that lifestyles are determined by basic and supplementary needs, as well as by the framework of individual values whose variation will determine social change [16].

- The socio-structural quantitative approach that studies lifestyles as forms of consumption where the feeling of freedom of choice predominates in the consumption of different goods and services [16].

- The qualitative approach that bases its analysis on the perception of the subject's daily life, considering in what way, work, free time and family (...) determine their opinions, attitudes and conduct [16].

- The theoretical approach based on social classes that is based on economic differences and their influences on the systems of values and attitudes. In this sense, the existence of a close relationship between the class structure, the set of cultural guidelines and the model on which culture is based to reproduce the class structure of modern societies is highlighted, [14]. Between 1981 and 1988, although there were different approaches on how to understand lifestyles, the important thing is: "looking at lifestyles and being able to see all differences simultaneously as something personal and social with great doses of originality and privacy but first of all, as something socially constructed" [17, 18]. In view of the opinion previously expressed, we can say that lifestyles can be seen as something individual or grouped, thus being able to speak about the lifestyle of an individual, group or culture [14]. The lifestyle constitutes a general way of life as the interaction of living conditions, in a broad sense and the individual standards of conduct determined by socio-cultural factors and personal characteristics [19]. Lifestyles are linked to values, motivations, opportunities and specific issues related to cultural, social and economic aspects [16]. The expression "lifestyles" describes a set of expressed behaviors, usually in the form of consumption patterns, which characterize the way in which an individual or social group fits into society [16]. This was an expression that originated from research inherent to non-infectious diseases, mainly in developed

countries [20]. Although, with the advancement of science and the facilitation of human tasks, there is a reduction in mortality from infectious diseases and an increase in longevity, but on the other hand, the appearance of chronic-degenerative diseases that negatively affect quality of life [20].

3. Lifestyles through life

There are some opinion differences in those who defend the approach of changing behaviors towards healthier lifestyles and those who advocate changing the physical and socioeconomic environment for better health. Initially, [21] it was justified the need for these two determinants: lifestyles and the environment, since both are somehow interconnected, since to change individual behavior, favorable environments are also necessary for the it is carried out. Setting the example of a sedentary person who intends to start exercising regularly, he must have conditions of a social environment conducive to being able to do it (time), but also physical conditions (sports facilities).

According to this, the characterization of lifestyles is fundamental, since inadequate habits can be reflected in health problems, which is why it is important to have preventive and constructive education from both the family and the sports environment. Sport and physical activity are basic pillars of education and health promotion, as well as healthy lifestyles [22]. Healthy lifestyles can also be identified as a set of relatively stable patterns of conduct, by individuals or groups, that are beneficial to health [22]. It is also mentioned that a healthy lifestyle is what manages or maintains health, which is multifactorial in nature, including physical, mental and social dimensions [23]. There are also other positive and negative factors in lifestyle that affect our health and well-being, in the short and long term, namely from middle age (40–60 years), our mobility [23]. People's autonomy and quality of life are directly associated with lifestyle variable, presented on the "Pentacle of Well-being" [24]. In the early 90's, several authors tried to join efforts to clarify the concept of healthy lifestyle, its variables, as well as ways to promote health. The main variables in the studies on healthy lifestyles carried out between 1987 and 1993 were: Alcohol consumption; Tobacco consumption; Eating habits; Physical activity; Consumption of drugs and medication; Resting habits; Accidents and risk behaviors and their prevention; Dental hygiene; Medical exams; Free time activity; Sexual conduct; Hygienic habits; Others [24].

The lifestyle is defined [25] as a set of mediating structures that reflect several of activities, attitudes and social values closely related and that depend on economic and social conditions, education, age, among others. Other factors. It manifests historical and cultural experiences and emerges from a set of decisions, over which the subject assumes control, thus, the lifestyle is revealed to be fundamental in the promotion and protection of health. It is an analysis that is based on healthy lifestyles, considered as ways of life that consider and understand aspects such as harmonious relationships, self-esteem and good communication, which directly influence the quality of life of each individual [26]. In the last decade, the values of blood pressure and obesity in children and adolescents increased exponentially, such as the body mass index, which promotes these same characteristics in adulthood, namely due to the lack of habits or specialized activity programs. [27, 28] A large part of the population does not control their weight in a healthy way without limiting their calorie intake even though maintaining a regular level of physical activities [28]. Eating a varied diet rich in vegetables, reduce the total amount of calories ingested [29]. Children's sports practice is of great importance in promoting values such as discipline and motivation to overcome obstacles during

the course of life [30]. Physical activity has a predominant role in behaviors that promote a healthy lifestyle, since childhood. In modern civilizations, automation and computer technology have made every day physical tasks simpler and easier. Leisure activities such as television and computer games have also reduced the amount of time to be more physically active [28]. However, these forms of leisure do not show more physical effort, so it is needed a regularly exercise for our body, so that the variables of physical inactivity do not harm our state of physical and mental health. To have that, it is recommended the performance of routine tasks, resulting in improvement quality of life [28]. The model of a healthy lifestyle is not a definition. In general, the lifestyle considered healthy is one that in its context promotes a lower probability of diseases and disabilities [28]. Healthy lifestyles are structured around a set of behaviors that create interest in the individual and which prevail over other, less healthy behaviors [28]. There are others associated with the concept of lifestyle, to better understand how various behaviors fit the current health model [31]. It is important to understand several terms and concepts, such as health, physical activity, physical fitness, food, sleep quality, rest habits and others. It is well documented that participation in physical activity on a regular basis is an important factor in improving the quality of life, as it is essential for the body to function and develop in a healthy way, [31]. Changes in lifestyles have significantly positive effects on long-term health [27]. It is easy to see that there is a close conception between a healthy lifestyle, the levels of physical activity of each individual and their behaviors.

In a comparison between practitioners and nonpractitioners of physical activity, and between genders, among college students it was found better indicators of lifestyles in students who practice physical activities, meaning that this variable is a determinant for a healthy life [32]. The study demonstrated also that resting heart rate has a positive association with physical activity and the lifestyle variables such as diet, respect for meals time and resting habits [32]. Is important to practice these healthy lifestyles in early adulthood, so that these practices, all together, can be maintained through life. In a study with 150 surf practitioners it was reflected that, according to the years of practice that young surfers had, the better their physical activity levels were, also a lower prevalence of sedentary habits better sleeping habits [32]. Also, the surfers who were competitors demonstrated to be more physically active, to have a lower prevalence of sedentary habits, a better control of their sleeping habits and risk factors (alcohol and tobacco) [28]. In adult practitioners, surfers with more years of practice had better care in feeding and were more physically active [32]. Analyzing all practitioners in general, the best results obtained were revealed in the context of nutrition, physical activity, preventive behaviors and social relationships. In terms of health education, this field has shown concern mainly with changing lifestyles, to instil in people the alteration of their habits, to better adapt to the environment in which they live. As an alternative to this way of acting and living, two different and complementary perspectives on education and health promotion emerge: the information provided to people, so that they can consciously choose and by their own choice, and the creation of physical and socioeconomic structures favorable to the practice of these healthy lifestyles [33]. Modern habits, such as exposure to stress, smoking and lack of adequate sleep are not considered healthy, because due to these, the increased risk of cardiovascular diseases, some types of cancer and the risks of mortality stand out among the main factors [33]. It is a percentage higher risk in smokers, as well as mental and physical tiredness resulting from insufficient number of hours of sleep or quality of sleep [34]. Sleeping habits have an influence on physical and emotional well-being, which in turn, influence quality and lifestyles [35]. The number of hours slept becomes a fundamental indicator of health and well-being, since sleep is a state that offers

the individual a feeling of physical and mental rest, allowing him to perform in good physical and mental conditions the tasks of the patient next day [36]. The quality and quantity of sleep time will be determined by sleep habits, which occur between bedtime and waking up. One of the main benefits of sleep for sports is the physiological capacity for muscle recovery that occurs when we sleep [37]. Analyzing sleeping habits between genders, it was found that women have more sleep problems, as sleep latency is higher in women than in men, justified by the influence of hormonal variation of the female organism, and this aspect has been seen as a tendency [38–40]. These factors can also result from increased pressure in work activities and psychological stress with more impact on women in the dual role of mother and professional, since they work in periods that should be intended for rest [41].

In a study with veteran athletes the dimensions of lifestyles with the highest percentage were balanced diet and respect for mealtimes, followed by resting habits, as well as in other studies found, where the two dimensions that revealed the greatest concern for the participants in the study were balanced eating and resting habits, including sleep [42].

3.1 Motivation, lifestyles and gender

As previously mentioned, the term quality of life is treated and analyzed from different perspectives, namely through science and common sense, from an objective or subjective point of view and in individual and collective approaches. It is a concept focused on the ability to live without disease or to overcome difficulties related to states or conditions of morbidity [43]. Regarding the differences between genders, this subject has always had different interpretations and continues to be the object of study in several areas of knowledge [44], since opinions are divided at national and international level and point to a good amount of data indicating the existence of very significant differences between men and women. More studies reveal [45] that male individuals have a higher quality of life in general, when compared to the female gender. For the realization, intervention, practice or adoption of behaviors aimed at the feasibility of other healthy lifestyles, it is necessary to feel and realize that there must be an internal and personal change, that is, a motivation for such behaviors [46]. It is important to understand the concept of motivation, since it is one of the most central concerns of any human activity, proving to be beneficial both at a biological and psychological level [47], as well as giving energy and direction to behavior [48], assuming a leading role in all contexts of human life [49]. When we approach the context and concept of motivation, it is important to remember that the reason is the basis of the motivational process, being, therefore, the essential element to trigger the initiative and subsequent maintenance of the activity performed by man [50]. Following this perspective, it is stated that motive is an internal factor, which initiates, directs and integrates a person's behavior, and relates motivation to reason, as an intrinsic strength, an impulse, a purpose, leading the individual to act in a certain way, directing his actions and the intensity of efforts to reach a goal [50]. Motivation is conceived as the dynamic object of behavior, through which one seeks to understand the process of orienting behavior towards preferred situations and goals [50]. It is one of the fundamental psychological skills inherent in sports and determinants in the psychological profile of athletes, being one of the factors that drive certain behaviors to achieve certain goals [51]. Motivation is characterized as an active, intentional and goal-oriented process, which depends on the interaction of personal (intrinsic) and environmental (extrinsic) factors [52]. According to this model, motivation has an energetic determinant, which corresponds to the level of activation, and a determinant of the

direction of behavior, as is the case with intentions, interests, motives and goals. Therefore, motivation can be classified in two ways: intrinsic motivation, which refers to the rewards that originate from the activity itself and related to instinct factors and needs; and extrinsic motivation, referring to the rewards that are not obtained from the activity, but are the consequences of the same, such as the status and affirmation [53].

Intrinsic motivation results in high quality learning and creativity, being especially important in the details of factors and forces that engender or compromise it [54]. It is the basis for growth, psychological integrity and social cohesion, it is also a natural tendency to search for novelties, challenges, as well to acquire and test your own abilities [54]. It is mentioned that intrinsically motivated individuals are more likely to be more persistent, to present higher levels of performance and to perform more tasks than those who require external reinforcements [55]. In the case of physical activity, individuals can also participate and compete sports for intrinsic reasons, for example, when they feel satisfied with learning new techniques in their modality. According to several authors [56–58] the intrinsic motivation can be classified taking into account different dimensions, such as: intrinsic motivation to know, when athletes are happy to learn something new, as a new technique; intrinsic motivation to perform, when the activity experienced generates pleasure and satisfaction in the accomplishment of something, such as, for example, trying to master a certain technique that we consider more complicated; and intrinsic motivation to stimulate the experience, when an activity starts as a way to experience the sensations derived from it, such as pleasure, fun and joy [56–58]. On the other hand, extrinsic motivation comes from external factors, in the form of positive and / or negative reinforcements, such as, for example, when athletes participate in competitions only to obtain recognition from coaches and/or family members. This refers to a diversity of styles that range from external regulation to integrated regulation, characterized by individual action goals, being directed by some consequence separately [59]. External regulation is characterized by the search for external incentives to practice, and the individual is committed to the task only to achieve a reward or avoid punishment [60]. This represents extrinsic motivation as it is traditionally defined, being the least self-determined form of extrinsic regulation Other perspectives [61–63] revealed that male individuals have higher levels of lifestyles in general, when compared to females, however, more studies [64] found that, despite the fact that women have a state of depression higher than that of men, it can be the product of family attitudes, community and society in general, as a way of protecting or abusing people. Also [65] women feel less tense, happier, with more energy and have higher levels of mental health, since programmed physical activity helps to improve both physical and psychological taste and well-being the same.

Regarding situations that most favor the quality of life, [66] female gender establish a group's unity, the good relationship with others, the experience and competence of the coach and positive feelings, which proves that the stronger the identification of women with the group of athletes, with the coach and with the technical team, the greater the dedication, persistence and discipline for training [66–68]. Women need more emotional feedbacks and social support than men. For them, the most important situations are dedication in training, positive feelings and a winning attitude, hence they present high levels of competitiveness. Addressing the topic of motivation takes us to a context of Self Determined Theory (SDT) and Basic Psychological Needs. SDT argues that individuals are active organisms, with an inherent tendency for psychological development and growth, which through various challenges stimulates and increases their capacities [69]. This is a theory that has grown regarding the study of motivation, as it explains what the pillars of motivation (intrinsic and extrinsic) are, as well as the factors related to its

promotion [70] considering the personality factors in social contexts and the causes and consequences of self-determined behavior [71]. People need to feel competent and self-determined to be intrinsically motivated, and as mentioned above, the subject's motivation is related to the satisfaction of three basic psychological needs: autonomy, that is, the need to feel independent, to the extent that that it is the individual himself who regulates his needs; competence, that is, the need to feel competent, to interact successfully according to the stimuli of the environment; and relationship, that is, the need to feel connected to others, that is, to be considered and appreciated [70]. In this way, we can say that it is these three psychological needs that explain the regulation of people's behavior, which is established in a motivational continuum, ranging from the lack of regulation or lack of intention to act, through the most controlled forms and ending in the forms more autonomous of motivation [71]. The theory of self-determination proposes that motivation varies over a continuum and that it takes different forms according to different levels of self-determination, with intrinsic motivation at one end, characterized by high levels of self-determination and in which, when carrying out an activity, there is no demand to achieve external rewards [72] and, on the opposite, there is demotivation characterized by the lowest level of self-determination, which corresponds to the absolute absence of both motivation intrinsic as extrinsic [73]. Intrinsic motivation is among the most important factors for maintaining exercise behavior and people who intrinsically regulate their motivation, demonstrate greater persistence, commitment, effort and pleasure in the activities they perform [54].

According to the relationship between gender and motivation [60], a study with veteran male athletes showed higher levels of motivation and introjected regulation than female athletes, that is, they are individuals who are involved in the practice of physical activity but fail to value it or simply practice it. to avoid internal pressure [73]. In turn, it is the female gender that has higher levels of external regulation, identified regulation and internal regulation [73]. As for basic psychological needs, we found that there are significant differences between genders, as the female gender has higher average values in the three dimensions: autonomy, competence and relationship, that is, veteran athletes feel that they are given the possibility to choose from the different sporting situations and in the face of behavior, they feel able to practice physical activity, as well as being able to obtain a positive relationship with other athletes [73]. It is the athletes who have higher levels of intrinsic motivation who feel more competent and autonomous [71]. Thus, we can say that the female athletes surveyed have higher levels of psychological well-being in relation to male athletes, as they obtained higher values of satisfaction with life and positive affections. Other results in veteran athletes, where the evaluation of the perception of satisfaction and the basic psychological needs for autonomy lead to behaviors motivated autonomously, promoting these, better eating habits and rest, as well as high satisfaction with life, and a lower consumption of tobacco [74]. Autonomous motivation has not proved to be a significant mediating variable between the basic psychological need for autonomy and lifestyles and satisfaction with life.

Another model proposed [75] also analyzed the predictive capacity of intrinsic motivation on the development of positive behaviors, finding that the most self-determined motivation positively predicts the variables of lifestyles that enhance health. In that model [76], people with higher self-determined motivation tended to perceive more advantages from physical exercise and a better quality of life. In addition [77] intrinsic motivation was crucial for the development of healthy habits such as eating and resting habits in adult and elderly women and, in this same population subject to study, [78] it was found that the promotion of intrinsic motivation positively favored eating habits. In a study conducted [78] with Physical Education teachers it was determined that to satisfy the basic psychological needs

of the students during the sessions, the students developed a more positive motivation, and at the same time, they were able to commit to behaviors associated with the contents taught in this discipline, such as the adoption of healthy lifestyle habits, being able to integrate those behaviors into their lifestyles. It was relevant to carry out cooperative and collaborative games in PE classes to encourage teamwork and, in by this, favor interpersonal relationships with a better feeling of affiliation to the group [75]. All these factors determined a more self-determined motivation of the students towards this field, which lead to a greater prediction of variables that enhance healthy lifestyles. Regarding the relationship between gender and motivation, significant differences were found in another study [46] where female gender had higher levels of external regulation. Regarding the basic psychological needs, there were significant differences between genders, since the male gender presented higher mean values in the three dimensions: autonomy, competence and relation, that is, the male students felt able to obtain a positive relationship with others. According to that, male students present higher values of life satisfaction, women are more vigorous and have higher levels of mental health, since physical activity is an essential factor for their physical and psychological well-being [46]. However, it was the male students who presented higher mean values of life satisfaction. Also, it can be found that the variable that correlates directly with intrinsic motivation towards practice is the intention to be physically active [79]. The practice of physical activity involves other habits related to a healthy lifestyle [80]. However, there are several studies [81, 82], that support a direct relationship between intrinsic motivation and the intention of future practice. There is a direct relationship between intrinsic motivation towards the intention to be physically active. The gender motivations differences exist, determining that in younger ages women tend to have more orientation and greater intrinsic motivation towards the practice of healthy lifestyles [83]. Men, also, tend to have more orientations towards the ego, and therefore a more extrinsic motivation. Women have a healthier diet than men, but as age advances, this diet improves in quality, especially in men, [84]. Other studies with active adults showed high levels in basic psychological needs and autonomous motivation, and lower values of controlled motivation and amotivation [51, 52]. In terms of lifestyles, it has revealed high levels of nutrition habits and rest, and lower values of tobacco consumption. The basic psychological needs showed positive and significant correlations with autonomous motivation levels, nutrition habits and rest [84]. Levels of satisfaction with life showed significant and positive correlations with autonomous motivation levels and positive affect, and negative correlations with controlled motivation and amotivation [84]. Also, nutrition habits and rest are predicted positively by autonomous motivation, as well as the basic psychological needs, showing healthy lifestyles related to the self-determination. This self-determination results from the motivation factor as one of the fundamental psychological skills inherent in sports practice and determinants in the psychological profile of athletes, being one of the factors that lead to certain behaviors to achieve certain goals, or that is, motivation is characterized as an active, intentional and goal-directed process, which depends on the interaction of personal (intrinsic) and environmental (extrinsic) factors [51, 52]. According to this model, motivation has an energetic determinant, which corresponds to the activation level, and a determinant of behavior direction, as is the case of intentions, interests, motives and goals. It's also revealed that motivation is a skill that depends on the interaction between personality and environmental factors, such as facilities, attractive tasks, challenges and social influences, not forgetting that over the years, the importance The personal and situational factors mentioned may change depending on current needs and opportunities. In another view, motivation is an internal state regulated by needs that activate or arouse behavior aimed at satisfying

those same needs [85]. The concept of motivation encompasses all psychic processes and states, including the totality of needs, impulses, aspirations, voluntary motions, moods, affections, and emotions. We can also consider it as the cause of movement and change, as well as the totality of forces that trigger, direct and maintain behavior towards a goal. Motivation is seen as a socio-cognitive process in which individuals become motivated or demotivated through the assessment of their skills in a context of achievement and the meaning of the context for the person in the last years [86]. Motivation is also understood as a set of biological and psychological mechanisms that enable the triggering of action, orientation towards a goal or to move away from it, the more motivated the person is, the more persistent and greater the activity [87].

As for other lifestyles analyzed [41] it was shown that the female gender had better results than the male gender, showing significant differences regarding food and hours of rest, as it is the female athletes who eat a more balanced diet, they respect the hours of food and rest, and, although without significant differences, they still consume less tobacco. It was found that the female gender has a more balanced diet, consuming more fruits and vegetables than the male gender, which in turn, consumes more sweets [87]. According to resting habits, contrary to what the literature says, it is women who have higher values, so and since this is directly related to food [88]. Women had a more balanced diet, they also felt that they were able to have more regular sleep habits. Continuing with gender comparison, [46] male students were identified with more favorable values for eating habits, resting habits, and Resting Heart Rate than female students. However, male students had higher values of alcohol and tobacco consumption with significant differences [88]. In the comparison between physical activity practicing and nonpracticing students, those who practice physical activity present the best lifestyles with differences in eating habits and RHR. This study suggested that male students give more importance to energy and nutritional consumption because it is essential for the maintenance of performance, body composition, and health.

In other investigations [89] high evaluations have been obtained in eating and resting habits and lower evaluations in tobacco consumption, [90, 91]. These investigations lead to adopt the idea that individuals highly connected to sports or physical activity assume behaviors related to healthy lifestyles and eliminate others that are limited for health behaviors. In relation to a balanced diet, most studies [92, 93] show that women have a healthier diet than men, but as age advances, this diet improves its quality, especially in men. In terms of eating and resting habits, [94] its confirmed that the female gender shows significantly better behaviors as well as a non-significant lower consumption of tobacco, [95, 96] also stressing that intrinsic motivation is crucial for the development of healthy habits, such as adequate eating and resting habits, particularly for adult and elderly women. In this segment, we can also mention that women are more concerned with their psychological and physical health and well-being than men, as it is women who give greater importance to adequate intervals of food and rest /rest, a since the existence of excessive training loads and competitions combined with insufficient recovery can cause a series of health disorders, such as physical and mental tiredness, injuries, muscle fragility, physical pain and discomfort, ultimately affecting the quality of life of the athletes [97].

3.2 Instruments to evaluate lifestyles

To evaluate lifestyles, instruments were created and used in research to measure several contexts of healthy lifestyles, we highlight those set out in **Table 1**, as well as the measured variables and the population of incidence in the respective validation process.

Questionnaires	Variables of healthy lifestyles	Population
Questionnaire CHVSAAF (Cuestionario de Hábitos de Vida Saludables de Alimentación y Actividad Física) [98]. (Questionnaire of healthy Lifestyles of food and physical activity – Spanish version)	Healthy food and physical activity	8 to 12 years of old.
Escala de Qualidade de Vida de [99]. (Quality of Life Scale)	Economic well-being, family life, education and idleness, media, religion and health.	Teenagers (from 13 years old)
Escala de Satisfação com a Vida [100] (Satisfaction with life scale)	Satisfaction with life	Teenagers and Adults
The Health Behavior in School Children: HBSC. [101]	Physical Activity, healthy food, tobacco consumption, alcohol and drugs, personal hygiene and sexual education.	Teenagers (11 to 17 years old)
Índice de Estilos de Vida [102]. (Lifestyles Index)	Consumption of Tobacco, alcohol, cannabis, healthy foods, insane foods, physical activity and sport.	Teenagers
Physician-based Assessment and Counseling for Exercise: PACE [103]	Physical Activity	Teenagers
Inventario de Actividad Física Habitual en Adolescentes (IAFHA) [104] (Inventory of Usual Physical Activity in Adolescents - Spanish version)	Physical Activity during school time; physical activity in a leisure context; physical activity in sports practice.	Teenagers (14 to 18 years)
Questionnaire ESVISAUN (Estilos de vida y salud en estudiantes universitarios: la Universidad), [105] (Lifestyles and health in university students: the University – spanish version)	Sociodemographic data, perceived health status and quality of life, physical activity, tobacco, alcohol and other drugs, eating habits, sexuality, safety, dental hygiene, illness and disability and health promotion at the university.	Teenagers
Cuestionario de Estilo de Vida Saludable en Estudiantes de Postgrado [106] (Questionnaire of healthy Lifestyles in post-fraduation students – spanish version)	Sports, food, sleep and rest.	Post-graduation students
Cuestionario de Estilo de Vida Saludable en Estudiantes Universitarios [107] (Questionnaire of healthy Lifestyles in post-graduation students – spanish version)	Ludic and sport activities, academic and family satisfaction, food consumption.	Post-graduation students
Teachers' Perceptions and Attitudes to Health Education Questionnaire: TPAHEQ [108]	Smoking, resting habits, alcohol consumption, physical exercise, own health status and attitudes towards personal health.	Adults

Questionnaires	Variables of healthy lifestyles	Population
Cuestionarios de Prácticas y Creencias sobre estilos de vida [109] (Questionnaire of practices and beliefs about healthy lifestyles – spanish version)	Practice of physical activity and sport, leisure time, self-care, eating habits, consumption of psychoactive substances and sleep.	Adults
Global Physical Activity Questionnaire: GPAQ - 2.0 [110]	Physical Activity	Adults and elderly
Cuestionario para determinar los Estilos de Vida (IMEVID) [111]. (Questionnaire to determine healthy lifestyles – spanish version)	Physical activity, nutrition, alcohol and tobacco consumption.	General population
Questionnaire FANTASTIC [112]	Family and friends, Physical activity, Nutrition, Tobacco consumption, Alcohol consumption, Sleep and stress, Personality type, Introspection, driving to work, other drugs.	General population
Versão Preliminar do Questionário de Estilos de Vida Saudáveis - EVS [113] (Preliminary version of healthy lifestyles questionnaire – spanish version)	Tobacco use, alcohol consumption, consumption of other drugs, respect for mealtimes, maintenance of a balanced diet	High school students
Questionário de Estilos de Vida Saudáveis - EVS [114] (Healthy lifestyles questionnaire – Portuguese version)	Eating habits, resting habits and tobacco consumption.	Veteran athletes (from 30 years old)
Cuestionário de Estilos de Vida Saudables - EVS [115] (Healthy lifestyles questionnaire – spanish version)	Tobacco consumption, rest habits, respect for mealtimes, and maintaining a balanced diet.	Persons between 14 and 88 years old
Questionário de Estilos de Vida Saudáveis - EVS II [116] (Healthy lifestyles questionnaire – Portuguese version)	Balanced diet, Respect for mealtimes, rest habits, consumption of other drugs, consumption of alcohol and consumption of tobacco.	Veteran athletes (from 30 years old)
Healthy Lifestyles Questionnaire (CEVS-II) [117]	Balanced diet, Respect for meal schedules, Rest habits, Tobacco consumption, Alcohol consumption, Consumption of other drugs, Physical activity.	Persons between 14 and 88 years old
Cuestionário de Estilos de Vida Saudables - EVS [118] (Healthy lifestyles questionnaire – spanish version)	Balanced Diet, Respect for Mealtimes, Tobacco consumption, Rest Habits.	Ecuadorian university students

Table 1.
Healthy lifestyle questionnaires.

All these studies demonstrate the importance of a healthy lifestyle being started very early and continued throughout life, and define the main actions aimed at a healthy lifestyle, as well as parameters of controls for metabolic variables. However, reservations should be made regarding the instruments for assessing and quantifying lifestyle, as there is still no gold standard method that provides security for assessing a healthy lifestyle. Thus, we suggest the continuation of studies to continuously assess lifestyles, with the possibility of including or excluding other variables, or of them in different contexts, whether economic, social and educational.

4. Sedentary behaviors

Whether in the dimension of scientific knowledge production or in the broad context of professional intervention in areas related to physical activity, health and well-being, it is of utmost relevance to begin this subchapter with a clarification of terms. In the scientific literature, the term 'sedentary' is used with the intention of characterizing those individuals who do not adhere to daily physical activity recommendations.

Sedentary behavior is characterized by behaviors with energy expenditure below 1.5 (METs) remaining in a sitting, reclining or lying position [119]. Unlike sedentary behavior, physical inactivity has been used to describe individuals who do not perform formal physical activity of moderate to vigorous intensity, that is, individuals who do not meet the specific recommendations for the practice of physical activity [120]. Sedentary lifestyle has been understood as the absence of physical exercise or very low energy expenditure (less than 1000 Kcal) [121]. From the time when man is a hunter to the present, there has been a drastic change in the way he lives. Recently, with technological and robotic advances, man has become even more inactive, in addition to starting to consume more tobacco and having an increasingly unhealthy diet [122]. With the industrialization process, the number of sedentary people increased due to the few opportunities for physical and sports activities, [123] and its prevalence is very high, especially in underdeveloped countries. Due to this technological and information advancement there was an increase of this inactivity, since there is a reduction in more intense activities at work and in daily activities that influence leisure hours, this is called sedentary lifestyle involuntary [124]. There are immense and multivariate factors that can determine a set of styles of physical activity, as previously mentioned by socio-demographic aspects (age, sex, socio-economic profile), psychological aspects (motivation and self-determination to change behaviors) and socio-cultural aspects (family, housing contexts, etc.) [124]. The various studies already presented try to highlight many of these factors that tend to be hierarchical and influence sedentary lifestyle in the various age groups [122]. Age is, in fact, a relevant factor, which may have a positive association with physical inactivity [122]. It is likely that some differences according to the type of activities (more or less vigorous) will decrease with the development of these people, with a decline in leisure activities and moderate intensity and an increase in activities of low intensity or activities considered informal. Regarding the types of physical exercises, men seem to be more involved in group practices, such as team sports and women choose more individual activities [125]. Another important and determinant aspect of sedentary lifestyle is the socioeconomic variable, in which people with lower income tend to be more sedentary, perhaps due to difficulties in investing in certain activities [125]. Combating a sedentary lifestyle should be a priority for the responsible entities. Previous studies show that sedentary behavior

accounts for a large portion of the daily routine of various populations (> 8 hours) [126]. Since the different recommendations for regular physical activity behavior suggest a daily reduction of sedentary behavior, the concept of physical inactivity as an alternative to sedentary behavior has been shown to be more appropriate to classify individuals who do not meet the recommendations for regular physical activity behavior of moderate-to-vigorous intensity [127]. Therefore, the determinants and consequences of excessive daily sedentary behavior on biopsychosocial health differ from the harms caused by physical inactivity.

Recently, the study of sedentary behavior in the world population has increased [128]. In recent years, the study of sedentary behavior in the world population (pediatric population, adult population and elderly population) has increased [119, 128, 129]. The evidence phases for sedentary behavior science have been guided by the Behavioral Epidemiology Framework and the following phases are distinguished: (1) identifying relationships of sedentary behavior with health outcomes; (2) measuring sedentary behavior; (3) characterizing prevalence and variations of sedentary behavior in populations; (4) identifying the determinants of sedentary behavior; (5) developing and testing interventions to influence sedentary behavior; (6) using the relevant evidence to inform public health guidelines and policy [129].

From a systematic review of the scientific literature, it can be concluded that excessive daily sedentary behavior is associated with a variety of health harms, including deterioration of physical fitness, diabetes, obesity, and depression [128]. In addition, excessive sedentary behavior is also associated with the risk of premature death [128]. However, it is important to consider the relationship between sedentary behavior and moderate-to-vigorous physical activity in relation to the deterioration of individuals' health. In this sense, it appears that the total volume of moderate-to-vigorous physical activity performed daily may mitigate the health harms of excessive daily sedentary behavior. Furthermore, the health consequences of excessive daily sedentary behavior appear to be more pronounced in physically inactive individuals [124]. Therefore, it appears that individuals who engage in excessive daily sedentary behavior and engage in less moderate-to-vigorous physical activity have a higher risk of mortality [124]. In contrast, individuals who exhibit fewer periods of daily sedentary behavior and demonstrate higher levels of daily moderate-to- vigorous physical activity have a lower mortality risk [128]. Scientific evidence thus suggests that excessive daily sedentary behavior is a risk factor for a person's physical health, considering the levels of moderate-to-vigorous daily physical activity. However, knowledge about the consequences of sedentary behavior on psychosocial health is still insufficient [127]. To clarify the consequences of sedentary behavior on mental health, we sought to identify and understand the consequences of sedentary behavior on the psychosocial well-being of elderly residents in Portugal [129]. As demonstrated by the study, a comprehensive understanding of the consequences of sedentary behavior on psychosocial health requires considering the different dimensions of sedentary behavior (the type of sedentary behavior, the interruption of sedentary behavior, the uninterrupted duration of sitting, and the frequency with which the elderly perform sedentary behavior). In view of the listed dimensions, sedentary behavior can be positive for maintaining cognitive functions, promoting positive affective states, and supporting social interaction. On the other hand, excessive sedentary behavior may also worsen psychosocial well-being and lead to mental fatigue and diminished social relationships.

In another direction, identifying the determinants of sedentary behavior is an essential step in scientific research. This step helps in the development of

interventions that reduce excessive daily sedentary behavior and increase the usual level of physical activity in different population segments [130]. Ecological models have been used as a theoretical framework to explain the determinants of sedentary behavior in individuals [131]. These models place great emphasis on environmental variables [131]. A shortcoming of these models is that they do not clearly emphasize the role that psychosocial variables can play in explaining sedentary behavior. However, ecological models can incorporate various psychosocial constructs to develop a more comprehensive framework that allows for the integration of multiple theories [132]. Thus, some psychosocial factors that may influence individuals' excessive daily sedentary behavior are highlighted below: [130] sedentary behavior may be determined by sedentary habits developed over the years; in another sense, positive representation, i.e., perceived satisfaction that individuals have from the different sedentary behaviors, may determine sedentary behavior; individuals may reduce the excess of daily sedentary behavior through physically active behavior (e.g., engaging in physical activity), which manifests compensatory health beliefs [133]; furthermore, social support may determine sedentary behavior in several ways. On the one hand, individuals' social support can discourage sedentary behavior. On the other hand, individuals may be encouraged by their social support to sit throughout the day. By understanding the health consequences of excessive sedentary behavior and some of its determinants, it becomes possible to present a range of strategies that can contribute to the daily reduction of sedentary behavior in individuals, within a logic focused on evidence-based practice. Thus, to minimize the health risks of excessive sedentary behavior, individuals can achieve a healthy balance between spending time on certain sedentary behaviors that may be beneficial for psychosocial well-being [129], engaging in low-intensity physical activity, and engaging in moderate-to-vigorous physical activity, leading to a reduction in excessive daily sedentary behavior [133, 134].

5. Conclusions

According to the subject pointed in this chapter it is enlightening that is necessary to maintain a physical and mental discipline, in the sense of feeling the need to change behaviors and maintain them, if they wish to contribute to a set of vectors of quality of life. Physical activity is a process that presents results that contradict a sedentary lifestyle, as it presents benefits at the physiological, psychological, social and mental level, in all age groups: children, adults, the elderly and special populations. It is understood that the practice of a set of behaviors considered as healthy lifestyles, previously identified, reveals positive effects that are effective in preventing hypokinetic, cardiovascular and psychological diseases, as well as promoting physical and well-being, that translates into the improvement of aspects directly linked to health and satisfaction with the individual's life. It is also noticeable that individuals with greater practice of physical activity show greater satisfaction in terms of their body image or greater predisposition to achieve it through food care. They reveal a greater consumption of fruits and vegetables, to the detriment of sweets, soft drinks and alcoholic beverages, that is, greater care with the type of food considered as a healthy habit. It is valid to affirm that the practice of behaviors considered as healthy lifestyles where physical activity is inserted influences all its variables in a positive way. In general, individuals whose parents do not smoke, usually do not consume alcoholic beverages and do more physical activity, even if sporadically. In this sense, the role of parents in adopting healthy lifestyles is very important, since they transmit a favorable image to their children

in the future adoption of these same behaviors. In the same way as individuals whose peers engage in physical activity practices are another determining factor. It is also important to promote levels of physical activity and reduce sedentary behaviors during periods of free time, but preferably with intervention strategies that consider the different interests and specific practices of practitioners. In this context, schools have a primary role in developing principles of attitudes linked to a healthy lifestyle by taking exceptional measures for an intercurricular approach to school in and for health. Some schools to promote healthy lifestyles offer students pieces of fruit after a Physical Education class. Despite this offer, it is also important to build a base of motor skills and the results of these good behaviors so that these experiences of activities on the part of children, adolescents and adults are pleasant, with the purpose of fostering continuous participation throughout the life process.. These factors seem to be particularly important to highlight the need to create programs that guarantee the adherence and maintenance of all these individuals in the practice of behaviors considered as healthy lifestyles. People should be encouraged to internalize the motivation to be active, if there are no examples of parents or close friends, they can continue with an active lifestyle.

6. For readers

For the readers of this work, we leave as advice that, from an early stage, in children, it is important to understand the principles underlying healthy activity. As adolescents they must learn and be informed with the capacity to make decisions, capable of planning and implementing individual activity programs, periodically, reassessed and modified as they get older. To have a balance diet, be engaged in physical activity programs, respect mealtimes and resting habits, and, also very important, to have enough hours of sleep with quality are determinant factors for a lifelong healthy life. Al last, a healthy lifestyle encompasses work relationships and family life, also determining factors for quality and life expectancy.

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Conflict of interest

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Chapter 2

Personality Traits, Achievement Motivation, and Self-Regulation in Physically Active and Sedentary Young Adults

Concepcion Padilla and Pilar Andres

Abstract

Previous research has established a link between exercise and executive functions. However, how personality, motivation, and self-regulation can influence this association have been little investigated. Studies investigating in these aspects have shown that physically active individuals are more extrovert, conscientious and open to new experiences than sedentary individuals. Those who are sedentary tend to show more neuroticism and less self-regulation. In this chapter, the literature exploring these aspects is reviewed. In addition, a study to examine the impact of these factors in physically active and sedentary young adults is presented. The Big Five Inventory, the Intrinsic Motivation Inventory, the Achievement Motivation scales, and the Adult Temperament Questionnaire were administered to evaluate personality, motivation, and self-regulation. The results revealed that active participants significantly differed from sedentary participants in terms of personality showing higher emotional stability, extraversion, and openness to experiences, in addition to greater inhibitory control (self-regulation). Associations between better control of emotions and impulses and cognitive control were also explored, finding a significant correlation between them. Some guidance is included to help health providers to design physical activity programs to promote cardiovascular exercise in populations with high levels of inactivity.

Keywords: Aerobic Exercise, Executive Functions, Working Memory, Personality, Motivation

1. Introduction

It is well established that exercise has a positive effect on our mind and body [1, 2]. Studies [3–5] looking at the effects of exercise on cognition have shown that chronic aerobic exercise tends to specifically enhance executive functions such as inhibitory control, task switching, and working memory. In addition, research [6, 7] has also shown that exercise interventions can be used to treat certain clinical conditions in which mood, anxiety, and/or depression disorders are presented along with diminished cognitive performance. However, the mechanisms through which these cognitive and emotional effects are exerted are still not well understood [8].

2. Athlete personality

Personality may be understood as a set of dynamic but stable characteristics that make a person unique [9]. The concept of personality refers to the self, social and world functioning skills learnt along life, which are influenced by genetics and nurture factors [9]. These skills affect how an individual perceives, interprets, and behaves in the world, making this individual's behavior predictable [9, 10].

According to the Big Five theory [11–13], personality can be divided into five general dimensions (see **Table 1**): extraversion, affability, conscientiousness, openness, and emotional stability, each of which can be further separated in two other subdimensions. Extraversion refers to a person's inclination to seek stimulation from the outside world, especially in the form of attention from other people. This dimension includes dynamism and dominance. Affability refers to a person's tendency to put others' needs ahead of their own, and to cooperate rather than compete with others. This dimension includes the subdimensions of cooperation/empathy and cordiality/kindness. Conscientiousness refers to a person's ability to exercise self-discipline and control in order to pursue their goals. This dimension is subdivided into scrupulosity and perseverance. Openness defines a person who enjoys learning and being updated on cultural matters or living new experiences. Emotional stability refers a person's capacity to control their emotions and impulses to maintain a low level of anxiety and vulnerability. It includes control of emotions and impulses and is opposed to the concept of neuroticism, which describes a person's tendency to experience negative emotions, including fear, sadness, anxiety, guilt, and shame.

Vanden et al. [14] have argued against the idea of an "athlete personality", claiming that athletes present with diverse personalities. In that vein, Brinkman [15] has argued that the most likely is that personality traits affect the level and type of motivation of the person, and then indirectly, the effort exerted to practice physical exercise. In a recent systematic review, Wilson and Dishman [16] reported that physical activity was associated with personality traits such as extraversion, neuroticism and conscientiousness, in line with a previous review [17]. Wilson

Big five questionnaire		
Dimensions:	**Subdimensions:**	
Extraversion	Dynamism	Dominance
Affability	Cooperation/empathy	Cordiality/kindness
Conscientiousness	Scrupulosity	Perseverance
Openness	Openness to culture	Openness to experience
Emotional Stability	Control of emotions	Control of impulses
Distortion scale		
ML-1 and 2 scales (achievement motivation)		
Adult Temperament Questionnaire (ATQ, effortful control).		
Activation Control	Attentional Control	Inhibition Control
Intrinsic Motivation Inventory (IMI, level of motivation during the cognitive tasks)		
Interest/Enjoyment,	Perceived Competence	Value/Usefulness
Pressure/Tension,	Effort exerted during task	

Table 1.
Questionnaires and scales used to measure personality, achievement motivation and self-regulation.

and Dishman [16] also found a small but significant correlation between level of physical activity and openness. The authors explain the relationship between extraversion and physical activity as the search of extroverts for sensory and social stimulation, usually being more social and outgoing, and therefore more exposed to activities involving physical activity. With regards to neuroticism, it has been frequently associated with anxiety and with a higher awareness of autonomic responses. Thus, individuals scoring high in neuroticism would present with a lower tolerance to high intense internal or external sensations and they would interpret increased arousal as negative [18, 19], avoiding physical activity. As for conscientiousness, people with high levels of physical activity show also higher levels of discipline and self-regulated behavior [16]. Self-discipline motivates them to fulfill their objectives, obtaining positive reward after achieving such self-imposed goals, and increasing their feelings of competence [20]. Adherence to healthy behaviors is more likely to be observed in people with high levels of conscientiousness [21]. Finally, individuals with high levels of openness are more receptive to new experiences and activities that involve physical activity [16].

Sutin et al. [22] carried out a meta-analysis where they explored the relationship between the Five Factor Model of personality and physically inactive lifestyle in 16 studies containing large samples. They observed that high neuroticism and low consciousness were strongly correlated with sedentary behavior, in agreement with Rhodes and Smith's [17] and Wilson and Dishman's [16] reviews. Conscientious individuals engage in physical activity motivated for internal, rather than external, sources [23], being concerned about healthy lifestyle rather than about physical appearance [24]. Instead, neurotic individuals are concerned about not looking physically bad to others [25], holding avoidance-related physical activity goals. They feel obligated to do exercise and guilty if they do not do it [23]. Interestingly, Sutin et al. [22] found that extraversion was the factor more highly correlated to physical activity. The authors explained it as these individuals having a more active lifestyle that include diverse activities among which there is a high variety of physical activity. Ebstrup et al. [26], for example, observed that extraverts tended to sit for fewer hours per day than introverts. Openness was also found to be associated with physical activity [22], although these individuals spent more hours than sedentary ones doing both physical and non-physical activities (reading or watching movies). Associations between personality traits and physical activity was not mediated by differences in age or sex [22].

3. Motivation

Motivation can be described as the reason why an individual initiates a behavior and maintains it along time to achieve a goal [27]. Specifically, achievement motivation [28] refers to the need to excel in an activity for which an individual wants to surpass him/herself or others [27, 29]. It can be driven by internal motivation, aiming just self-satisfaction, or by external motivation, pursuing an external reward that can be social or material [27, 30]. It is highly associated with the participant's interests [30, 31]. For example, someone may have a high achievement motivation at work, but not for sport. The Intrinsic Motivation Inventory (IMI) [32] is one of the scales measuring this kind of achievement motivation.

Mehrabian [33] or Morales-Vallejo [34], however, describe achievement motivation as a general trend for risk taking and ambition. Individuals showing this general trend perseverate and self-regulate themselves until achieving their goals. Achievement motivation scales (ML-1 and ML-2) assess this type of achievement motivation.

4. Self-regulation

Self-regulation refers to processes triggered to control behavior, cognition, and emotional states [35]. This construct is measured, for example, by the Adult Temperament Questionnaire (ATQ) [36]. The concept includes effortful/executive control, referring to the emotional, behavioral, or/and physiological control of responses to focus attention on a goal-directed task, suppressing non-relevant information or actions [10, 37]. Thereby, effortful control is the dimension of temperament controlling emotional reactivity, both positive and negative [38, 39]. Rothbart and Rueda ([10], see also [40–43]) considered as part of the anterior attentional network system and highly related to executive functions. Besides, activation control refers to the capacity to carry out a task, despite a natural tendency to avoid it, since such activity is very demanding or frightening for the individual [36]. Attentional and inhibition control can be identified with working memory and inhibition respectively [44, 45]. The difference between executive and effortful control is that the first is involved in cognitive control and flexibility, whereas the second is in the regulation of emotional reactivity [39]. It is also important to note that certain temperamental dimensions correlate with certain dimensions from the Big Five's questionnaire [36]. In the case of effortful control, for example, it is negatively correlated with neuroticism, and positively correlated with consciousness [36, 46].

4.1 Self-regulation and cognitive control

It has been suggested (see for example [47–49]) that cognitive control, as measured by cognitive tasks such as inhibitory and working memory tasks, is the antecedent of self-regulation, and therefore of physical activity adherence. In other words, it is argued that the reason why people exercise on a regular basis is that they have good cognitive control, which allows them to self-regulate better, and so, keep training for longer periods of time. According to this view, poor cognitive control would lead to lower self-regulatory capacity and greater tendency to be driven by routine reactions, succumbing to temptation or impulsive behavior (overeating, sedentariness) [50–53].

5. Do the physically active differ from sedentary young adults in personality traits, motivation, and self-regulation?

To investigate the extent to which personality traits, motivation, and self-regulation might differ between physically active and sedentary young adults, a study where participants that had previously shown differences in cognitive control or executive functions in our previous studies [54, 55] was carried out.

The objective of this study was to investigate possible differences in personality, achievement motivation, and self-regulation between the physically active and sedentary participants. Participants, that explained why active participants showed better executive/cognitive control (inhibition and working memory) than sedentary participants in our previous studies [54, 55]. We hypothesized that young adults showing higher levels of physical activity and fitness (keeping a frequency of exercise of at least 6 hours per week during at least 10 years) will present with higher scores in the Big Five dimensions of perseverance and emotional stability, greater achievement motivation, and better self-regulation. We also predicted that effortful control (measured by the ATQ) will be correlated with emotional stability

(Big Five) and its subcomponents 'control of emotions' and 'control of impulses', as Evans and Rothbart [36] previously found. In addition, cognitive control, as measured by the stop signal task (SST; inhibitory control) and the AOSPAN (working memory) will be correlated with effortful control (ATQ) and emotional stability (Big Five); and will be positively associated with physical exercise practice over time.

5.1 Materials and methods

5.1.1 Participants

Participants from two previous published studies [54, 55] were invited to take part in this study to complete some additional cognitive tasks and personality questionnaires. They gave their informed consent and were paid or given course credits if they were university students. As in previous studies, the inclusion criterion for the active group was having practiced cardiovascular exercise for at least 10 years, following an exercise routine of at least 6 hours distributed in at least 3 days a week. Sedentary participants could not have practiced cardiovascular exercise for more than 1 hour a week in the last 4 years and they could not have exercised with a high frequency or intensity during their childhood (see [55]). Following these criteria, 70 participants, 36 active and 34 sedentary, aged between 18 and 30 years (M = 22.39, SD = 3.34), were included in the study according to their frequency of aerobic exercise and fitness levels. The active group exercised an average of

	Group	
Variables	**Active**	**Sedentary**
Total participants	36	34
Age	22.14 (3.14)	22.65 (3.57)
Education	15.22 (3.63)	13.71 (2.98)
Rockport	56.94 (8.46)	45.35 (7.94)
Total Exercise Months along life	233.67 (217.96)	67.56 (45.57)
Total Exercise Hours along life	8072.48 (4937.98)	1578.23 (1616.57)
Vocabulary	43.14 (6.49)	45.03 (6.88)
Participants per study:		
Padilla et al. [10]: AOSPAN + SST	29	29
Padilla et al. [9]:	7	5
Participants per task:		
Big Five	36	34
ML	36	34
ATQ	36	34
IMI	34	33

Note: Adult Temperament Questionnaire (ATQ), Achievement Motivation Test (ML), Intrinsic Motivation Inventory (IMI), Automatic Operation Span Task (AOspan), and Stop Signal Task (SST).

Table 2.
Demographic variables averages and standard deviations in brackets.

10.44 hours per week (SD = 5.88), and the sedentary group exercised 1.10 hours per week (SD = 2.11).

To make sure that groups did not differ in terms of education or intelligence, years of education and intelligence were measured. The Vocabulary Subtest of the Wechsler Adult Intelligence Scale- III (WAIS-III) [56] was used to evaluate intelligence. None of the participants had a history of mental disorder or physical illness incompatible with the study. The characteristics of both groups are presented on **Table 2**.

5.1.2 Procedure

The experiment was performed in accordance with the ethical standards stated in the 1964 Declaration of Helsinki.

5.1.2.1 Questionnaires and scales

Participants were first requested to complete the following online personality and motivation questionnaires from home (**Table 1**).

Personality was evaluated using the "Big Five Questionnaire" [11]. Along with the main personality dimensions, the questionnaire contains a response distortion scale that measures the trend to lie in their responses. A Likert 5-point scale is applied to assess the participant's level of agreement or disagreement with a given statement. Direct scores are calculated for each subdimension subtracting reverse item scores from direct item scores. The result is added to the other subdimension conforming the dimension. For example, dynamism + dominance = extraversion.

Achievement motivation was evaluated with the ML-1 and 2 scales [34], measuring a person's capacity to achieve a long-term goal. Participants are asked about work, social, or academic achievement, putting more emphasis on risk taking in the second scale.

Effortful control was assessed using a short version of the Adult Temperament Questionnaire (ATQ) [36]. This questionnaire measures three subcomponents of effortful control: activation, attentional, and inhibition control.

Intrinsic Motivation. The Intrinsic Motivation Inventory (IMI) questionnaire was applied just before participants carried out the SST and AOSPAN in a previous study [32]. The purpose was to measure the level of motivation during the performance of these two cognitive tasks. This inventory contains five dimensions measuring: a) interest/enjoyment, b) perceived competence, c) value/usefulness, d) pressure/tension, and e) effort exerted during task performance. Fifty-eight participants completed this inventory.

5.1.2.2 Cognitive control measures

They were obtained from the 58 participants taking part in Padilla et al.'s [55] study, using the Automatic Operation Span Task (AOspan) [57] and the Stop Signal Task (SST) [58] to measure working memory and cognitive inhibition, respectively.

5.1.2.3 Cardiovascular fitness measures

Cardiovascular and fitness levels were obtained from Padilla et al.'s [55] study. Maximal oxygen uptake was measured with the Rockport 1-mile Fitness Walking Test [59], which presents a high correlation coefficient (0.88) with a direct index of VO_2max obtained using a treadmill [59, 60]. Total hours of aerobic exercise in the past and present were separately calculated with a weighted average taking into

	Active	**Sedentary**		
Dimensions	***M (sd)***	***M (sd)***	***t (df)***	***p***
Extraversion	81.06 (9.95)	72.12 (11.26)	3.52 (68)	.00*
Dynamism	42.17 (5.40)	37.59 (7.11)	3.04 (68)	.00*
Dominance	38.89 (5.95)	34.53 (6.13)	3.02 (68)	.00*
Affability	87.50 (5.60)	84.03 (9.35)	1.87 (53.39)	.07
Cooperation	45.78 (2.81)	44.29 (5.52)	1.40 (48.37)	.17
Cordialness	41.72 (4.25)	39.74 (5.65)	1.69 (68)	.10
Conscientiousness	83.72 (10.75)	86.88 (12.65)	1.13 (68)	.26
Scrupulousness	38.75 (6.61)	42.24 (8.11)	1.98 (68)	.05
Perseverance	44.97 (5.65)	44.65 (6.53)	.22 (68)	.82
Openness	88.86 (8.90)	85.35 (8.43)	1.70 (68)	.10
Openness Culture	42.86 (5.79)	43.35 (5.43)	0.37 (68)	.72
Openness to Experience	46.00 (4.85)	42.00 (5.33)	3.29 (68)	.00*
Emotional Stability	75.06 (15.60)	63.79 (16.95)	2.90 (68)	.01*
Control of Emotions	38.39 (9.58)	32.15 (8.94)	2.81 (68)	.01*
Control of impulses	36.67 (7.00)	31.65 (8.89)	2.63 (68)	.01*
Distortion	81.06 (9.95)	72.12 (11.26)	1.03 (68)	.31

*Note. p: p values, * significant at the level of $p < 0.05$.*

Table 3.
Averages (standard deviations in brackets) from Big Five questionnaire dimensions and subdimensions in active and sedentary participants.

	Active	**Sedentary**		
Test	***M (sd)***	***M (sd)***	***t (df)***	***p***
ATQ:				
Activation Control	4.89 (0.76)	4.77 (0.84)	.60 (68)	.55
Attentional Control	4.19 (0.89)	4.10 (1.11)	.37 (68)	.71
Inhibitory Control	4.74 (0.87)	4.13 (1.04)	2.65 (68)	.01*
Total	4.65 (0.63)	4.36 (0.75)	1.75 (68)	.08
ML:				
ML-1	41.81 (4.64)	40.00 (4.47)	.89 (68)	.10
ML-2	31.92 (5.31)	32.47 (4.19)	.16 (68)	.63
IMI:				
Interest/Enjoyment	36.72 (8)	33.93 (7.11)	1.41 (56)	.17
Perceived Competence	27.48 (6.78)	23.79 (6.49)	2.12 (56)	.04*
Effort	29.93 (2.98)	29.62 (3.12)	.39 (56)	.70
Value/Usefulness	21.07 (5.02)	20.72 (4.11)	1.12 (56)	.27
Pressure/Tension	16.71 (5.44)	17.83 (5.78)	.29 (56)	.78

Note. Adult Temperament Questionnaire (ATQ), Achievement Motivation Test (ML), and Intrinsic Motivation Inventory (IMI).

Table 4.
Average, standard deviations per group, and p values in tests measuring different aspects of motivation.

account the weekly hours of aerobic exercise at each period. The weights were the number of weeks that frequency of exercise had been kept for. Total hours of past exercise (performed during their childhood and adolescence) were added to total hours of present exercise (adulthood). Total months along life were also calculated.

5.2 Results

Demographic data (**Table 2**), scores from the Big Five questionnaire (**Table 3**), motivation, and the Adult Temperament Questionnaire (ATQ, **Table 4**) from the active and sedentary groups were compared using independent groups t tests. The groups differed significantly in terms of cardiovascular exercise frequency [t (43.33) = 8.80, p = .00, d = 2.67] and fitness levels [Rockport test; t (66) = 5.82, p = .00, d = 1.43]. Results also showed that sedentary and passive participants did not differ in terms of age [t (68) = .64, p = .53, d = 0.16], years of education [t (66.75) = 1.92, p = .06, d = 0.47] or vocabulary [t (66) = 1.16, p = .25, d = 0.29].

The Big Five averaged scores are presented in **Table 3**. The independent t tests showed that active participants obtained significantly higher scores in extraversion [t (68) = 3.52, p = .00, d = 0.85], subdimensions of dynamism [t (68) = 3.04, p = .00, d = 0.73] and dominance [t (68) = 3.01, p = .00, d = 0.73]. More importantly, active participants obtained significantly higher scores in emotional stability [t (68) = 2.89, p = .01, d = 0.70], control of emotions [t (68) = 2.81, p = .01, d = 0.68] and control of impulses [t (68) = 2.63, p = .01, d = 0.64]. In addition, they were more open to new experiences [t (68) = 3.29, p = .00, d = 0.79]. Active and sedentary participants did not differ in the level of distortion in their responses [t (68) = 1.03, p = .31, d = 0.25].

None of the motivation scales revealed significant differences between active and sedentary participants (p > .09, see **Table 4**), except for perceived competence from the IMI (t *(56)* = 2.12, p = 0.04, d = 0.57).

When analyzing the ATQ (see **Table 4**), results revealed that groups differed significantly in the inhibitory control subscale [t (68) = 2.65, p = .01, d = 0.64], showing that active participants had a higher inhibitory control than sedentary participants. Activation, attentional and total control did not differ significantly between groups (all p > .08).

Further analyses revealed an absence of correlation between cognitive inhibition (measured by the SSRT from the Stop Signal Task) and inhibitory control (effortful control from the Adult Temperament Questionnaire), emotional stability, control of emotions, or control of impulses (Big Five Questionnaire, p > .05). However, significant correlations were observed between AOSpan (working memory) performance and inhibitory control (r = .28, p = .04) and the personality subdimension control of impulses (r = .32, p = .01).

Regression analysis between control of impulses and AOSpan was carried out, as the resulting correlation index was higher than the one between AOSpan and Inhibitory control. Inhibition control was excluded from the regression analysis since it correlated with control of impulses and collinearity assumption was not met. A significant regression equation was found [F (1, 56) = 6.45, p = *.01*], with an R^2 = .10, indicating that control of impulses explains 10% of the variance of the AOSpan score.

6. Discussion

The aim of the present chapter was to make an overview about the literature investigating how personality traits, motivation, and self-regulation might differ

between physically active and sedentary participants. These factors might relate to each other and being associated to cognitive control, and eventually, to physical activity adherence. The results of a study where these factors were explored were included to put this research topic in context.

According to recent reviews [14, 16, 17] extraversion, neuroticism, and conscientiousness are personality traits highly associated with frequency of physical activity. Openness is also associated, but in a smaller degree. Individuals who are extrovert are in search of sensory and social stimulation, which implies being more involved in physical activities. Additionally, low levels of neuroticism are related to low awareness of autonomic responses and therefore, to higher tolerance to high intense internal or external sensations. The increased arousal caused by high intensity physical exercise might be perceived as something negative by individuals scoring high in neuroticism. On the other hand, conscientious people are able to perseverate and self-regulate their behavior to achieve their self-imposed goals. They feel competent when they achieve their objectives. Moreover, individuals who are open to new experiences enjoy spending more hours doing both physical and non-physical activities. Furthermore, achievement motivation and self-regulation might, in addition, explain physical activity adherence. It has been shown [21–24] that individuals with high cognitive control self-regulate themselves better and keep training for longer periods of time.

The results found in our study were in line with the literature (see for example [16, 17]). We found that active participants were more extroverted or energetic than sedentary participants, suggesting that active participants tend to show a more positive mood, are more dynamic, and able to assert themselves in their personal relationships. Active participants also displayed higher scores in emotional stability and were more open to new experiences. As expected, active and sedentary participants also differed in self-regulation, specifically in inhibitory control, where active participants presented with better control of positive and negative emotions and physiological reactions. However, groups did not differ in achievement motivation, except for perceived competence during task performance (AOspan), which was higher in the physically active group.

The fact that active participants controlled better their reactive emotions and showed a personality pattern characterized by low neuroticism and high positive emotions, along with a tendency for seeking new experiences, characterizes physically active people as persons with high self-regulation levels according to Evans and Rothbart's [36] predictions. Nevertheless, contrary to such predictions, active people, although more self-regulated, were not characterized as more conscientiousness (i.e., more reflexive, perseverant, meticulous, and organized) than sedentary participants. This could be related to the fact that most participants were university students and good organization skills are required to reach that academic level. The absence of a difference between groups in conscientiousness suggests that this trait did not determine differences in performance on cognitive tests. Thereby, the low degree of neuroticism of physically active participants along with positive affect might result in more constructive strategies that motivate them to keep trying until achieving the task goal.

When the relationship between cognitive control (AOspan and SST), inhibitory control (ATQ, self-regulation), and personality traits were explored in our study, it was shown that working memory capacity (AOspan) correlated positively with inhibitory control and control of impulses (variables in which active participants obtained higher scores). Control of impulses explained 10% of the working memory variance. Hence, differences in inhibitory control and control of impulses could have contributed to the AOspan performance in Padilla et al.'s [55] study.

Finally, physically active participants showed greater self-regulation and better cognitive control than the sedentary group. This is compatible with Rueda &

Rothbart's study ([61], see also [39] or [43]) suggesting that better self-regulation contributes to better cognitive control.

Additional studies will be necessary to corroborate whether self-regulatory capacity is one of the main factors contributing to better executive functions in studies about chronic exercise, or whether it is a combination of greater exercise practice and higher self-regulation which leads to higher cognitive control. As mentioned before, aerobic exercise interventions on psychiatric disorders [62] have suggested that exercise may be a way of improving emotional control and self-regulation [63].

7. Conclusion

To conclude, extraversion, neuroticism, conscientiousness, and openness are personality traits associated with higher levels of physical activity. Self-regulation also has an important role on keeping routines of physical exercise. When these factors were tested in our study, active participants showed higher inhibitory control, emotional stability, and more positive mood than sedentary participants. Control of impulses was highly associated with scores in working memory (AOspan) [55]. Therefore, our findings suggest that personality and self-regulation contributed to the effect of exercise on working memory observed in Padilla et al.'s study [55]. In future studies, it will be necessary to investigate the causality between self-regulation and exercise further to better understand the direction of the effects between them.

These findings are positive in the sense that help health providers to design programs to promote physical activity. These programs should consider participant's personality traits and self-regulation capacities. Exercise interventions may target modifying these aspects in parallel with the physical exercise program. An example of this might be designing a physical activity program where individuals exercise always with more people belonging to the same group. The inclusion of a sport coach to set schedules and short and long-term objectives to accomplish as an individual and as a group might be helpful to potentiate conscientiousness and self-regulation. The coach must reward the group every time they achieve their objectives. Other leisure activities may be offered at the same time to stimulate extraversion and openness.

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Conflict of interest

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Chapter 3

The Development of Motor and Perceptual Skills in Young Athletes

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Abstract

Human movement is a complex phenomenon. For people involved in teaching motor or perceptual skills in sports, effective models of training in children are a major challenge. Topics related to learning and the development of motor or perceptual skills help people involved in learning movements (coaches, physical education teachers, kinesiologists, physiotherapists) to have a deeper knowledge of the learning processes. An attempt is made to combine theory and practice so that this chapter can be a simple but useful tool for learning, evaluation, proper guidance, planning practice, and providing simple practical approaches to make the work of professionals more effective.

Keywords: motor development, processes of learning, training methods, motor skills, perceptual skills

1. Introduction

The purpose of this chapter is to answer the following questions: what are the dimensions of sport expertise? What motor or perceptual skills do athletes usually use in team sports? And what training method should coaches follow in order to make their novices experts? The biggest challenge for coaches, however, is how to keep their athletes motivated, especially children, while creating a positive learning environment, developing motor and perceptual skills, keeping the athletes interested by combining teaching, training, and entertainment, and providing positive training experiences in each training session. All of the above issues should be combined with the fact that each athlete has different abilities [1]. Some important elements that an effective coach should consider are summarized below: utilization of teaching time, organization of the training space, development of positive attitudes [2], and giving the appropriate guidance and deliberate practice - the type and frequency of stimuli an individual receives in order to achieve sport expertise [2]. This chapter opens with an introduction to the preparation and support of the learning experience, before attempting to answer these questions in the main section.

2. Preparing an effective exercise for children

There are situations in which young athletes try to improve their performance of a certain movement or action. All of these situations are referred to as learning experiences and are achieved through targeted, systematic, and organized practice [3].

As we perceive, learning is the interaction between the teacher and the learner, focused on achieving the set goals based on the needs of the trainee, which may change. The effective coaches should prepare their athletes for sports excellence by ensuring optimal, steady performance, improving both physical condition and the technical, perceptual and emotional aspects of training [4].

Initially, the coach should set the goals. The "goal setting" theory was developed by Locke [5], who argued that the coach should set specific and measurable goals individually for each athlete. Locke also holds that goals should be challenging, difficult but not impossible. In addition, the goals should be set in a participatory way, so that the coach can be confident that the trainees are taking the implementation of their goals seriously and are committed to conquering them. Finally, there should be feedback on performance concerning the goals.

In our experience, another very important element that the coach should take into account is the effective use of the training area. The trainer should make sure that an equipped room is available to display videos or photos for the theoretical phase of training where required. There is evidence that the combination of theoretical and practical training is a very effective method for teaching motor or perceptual skills in sports in a changing environment [6, 7]. Some researchers [8–11] investigating methods of practicing perceptual skills used simulation techniques through video projection. The advantages of the simulation techniques are that they can adapt the learning to the personal rhythm of each trainee, they can be used when the athlete is absent from training due to injury or fatigue, they are easily used by people with mobility difficulties, the equipment is cheap and affordable, and they can be applied to all sports. Through the technical simulation, one can adjust the possibilities provided to ensure different training methods. For example, in a picture view, one can emphasize different parts of the visual scene (explicit practice) or block them (implicit practice). Simulation systems and virtual reality techniques will probably soon be used for the basic practice of perceptual skills. Simulation systems provide a seemingly natural racing scene, while virtual reality techniques provide the racing environment through computer units [12]. Using virtual reality systems, perceptual skills can be developed, even in beginners, because they are not bound by the technique of movement. These systems provide precision in movement and are recommended for practicing both motor or perceptual skills.

The level of difficulty of the exercises should be suitable for every athlete in order to ensure a success rate. The exercises should be difficult but also achievable, keeping the self-efficacy of the athletes at a high level. Lewthwaite and Wulf [13] stated that several studies of novice, experienced, and expert performers [14] demonstrated the impact of a sense of success on subsequent performance. Previous achievements in sports performance establish a sense of self-efficacy [15, 16]; and previously positive outcomes give rise to positive expectations for future successful performances [13]. Self-efficacy is described by Bandura [15] as the belief and judgment which a person has regarding their ability to execute specific actions relative to the achievement of specific outcomes. Generally, individuals with high levels of self-efficacy attempt new performances in future trials, expend their effort on these performances, and commonly display increased success in future motor skills [17]. Self-efficacy may be a prospective predictor of motor performance [14] and learning (retention and/or transfer of skill) [18]. The positive effects of self-efficacy on performance in sport and exercise settings are well established [19]. The early development of self-efficacy beliefs is very important, especially for beginners [20]. There is a clear relationship between perceived mastery of performance and feedback in motor performance with self-efficacy [19, 21, 22]. Several researchers [23] have investigated the effect of different instruction programs by differentiating the level of motor skill performance, showing that guidance and deliberate

practice - the type and frequency of stimuli an individual receives to achieve sport expertise - play an important role in the improvement of sports performance. When the levels of effort and success are high, then the interest of the athletes is also kept high. When there is success with little effort, then the exercise is considered easy. On the contrary, when the effort is great and there is no success, then the exercise is considered very difficult. Finally, when the effort is small but there is no success, then the interest of the athletes is not maintained.

Finally, skills presentation techniques, i.e. verbal instructions, and demonstration are used to help trainees gain execution knowledge for the desired movement. Oral instructions provide essential information for learning. They describe the skill, the result, the knowledge, the motivation, the attention, and the interest, and they clarify the goals (technique - result, accuracy - speed). Oral instructions should be specific, e.g. "look at the ball." They should also be limited in number, not providing information every time but one piece of information at a time, and need to be repeated due to the limited capacity of memory and attention. Coaches should also direct the athletes' attention to the appropriate key points of the skill. Finally oral instructions should be provided before or after execution but not during execution. The coach should provide information to all athletes. When the skill is easy, they should move among the trainees and make corrections. But when the skill is difficult and the athletes are novices, they should use demonstration (for example by showing videos of the correct performance by expert athletes). Information is more easily conveyed by visual demonstrations than by verbal instructions. The demonstration also helps the trainee to develop the ability to detect and correct mistakes. Trainees should have a good viewing angle and the coach should direct trainees' attention to key points. There is evidence that when beginners watch others perform the skill, they learn faster. The demonstration technique can be used by the coach to demonstrate the technique or part of the skill. This method can be used for both experienced and novice athletes and can be done either at the beginning or during training [24, 25]. It is most often used in complex movements and at beginner learning levels. In order to be substantial, feedback should be specific and not general; it should be positive; as an example after the proper performance, it should be corrective and only individual, otherwise it creates frustration and fear of failure; the ratio of positive and corrective feedback should be 4/1; and pointing out errors should always be accompanied by correction instructions.

3. Development of motor and perceptual skills

3.1 The dimensions of sports expertise

The efforts of researchers and coaches are intended to discover the most effective methods for athletes to achieve the best possible result, performing the optimal movement. Starkes [26] defined athletic excellence as constant outstanding performance over an extended period, defining four key areas: a) the physiological, b) the kinesthetic coordination and technical execution, c) the perceptual, and d) the psychological.

a. **The physiological field** refers to the individual components that constitute physiology and include specialized factors such as strength, aerobic and anaerobic capacity, muscle type and muscle fiber distribution, body morphology and size of each body part, height, flexibility, and general esthetics [27]. The physiological aspect of performance is common to sports, although it varies depending on the nature of each sport. For example, the physiology of speed runners

differs from that of endurance runners. There is evidence to suggest that certain physiological factors such as body morphology and muscle fiber type may change after regular training [28]. However, sports physiologists agree that the degree of human adaptation to the environment is indeed limited, the limits imposed are primarily genetically determined, and heredity plays a decisive role, meaning that improvement is limited [29, 30]. Hereditary predisposition to physiological traits appears to significantly limit factors that affect athletes' performance. However, researchers argue that even if the best physiological traits are hereditary, this is not sufficient for high sports performance [31].

b. **Kinesthetic coordination and technical execution** concern the ability of kinetic execution. The technique of high-level athletes depends on the degree of esthetic-motor cooperation and perception, through which the movement is perfected [32]. Technical specialization and experience refer to the degree of coordination of muscles and senses, through which sophisticated, efficient, and effective ways of movement are expressed [33]. Measurements related to technique in athletic skills include qualitative analyses to assess the kinematic and kinetic motif of movement [34]. Regarding the improvement of the performance of the technique, sufficient data confirm that perfecting the movement is a result of long-term, systematic, and deliberate practice [34]. Over time, athletes acquire motor skills patterns which are highly stable and effective, while movement is characterized by a high degree of automation [35].

c. **Perceptual and cognitive abilities** are crucial, especially in team or dual sports when the environment changes and the movement needs to be adjusted to the upcoming stimuli. The knowledge of high-level athletes can be divided into two areas: tactical/strategic skills and perceptual skills [9]. Tactical skills are related to the athlete's overall strategy in each sport, while perceptual skills are related to selective attention, anticipation, and decision making. More specifically:

   i. **Tactics/strategy skills.** Specialization in tactics is essential for the development of expertise in sports [26]. Knowledge of tactics includes not only the athlete's ability to determine which strategy is most appropriate in each situation, but also whether the strategy can be successfully implemented within the constraints of movement [26]. In addition, specialization in sports tactics is different from that in non-motor activities, in that psychological and technical constraints characterize athletes' strategic choices. The methods used to evaluate the tactics concerned the protocol of analysis and observation of behavior, both in training and on the field [36].

   ii. **Perceptual/cognitive skills.** Perceptual/cognitive skills refer to the ability to perceive and adapt to the environment and include the skills of selective attention, anticipation, and decision making [37]. From a competitive environment full of information, motor behavior requires the decoding of the offered elements from the visual scene, by developing strategies of focusing attention, continuous interaction of short-term memory (working memory) with long-term memory, the ability to translate the decision into a kinetic response, and the ability to flex and modify, if necessary, the original decision at the same time. The methods used to evaluate perceptual skills are usually speed and accuracy. These mainly rely on the value of decoding information derived from perceptual skills and the effective response [36]. Research shows that perceptual/cognitive skills training can start at 12 years old [38].

d. **The psychological field** is divided into two sections: a) emotional regulation and b) psychological skills. Emotional regulation is the athlete's ability to control their emotions. Psychological abilities significantly affect athletic performance [33]. Abernethy and Russell [39] report that experienced athletes are motivated internally or externally, have a greater sense of self-efficacy, are more effective in responding to difficult play conditions, and are better able to match appropriate psychological strategies to play conditions, which allows them to respond more effectively. Their sense of self-efficacy enables them to make effective and appropriate decisions under stress and fatigue [40, 41]. In extreme conditions (e.g. stress), the ability to respond correctly and quickly is not greatly affected, as they experience these situations as positive or even provocative [41].

The development of all the above skills is particularly crucial in team sports with a changing environment in which there are simultaneous requirements for excellent performance in motor and perceptual execution plus the management of psychological burdens (e.g. stress). If we can intervene and improve three out of four factors of athletic success - technical, perceptual, and emotional (considering that the biological factors are inherited) - then it is important to identify the most effective training methods for achieving athletic expertise.

3.2 Fundamental framework of perceptual skills

Choosing the right decision in sports requires adaptable behavior in each game scenario, based on the athlete's ability to solve problems. Many researchers are looking for answers to the question "what information do elite athletes use and by what mechanisms do they choose the motor response that requires accuracy even in short time limits?" The elite athletes who have automated these mechanisms seem to respond successfully and with relative ease to extreme competition situations as if they already know the competition scenario and the opponent's movements. The following is a detailed description of three perceptual skills (selective attention, anticipation, decision-making) that play a key role in sports with changing environments, such as team sports or dual racket sports.

3.2.1 Selective attention

Visual attention plays an important part, not only in team sports in which players have to simultaneously monitor the activities and positions of multiple players, but in sports in general [42]. The athlete is observing a display that contains a target stimulus among a variable number of distractor stimuli. The athlete should select all the sports content key points of the environment to focus their attention on and extract the necessary information from the changing sports environment. Early recognition drives on faster prediction, while efficient processing results in better decision-making and effective response to environmental stimuli [43]. Attention is described as the selection of relevant stimuli and the selective structuring of the field of perception [44]. Research has recognized the significance of attention in sports, and the scientific literature provides numerous findings reporting the predominant attentional capacities of experts compared to relative novices [45]. Based on findings in neuroscience [46], attention can be divided into four distinct sub-processes, all of which differ across individuals to varying extents: orienting attention, selective attention, divided attention, and sustained attention. In a sports context, a) orienting attention may be useful for referees since it refers to following different stimuli and extracting relevant features from the complex surroundings;

b) selective attention may be useful for coaches since it gives the ability to recognize the key feature of a complex technique that needs to be changed for the athlete to be able to perform better on the next attempt; c) divided attention can be useful for athletes since they can divide their attention among all the relevant stimuli of a complex situation and subsequently use this information to improve their tactics; and d) sustained attention may also be useful for athletes since they maintain their attention for a longer period.

Visual attention should be differentiated from visual perception since perceptual processes, except for information acquisition, also include cognitive activities such as attention and memory, as well as motor and affective processes. Therefore, attention seems to be a sub-function of a perception whose role is to select the relevant stimuli from a large number of them to guide actions. Selective attention is defined as when specific stimuli are preferred over others, as opposed to simply orienting attention to single locations [44]. Chelazzi et al. [47] observe that "visual selective attention is the brain function that modulates ongoing processing of retinal input for selected representations to gain privileged access to perceptual awareness and guide behavior" (p. 58). If efficient goal-directed behavior is crucially mediated by visual selective attention, it is important to identify the most effective training models for improving selective attention in novices.

In a sports setting, when athletes are exposed to dozens of simultaneous stimuli, only a small part of the incoming information processes and guides behavior because processing resources are inherently limited [47]. As a result, all the available stimuli compete with each other to gain access for further processing, and the visual system chooses to focus the attention on one or a few stimuli that are more relevant to the task [48]. Selective attention functions via a dual mechanism through which the individual focuses their attention on the most relevant information in terms of the task goal while diverting their attention from irrelevant information which may impact the execution of the aiming behavior [49]. According to the ecological theory, Abernethy, Burgess-Limerick, and Park [50] argue that environmental information is selected through visual flow and guides the movement without the mediation of any cognitive processing. On the other hand, Müller and Krummenacher [43] argue that the development of visual processing models discloses an interchange between the pre-attentive and attentive processes. They stated that "if the output of preattentive processing is assumed to only represent basic visual features so that the essential operations of object recognition are left to attentional processes, focal attention must be directed rapidly to the (potentially) most meaningful parts of the field so that the objects located there can be identified with minimal delay" (p. 392), which seems to be a cognitive process. It is concluded that selective attention could be developed either by specific guidance to the most meaningful parts of the field (which presupposes cognitive processing) or without the mediation of any cognitive processing. Therefore, an important question is which methodological approach can lead to the development of selective attention skills.

3.2.2 Anticipation

The improvement of the anticipation skill is decisive for an athlete's performance, especially in dual or team sports in general, in which the environment is altered and an adaptation of the motor response to the corresponding stimuli is required. Thus, an element of utmost importance for athletic performance is an athlete's ability to anticipate what is going to happen next, analyzing stimuli from the surrounding environment to make accurate and quick decisions [37], based on declarative and procedural knowledge. Loeffler and colleagues [51] suggest that

three practices are mainly used to evaluate the anticipation skill: a) temporal occlusion (e.g. a handball penalty is occluded at three different time points), b) spatial occlusion (e.g. selected body areas of a penalty-taker or the ball are removed/presented in isolation), and c) point-light display.

According to Cañal-Bruland, and Mann [52], there athletes use two types of information source to anticipate the next action: a) kinematics of the opponent and b) non-kinematic (or contextual) sources of information. The efficient pick-up and use of information emanating from these sources may be governed by different factors related to domain-specific (visual and/or motor) expertise. Kinematic information relates to the key points in the body or the movement of the opponent. The non-kinematic (or contextual) information includes, for instance, tactics, the opponent's position in the court [53], or knowledge of action preferences [54] or sequences of action outcomes [55].

According to Williams, Ward, Smeeton, and Allen [56] there are two types of anticipation in sports: a) related to what is going to happen in the environment, for example when the driver of a car anticipates that the driver in front will turn left. This type of anticipation is referred to as "spatial" or "event" anticipation. b) Predicting what is going to happen in the environment allows the driver to plan their movements in advance so that when the event occurs they expects to be able to start their response faster (in a much shorter time than the usual reaction time). This type of anticipation is known as "time anticipation". It is important to anticipate what is going to happen so that the right moves are prepared in advance [56].

Anticipation depends on the effectiveness of the collaboration between working memory and long-term memory [56]. For this process to take place quickly and accurately, a knowledge base is required, which includes declarative and procedural knowledge. French & McPherson [36] point out that the structure of knowledge in open ball sports consists of two distinct levels: the micro-level and the macro-level. The micro-level refers to what knowledge is required (declarative knowledge) during the performance and depends on the degree of involvement of the working memory. This kind of knowledge is directly related to the visual focus strategies developed by the athlete and the ability to anticipate. The macro-level refers to the action plan (procedural knowledge) and the recognition of the current racing scenario. Spatial and temporal anticipation skills bring a strong advantage in performing various skills. But if the anticipate can predict correctly in both ways, the advantage becomes even greater [36].

3.2.3 Decision-making

In most team sports, an athlete's successful performance depends on both proficient control of movement and the ability to make effective decisions about motor responses. The necessary behavior consists of a creative decision-making in which both accuracy and speed are at top-level [57]. Performers use certain kinds of decision, such as anticipating the direction of a movement, recognizing which repetitive patterns of play strategy are used by the opponent, or identifying certain movement characteristics associated with different responses [58], based on declarative and procedural knowledge. Also, in this phase, the information related to the stimulus is recalled from memory and the information related to the response to the stimulus is activated. This information may be previous responses to a similar stimulus. Some researchers believe that in this phase the image of the response is created, which contributes to the execution of the response [59]. Finally, a series of facts allows the individual to choose the appropriate answer from several possible choices. For example, a basketball player has to decide whether to pass the ball to a teammate or not. Such decisions are very important both in sports and in everyday

life, e.g. in driving. Making decisions in the laboratory is evaluated by measuring the reaction time and the accuracy of the answer.

Making the right decision in sports requires both the perceptual and the motor behavior to be adaptable to different scenarios, based on the athlete's ability to solve problems. In a competitive environment full of information, sports performance requires the data provided by the visual setting to be decoded, through the development of strategies for selective attention, continuous interaction with memory, the ability to transform the decision into a motor response, and finally the ability to modify the initial decision in time if necessary [60]. One characteristic of elite athletes in making a decision is the ability to quickly and accurately use the information collected by the visual system and combine it with the information in long-term memory. The cognitive mechanisms which are capable of retaining crucial data in an active state for use in ongoing tasks are defined as working memory [61, 62].

Another issue related to and influencing decision-making is the concept of "complexity". In many sports, athletes have to deal with the temporal or spatial constraints of the environment. As Raab [62] observes, complexity is defined as an environmental complexity, and is operated by changing the amount and connectivity of offered information. Other elements that create complexity are using dual tasks [63], transferring tasks [64], and adding situational factors such as time pressure or emotional stress [9]. Additionally, complexity is linked with the demand to process both a decision and a movement in close succession or even concurrently [65]. Thus, working memory is a system not only responsible for the storage of useful information which is used in the decision-making process but also for mechanisms of cognitive control and attention [66], which makes the concept applicable to complex behavior. For novice athletes, the simultaneous execution of a movement and decision-making causes working memory overload and may therefore cause a disruption in motor performance [67]. To all these elements of complexity are added the tactics of each sport. Raab [62] suggests that in tactical decisions, varying the number of choices and attributes is a useful means of manipulating the cognitive complexity of a situation. For perceptual manipulations, space–time parameters (e.g. distances and moves of players) can also be varied.

3.3 Effective training models for the development of perceptual or motor skills

The development of perceptual skills is very important for sports with open skills, in changing environments where athletes have to quickly and accurately select which stimuli to concentrate their attention on [7]. Comparing experts and novices, several researchers have shown that experienced athletes have more efficient cognitive and perceptual processing mechanisms than novices [60]. Experienced athletes are usually able to extract and process large amounts of information faster and more efficiently from a visual presentation in their specific field of specialization, rather than other irrelevant visual stimuli presented to them [68]. A critical skill of sports athletes is whether they can analyze, select, and pay attention to the useful information of the sports setting and ignore the non-useful information. Subsequently, how are experts able to predict the upcoming stimulus or movement of the opponent and make the right decision? Some researchers have compared how experts and novices pay attention to feint or non-feint actions, concluding that experts outperform novices in inferring the true action intention of the opponent [69]. The question that arises is how to develop the perceptual skills of novices to efficiently select and pick up the most relevant information of the sports setting, anticipate the sports scenario, and make a fast and correct decision. Which learning mechanism is most effective for the development of perceptual skills in novices?

Childhood is an important and sensitive period for cognitive development; however, there is limited research on the methods of development of perceptual expertise in children [70]. Many training programs have been designed and tested to improve perceptual skills in different sports, and results have shown that it is possible to acquire perceptual skills with training sessions both in the field and the laboratory [71]. In a review, Memmert [44] reported that attempts to manipulate selective attention include approaches that direct the visual search to important "information-rich areas" through visual (attentional cues) or verbal (instructions) hints. The training methods/models recorded in the bibliography use training protocols either on the field or in the laboratory, or a combination of laboratory and field.

3.3.1 Training models based on the process of consciousness

Magill [72] suggests that perceptual skills can be improved via two training models based on the process of consciousness: a) using conscious practice models such as explicit training methods, in which the perceptual-motor problem is addressed consciously and with the contribution of working memory to create declarative knowledge [73], or b) using subconscious practice models such as implicit training methods, in which the perceptual-motor problem is addressed subconsciously without the involvement of working memory to create procedural knowledge [74]. More recent studies in the motor learning literature have provided evidence on the crucial role of working memory during the learning process, and even now there is a controversy concerning the different effects of traditional-explicit instruction versus the implicit or analogy methods for the acquisition and retention of sports skills [10, 75–79]. Many researchers argue for the role of unconscious (implicit) processing in learning motor skills [75, 78] or perceptual skills [6, 80] as opposed to conscious (explicit) processing [10, 77, 81].

The explicit learning method is the most common training method used by coaches especially for novices [2]. Through explicit practice, focusing attention on the key points allows the athletes to recognize the appropriate stimuli, analyze them, and process them for the correct response [81]. In this mode of instruction, the coach sets out clear rules and gives verbal instructions on how to execute a particular movement or skill. The acquisition of knowledge via the explicit learning process results in consciously accessible declarative knowledge that can be articulated [82]. Beilock and Carr [83] argue that novice performance is based on explicit, declarative knowledge that is held in working memory and monitored in a step-by-step approach. Muller and Krummenacher [43] note that the allocation of attention can be initiated either consciously or unconsciously, suggesting that guiding attention explicitly to the information-rich points may have a positive effect on the final goal of the task. Explicit learners also develop meta-knowledge (knowledge about our knowledge) about their sports ability [84]. Access to meta-knowledge apparently affects the individual's self-confidence or self-efficacy and could become a factor of success or failure in sports [8]. However, it has been shown that the explicit use of rules places a heavy load on working memory resources. These limitations, under some conditions, will impede learning, since working memory is extremely limited in both capacity and duration [11]. However, explicit learning is not a necessity in the initial phase of learning, since automatic, smooth, effortless, and fast control of goal-directed movements can also be acquired implicitly [85]. Although the explicit model may be effective in improving the movement form, it has been criticized for the loss of the contextual nature of the skills in open sports.

In the implicit learning method, the coach does not give rules of execution but distracts the attention of the trainees using a secondary stimulus [81, 82, 86], in

order to develop procedural knowledge, bypassing working memory processing [9, 87]. Ewolds and colleagues [88] argue that in implicit learning the input information directly determines the output of the movement, without the use of attention, and without leading to conscious awareness. Thus, motor skills that are learned implicitly are thought to be less reliant on declarative knowledge than skills that are learned explicitly [10] and instead capitalize more strongly on automatic processes [89].

Several researchers have proposed that the implicit learning method is more effective than the explicit because the latter has been associated with distraction of attention during execution, while implicit learning results in limited declarative knowledge, so there is no additional loading to impede automated movement [8–10]. Implicit learning techniques are thought to lower the amount of attention required to acquire and perform cognitive tasks [90]. Many researchers support the beneficial effects of implicit learning on selective attention and visual skill for adults [74, 91]. Moreover, the supremacy of implicit learning over explicit learning is expressed in conditions of psychological pressure [81, 92]. However, some problems arise from the implementation of implicit learning methods, such as the lack of execution rules, which novices need in the early stages of learning [9, 10] and the impracticability of application in the field, due to the second stimulus [93]. According to Masters [9], the use of a secondary task seemed to impair performance, as it imposed on the learners processing demands they were unable to manage. On the other hand, from a practical point of view, it is not easy for sports coaches to use a secondary task when teaching skills in the field. Furthermore, acquiring knowledge with the use of a secondary task methodology may not only be difficult and demanding, especially for novice athletes, but the learner's intrinsic motivation may also be weakened by the constant deterioration in performance, as there is a decrease in perceived competence [94]. As Masters [63] argues, one way to overcome the practical problems arising from the secondary task and at the same time take advantage of the implicit learning may be the use of analogies via the analogy training method.

The analogy training method is an implicit type of instruction that aids the learning of a new concept by expressing it in terms of a fundamentally similar concept [95]. It provides learners with information through biomechanical metaphors (analogies) that disguise many of the technical rules ordinarily provided by explicit instruction [63]. Thus, analogy learners have less access to declarative knowledge about the movement than explicit learners [8, 96]. In sport, coaches often draw on analogies to help their athletes understand the skill to be learned. For example, a basketball player may be told to put their hand in the cookie jar when shooting, or a golfer may be instructed to swing the club like a pendulum when putting [93]. Swimming coaches may teach their students to "kick like a dolphin" when they learn the butterfly swimming stroke [97]. Previous studies have shown that learning by analogy instructions is more robust than learning by explicit instructions in cognitively demanding situations, such as stress or dual-task conditions [77, 90, 98]. Previous work has compared the implicit to the explicit learning method of tactical decision-making in ball games [62], and explicit to analogy learning, also in tactical decision-making in ball games [93]. Poolton et al. [93] report that analogy learning improved performance in a decision-making task in complex situations, and was better than the explicit learning condition. Liao and Masters [8] compared implicit, explicit, and analogy learning methods for a motor task. They found that analogy learning was more effective than the implicit or the explicit learning method when a concurrent secondary task was added. Additionally, Lam and colleagues [90] suggest the use of the analogy learning method, comparing it with the explicit method for the improvement of a motor skill under pressure. They mentioned that the analogy learning group had less access to the rules about the mechanics of the

movements as opposed to explicit learners. Koedijker et al. [99] suggested that analogy learning seems to by-pass the use of working memory early in learning, thus reducing the need for novices to direct attention to the execution of the movements (declarative knowledge), and as a result, the control structures that preside over the performance of the novice might be more procedural than declarative. It also seems that analogy learning combines the benefits of both explicit and implicit learning without the disadvantages of working memory overload of the explicit learning or the implementation difficulties (due to the dual-task demands for novices) of the implicit learning. However, according to the systematic review by Gröpel and Mesagno [100] the results on the effectiveness of the analogy learning methods are "somewhat inconsistent" (p. 15), since some studies report significantly better performance under pressure conditions compared to explicit instructions [8, 90], although others do not find such effects [101, 102].

But what is the role of working memory and how it can be manipulated through instructions? In open sports with a changing environment, such as team sports, the athlete's ability to adjust to the environment and the upcoming stimuli plays a crucial role. The rapid perception and processing of different stimuli which the athletes receive from the environment leads to the shortest time anticipation, then to correct decision-making, and finally to the most appropriate response-reaction [33]. The mechanisms of attention are responsible for selecting the information that gains access to working memory where action plans can be elaborated [103]. Thus, working memory is a system not only responsible for the storage of useful information but also for mechanisms of cognitive control and attention [66], making the concept applicable to complex behavior. Working memory is a cognitive system that holds and manipulates information while performing cognitive operations [104], and is essential in motor learning [105]. When novices learn a new skill, they pass from a cognitive through an associative to an autonomous phase [106]. In the cognitive phase, knowledge is explicit; it is transformed into implicit knowledge in the autonomous phase. Skill acquisition begins with the declarative, explicit encoding of knowledge with high cognitive processing demands, and ends with procedural, implicit encoding in which demands are low. Both declarative and procedural knowledge is crucial to performance in sports which demand high-strategy skills, and the first step is for the athlete to be able to perceptually select the relevant cues from the environment while ignoring the other information. The explicit encoding process culminates in rules that can be applied to future performance, and which are used for adjusting to task variations. It has been shown that explicit use of such rules places a heavy load on working memory resources [11]. When implicit processes are implemented, athletes are less likely to modify their performance according to explicit rules because they are unaware of the mechanisms underlying performance [107]. Baddeley [66] suggests that implicit processes provide the expert with greater resources to carry out other tasks such as decision-making. On the other hand, explicit processes are reliant on working memory to produce declarative knowledge which is accessed by conscious thought, so that the motor system can control movement "online" [11]. It seems that both motor skills [67] and perceptual skills [6, 62, 92] can be learned implicitly without early dependence on working memory. Several researchers have proposed that implicit learning is more effective than explicit in learning motor skills because the latter has been associated with the distraction of attention during execution, while implicit learning results in limited declarative knowledge, so there is no additional loading to impede automated movement [8–10].

Another question is what happens when athletes are pressured by stress, which is the most realistic condition. In competitive sports, when athletes are performing under stress they worry about optimal performance, which occupies parts of the working

memory system which is needed for optimal performance [108, 109]. In stressful situations, when athletes are looking for the correct movement execution they try to remember explicit rules and thus they alternate their motor control from an automatic-implicit control to a more conscious-explicit control, hoping that this will ensure correct performance [82]. Masters [9] argues that when motor skills are learned implicitly, without early dependence on working memory, they are less affected in pressure situations since they do not acquire explicit rules to recall them. Several researchers [8–10] also hold that implicit learning is more effective than explicit in learning motor skills, especially in stressful situations, because the latter has been associated with working memory overload during execution, while implicit learning results in limited working memory overload and declarative knowledge storage, so there is no additional loading to impede automated movement. When athletes acquire skills through explicit methods they underperform when placed under psychological stress since they try to recall the rules of execution – a process similar to novice execution [10, 110]. Masters [9] reported this situation as "reinvestment"; according to the reinvestment hypothesis, athletes who learn motor skills through explicit learning methods reduce their performance when they are under psychological pressure because in order to respond they return to the information processing of the initial stages of learning. In this way, they divert their attention from the rich information provided by the environment, while choosing to recall rules and instructions that they have already learned about the skill. Thus, the omission of explicit rules has a positive effect on performance, especially in stress conditions [8, 11]. Van der Kamp et al. [85] explain that this is because "*the liability to the well-known phenomenon of choking is diminished in comparison to explicitly learned movements, which are much more prone to the recurrence of explicit step-by-step monitoring (i.e., the reinvestment of verbalizable rules) as reflected in broken and stuttered movement execution*" (p. 506). Additionally, Davids, Williams, Button, and Court [111] suggest that the implicit learning method can be just as effective as explicit learning, however, the former is better in high-stress situations [8, 10, 93]. Liao and Masters [8] stated that "*If the task does not demand a lot of information processing resources and many spare resources are available, the motivational function of psychological stress may be likely to have a positive influence on performance*" (p. 318).

Moreover, two other theories describe that anxiety consumes the limited attentional resources of an individual, leaving less attentional capacity for the actual ongoing task [112, 113]. According to the "Attentional Control Theory – ACT" [114], anxiety causes a diversion of processing resources from task-relevant stimuli to task-irrelevant stimuli. This impairment and pre-empting of attentional resources leads to a shift in the attentional systems such that anxiety leads to increased reliance on the bottom-up, stimulus-driven attentional system. This is an expansion of Eysenck and Calvo's [115] "Processing Efficiency Theory – PET" which was developed to clarify the link between performance and anxiety used the following two assumptions: i) cognitive anxiety establishes itself in the form of worrying thoughts which influence working memory by reducing the limited attentional resources, thus decreasing the quantity of free attentional capacity to involve in parallel task demands, and ii) anxiety leads to increased cognitive effort and the conquest of additional processing resources.

3.3.2 Training models based on the type of instructions

Wulf [116] proposes that the type of instructions - external rather than internal focus of attention - is the factor that affects the development of perceptual and motor skills. Several studies have demonstrated that manipulation of feedback instructions which induce an external focus by directing performers' attention to the effects of their movements (external focus) rather than their body movements (internal focus) results in more effective motor performance and learning for either

movement form or outcome [117]. The external focus provides a subconscious motor control that results in greater movement automaticity compared to the internal focus of attention [116, 118–120]. Chua and colleagues [121] mentioned that training via external focus leads on automatic control processes frees up that system to engage flexible, reflexive movement control processes, and likely enhances functional connectivity of task-relevant brain areas [122, 123]. Chua et al. [121] also note that internal focus is linked with self-related thoughts and increases micromanagement of the intended movement such that learners are more likely to engage in conscious control of their motor system and disrupt automaticity [119, 123]. According to Masters [9], during motor execution, declarative knowledge of "what to do" is usually acquired in the early learning stages, when individuals try to find which response is the most optimal. Cognitive knowledge and conscious processing regarding the components of motor skills have been found to produce poor performance [9, 83]. It seems that the internal learners tried to consciously recall the rules governing the answer, and therefore tended to consciously interfere with the control processes and interrupt the automatic response processes. The theoretical background can be explained by the "Constrained Action Hypothesis" [122], which states that an external focus of attention promotes a more automatic type of control and allows the motion system to take advantage of unconscious and rapid control processes. Instead, an internal focus may lead to a conscious type of control, causing learners to restrict their motor system by interfering with automated procedures [124]. Poolton and colleagues [125] also suggest that external attention cues, even during the initial stage of learning, reduce the load of working memory. In contrast, internal attention cues increase the load of working memory, which may lead to reduced performance, especially in young individuals.

Despite the consistent evidence in favor of the hypothesis that external focus is superior to internal focus in adults, research on the benefits of internal versus external focus of attention in children is ambiguous [126]. While some studies have confirmed the beneficial effects of external focus in children [123, 127], others showed that the focusing function did not affect children's motor learning and performance [128, 129]. Tsetseli and colleagues [130], found better scores in tennis serving movement form by young athletes who practiced using an external focus of attention than in those who practiced using internal focus. They argue that in studies with more stable (closed) environments, no differences were found between the internal and external attentional focus group, in movements such as golf shot [116] and soccer kick from a fixed ball position [131]. This may lead to the conclusion that instructions directing the attention externally may be more effective and beneficial for open skills [130]. It is worth highlighting here that directing attention to the task goal (hitting the target) bridges the gap between goal and action [132]. Peh et al. [133] conclude that an external focus of attention has a different impact on different stages of learning, while Singh and Wulf [134] suggest that both internal and external focus of attention are different according to the level of expertise. Becker and Smith [135] suggest that attentional focus affects children and adults similarly, but task complexity moderates these effects. An et al. [136] conclude that both movement form and outcome are enhanced in complex skill learning by providing learners with relatively simple external focus instructions.

Another explanation for the superiority of the external over the internal focus of attention is provided by the "Optimal Theory" [123], in which external attentional focus conditions are presumed to facilitate functional connectivity, that is, task-specific neural connections across distinct brain regions that are seen in skilled performers [124, 130]. Lack of a clear task focus (internal focus) would impede switching to task-related functional networks or goal-action coupling [137]. The external focus directs to an unconscious control process, directs movements with

relative clarity toward the action goals enhancing goal-action coupling, and promotes automaticity [122, 123]. By directing the concentration away from the body and to the desired effect of the movement or the target, external focus favors the establishment of effective neural connections that are critical for optimal performance. The result is an effective movement pattern and improved learning and performance. Ghorbani and colleagues [137], who support the "Optimal Theory", propose that the adoption of an external focus of attention directs the attention on target, successfully and perhaps more beneficially to young athletes [124]. Moreover, it is well established that external focus enhances neuromuscular automaticity, increases task goal orientation [121], reduces cognitive load [138], and alleviates performance anxiety [124].

4. Conclusions

In this chapter, an attempt has been made to answer the following questions: what are the dimensions of sport expertise and what training methods is it suggested that coaches use in order to make their novices experts (perceptually or kinetically)? The conclusions are summarized below:

Starkes [4] defined athletic expertise as constant outstanding performance over an extended period, defining four key areas: a) the physiological, b) the kinesthetic coordination and technical execution, c) the perceptual, and d) the psychological. The development of all the above skills is particularly crucial in team sports with a changing environment in which there are simultaneous requirements for excellent performance in motor and perceptual execution plus the management of psychological burdens (e.g. stress). If coaches can intervene and improve three out of four factors of athletic success - technical, perceptual, and emotional (considering that the biological factors are inherited) - then it is important to identify the most effective training methods for achieving athletic expertise.

The researchers propose effective training models for the development of perceptual or motor skills a) based on the process of consciousness, and b) based on the type of instructions.

a. Training models based on the process of consciousness: Compared with the explicit method or the rest of the implicit methods that divert attention, analogy learning seems to produce better outcomes and ensure more stable performance in the long run and under stress conditions. Explicit training drives trainees to a working memory overload, resulting in delayed and wrong answers, and making them underperform dramatically in stressful situations. Even though the explicit method is the most common, analogy learning is recommended because it contributes to both accuracy and speed of decision-making and skill learning under normal and stressful conditions. Learning by analogy is practicable in the field, and could be applied instead of methods that rely on the use of explicit instructions. The use of simple analogies may support the implicit development of athletes' skills without disrupting their performance. Nonetheless, it is coaches who face the greatest challenge: they are the ones responsible for coming up with effective analogies, which will comprehensively integrate all the necessary technical structures for a new skill to be learned and performed. Although this entails certain difficulties, the overall advantages implicit learning has to offer compared to explicit learning seem to promise a favorable outcome. Further research is needed to expand our knowledge on the implementation of analogy learning in other perceptual skills, in both simple and complex situations, in different sports as well as in different contexts and domains, such as production, the military, or medicine.

b. Training models based on the type of instructions: The positive effects of external vs. internal attentional focus for motor skill learning have been proposed by many researchers. Since both methods improve movement form and outcome, the decision of where to focus may not be a matter of what is right or wrong, but rather which is better under certain circumstances. Instructors should consider that effective sport skill learning occurs using either an internal or external attention focus depending on various factors, including whether the skill is open or closed, as well as the preferred attention focus of the participant. The adoption of an external as opposed to an internal focus of attention leads to the enhancement of motor learning and performance, and promotes participants' focus on the goal. It seems that directing attention to the task goal (hitting the target) bridges the gap between goal and action. It is concluded that an external focus of attention has a different impact on different stages of learning, or at different levels of expertise, while task complexity moderates these effects. It seems that the complexity factor might interact differently with the attentional focus factor for movement form or movement outcome, and this needs further research.

The biggest challenge for coaches, however, is how to keep their athletes motivated, especially children, while creating a positive learning environment, developing motor and perceptual skills, keeping the athletes interested by combining teaching, training, and entertainment, and providing positive training experiences in each training session.

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Chapter 4

Sports Motivation in Athletes in the Face of Psychosocial Risk and Pandemic Due to COVID 19

Ericka Matus, Lorena Matus and Jay Molino

Abstract

In this chapter, the reader will discover the importance of motivation in general and sports through a tour of the most critical theories in the field. Furthermore, we present the experiences of a group of young athletes during the quarantine due to the covid-19 pandemic in the Republic of Panama. Also, the reader will be able to identify the psychosocial risk variables and how sports is a mitigation factor for covid-19.

Keywords: sports motivation, COVID-19, psychosocial risk, athletes

1. Introduction

Even before the Hellenic greatness of physical culture in Greece, motivation had already been studied and implemented, as shown in the historical records of the time. It is no accident that it had a predominant place in ancient society. Since then, motivation and sports activity have been a powerful combination in the achievement of athletic goals.

Sport is the purest activity where the best human qualities emerge; however, there are psychosocial risks such as poverty and violence, spatio-temporal factors, stress, work overload, poor coverage in education, physical and mental health, among many others, that affect motivation to varying degrees or levels, in this document, an alternative to mitigate some risks is presented.

This chapter also refers to the presence of the SARS-CoV-2 virus that, since December 2019, disrupted all human activities worldwide, generating the collapse of small businesses, the cancelation of sports, artistic, and cultural activities. Educational, physical, recreational, and occupational. Only the priority tasks continued, although with radical changes, such as in the health sector, where all personnel continued to work with high biosecurity measures.

2. Motivation associated with sports environments

Motivation is a psychological process that has taken various paths according to the theory, paradigm, or model. This wealth has allowed it to be treated as a multidimensional concept to be not limited or adjusted to a given plane. For instance, Castro-Sánchez et al. [1] report that motivation is one of the most studied variables

because it explains human behavior. In the context of recreational and professional physical activity, it provides an understanding of factors such as the choice of a sports modality, the persistence, performance, and intensity of a specific sports activity.

Of the motivation theories that stand out in sport psychology for their emphasis on social factors are the self-determination theory developed by Deci and Ryan in 1985 and the achievement goals theory formulated by Nicholls in 1989. These Proposals explain the training and competition situations towards success [1].

There are other proposals aimed at personal improvement, in which the perception of success or failure is a unique interpretation. In addition, other theories explain the search for pleasure, personal image, or social relationships when carrying out sports activities [1].

Likewise, the theory of intrinsic (for pleasure) and extrinsic (for benefits) motivation is used by athletes and coaches. In addition, the theory of attribution also explains the causes of success or failure through three dimensions: control, causality, and stability. Additionally, the expectation theory of value suggests that success depends on the value (evaluation of importance) and expectation (belief in one's capacity) [2].

On the other hand, the motivational climate model is widely used, particularly by the technical team, to obtain higher performance from the athlete [3, 4]. Additionally, studies have been published on users' motivation to sports centers and their psychological profiles [5].

A widely disseminated conception is the protection motivation theory (PMT) that was first developed by Roger [6] to understand the factors that motivate the intentions of individuals and behaviors related to managing the risk of a disease or protecting themselves from health problems.

According to Roger [6, 7], the motivation derives from an individual's assessment and coping of threats in the face of assessing a risky situation. Thus, threat assessment is a process comprising perceived severity (the degree of perceived harm of a threat) and perceived vulnerability (the susceptibility to experiencing damage), while the coping assessment process includes the perception of effectiveness (possibility of preventing or reducing harm), perceived self-efficacy (confidence in carrying out protective measures), perceived costs (economic, temporary and physical), and adopt recommendations.

According to the protection motivation theory (PMT), the coping estimation involves:

a. Verifying the effectiveness of protective behavior in dealing with the threat.

b. Believe in one's own ability to handle protective behaviors.

c. Calculate the effort of the response.

Response effectiveness and self-efficacy are expected to strengthen coping assessment, while the expectation of response cost will reduce it [8]. **Figure 1** shows the protection motivation theory.

PMT uses the combination of two cognitive processes: the intention to protect oneself from a potential threat and the response to a threatening situation that can be protective (adaptive) or risky (maladaptive). It is expected that there will be a balance between the two processes: threat assessment and coping assessment [9].

In short, research suggests that individuals' intentions to perform a task influence real behaviors (cited in [11]), so that a diagnostic assessment of intentionality would allow the identification of actions, behaviors or conducts afterward, and that

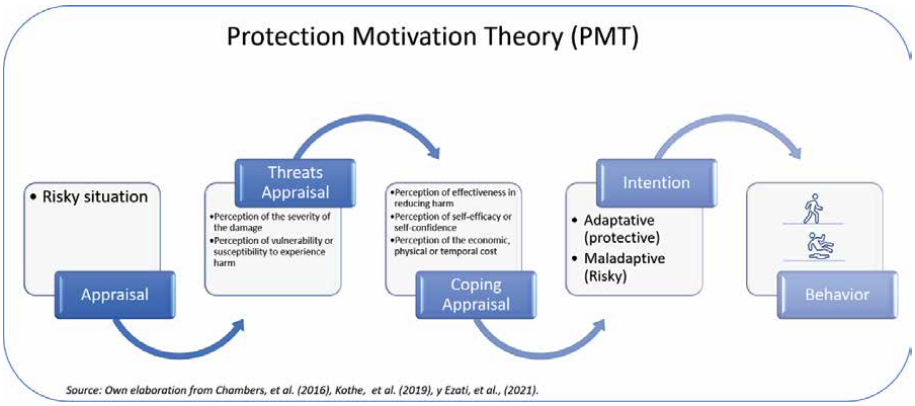

Figure 1.
Protection motivation theory. Source: Own elaboration from Chambers et al. [9], Kothe et al. [10], and Ezati et al. [8].

is the main reason why PMT has been used to develop risk-reduction interventions, for example, [8]) applied the protection motivation theory to predict behaviors during the covid-19 pandemic.

Concerning the theory of training motivation, Chung et al. [12] developed a model based on a meta-analysis in which they included variables that had not been considered in the work of Colquitt et al. [13], as shown in **Table 1**. From **Table 1**, there are five areas that benefit from the theoretical model which is shown in **Table 2**.

Thus, since the end of the previous century, studies focused on motivation to learn (as is the case with the previous model) have been used as a basis in the theory of training motivation [12].

Many scholars have suggested a series of variables and correlations to explain motivation in general and sports in particular: Chung et al. [12], for example, Martinez-Cevallos et al. [5] published research to analyze the motivation for attending sports centers. Likewise, Quesada and Gómez-López [14] suggest that those starting a physical activity with high levels of intrinsic motivation attend the various physical activity sessions more frequently than those with higher levels of extrinsic motivation. Wolska et al. [15] suggest that motivation is one of the best

Personality traits:	Knowledge and skills:	Individual motivation:
• Locus of control (+)	• Cognitive ability (+)	• Valance (+)
• Anxiety for learning (−)	• Education (+)	• Pretraining self-efficacy (+)
• Openness (+)		• Learning goal orientation (+)
• Conscientiousness (+)		• Performance goal orientation (+)
• Extraversion (+)		
• Agreeableness (+)		
• Neuroticism (−)		
Job/career variables:	Climate variables:	Demographic information:
• Organizational commitment (+)	• Manager support (+)	• Age
• Job involvement (+)	• Peer support (+)	• Gender
	• Organizational support (+)	
	• Learning culture (+)	

Table 1.
Theoretical model of suggested effects of motivation to learn and its antecedents and outcomes.

Affective-based:	Cognitive-based:	Skill-based:
• Posttraining self-efficacy (+)	• Declarative knowledge (+)	• Learning performance (+)
• Training reactions (+)		
• Learning satisfaction (+)		
Work attitudes:	**Distal outcomes:**	
• Turnover intention (−)	• Training transfer (+)	
• Job satisfaction (+)	• Job/task performance (+)	

Table 2.
Theoretical model of suggested effects of motivation to learn.

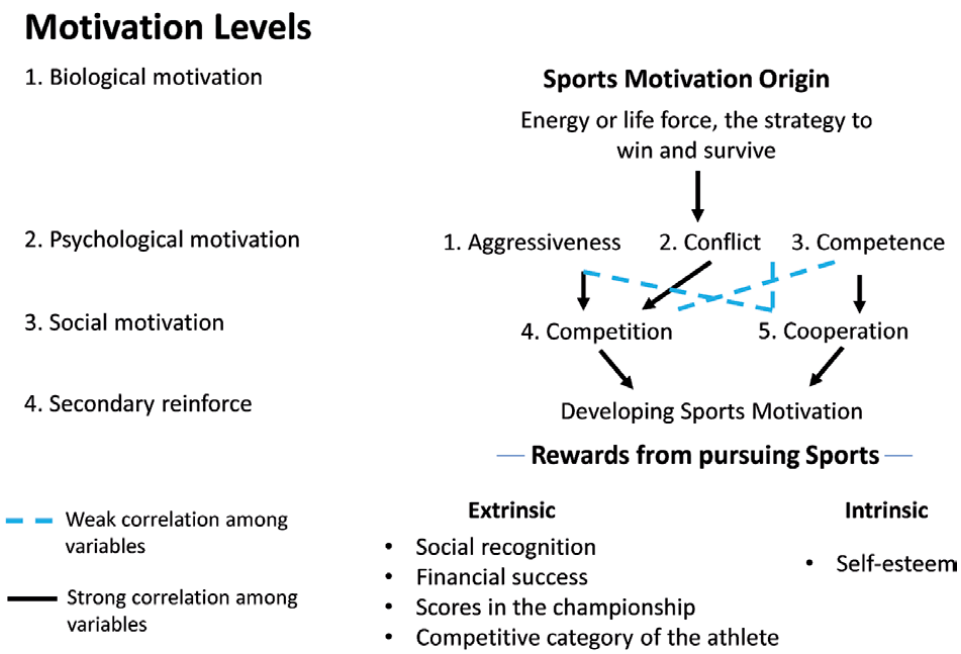

Figure 2.
Butt's motivation model. Source: [17].

predictors of human performance because it improves performance and seeks perfection in sports training; while Moradi et al. [16] point out that sport and physical activity have the potential to contribute to health, social and economic goals.

Through the work of Butt [17], the motivation for physical activity and sport can be understood when biological, psychological, social, and secondary enhancers are interconnected, as shown in **Figure 2**.

For Butt, the origin of sports motivation is an energy or vital force that requires a strategy to win and survive, so the coach and psychologist must work with aggression, conflict, competence, competition, and cooperation.

3. Sports discipline

Sports activity represents a substantial economic revenue in almost every country in the world. Millions of dollars spent in equipment, uniforms, food supplements, technology, stadiums, television networks, sportswear, trainers, fitness trainers, sports medicine, physiotherapists, referees, sponsors. It is the world's most

Stages of training		Objective	Activities	Techniques
Sports	**Psychological**			
Diagnostic evolution	Diagnostic evolution	Start of cycle. Assess psychological skills	Psychometric tests Observed games	• Observation • Interview
Candidate selection	Psychological rest	Integrate complementary experiences for both physical activity and mental preparation	Leisure Games Other sports Change of activity. Parents' meetings and code of ethics Parent organization Outcome Locus of control Behaviors that are tolerated Behaviors that are not tolerated Psychometric tests	• Sociogram • Group-task integration • Group-society • Questionnaires • Communication • Trust • Member growth • Semantic differential • Operational group—define the task • Constructivism
Physical training	General psychological preparation	Set daily goals. Translate achievements at the time of the competition. Psychological goals—good mood Games and personal challenges No half measures while training Plan for training Fatigue resistance to pain Relaxation for easy rest Relaxation for weightlifting Viewing energy images to control fatigue. Modify "*I cannot do it*"	Self-knowledge Motivation • Training • Competition Resistance • Fatigue • Pain Self-confidence • Work assessment Self-control Psychometric tests	• Relaxation • Thought control • Self-dialog • Energization • Visualization

Stages of training		Objective	Activities	Techniques
Sports	**Psychological**			
Specific technical work	Specific psychological preparation	Fine motor skills optimization Relearn about the sensory perception of each exercise. Set internal control locus	Psychokinesthetic Preparation Self-control Self-confidence Get a better multisensory image of the proper execution to achieve self-confidence and hence self-control. Psychometric tests	• Videos • Improvement Journal • Visual perception training • Biomechanics analysis
Pre-competition	Control	Improve automatic response. Minimize athlete decision making	Create routines. • When to eat. • What to eat. • Dialog and recommendations • Breathing • Rhythms • Competition behavior • Activity visualization Routine assessment Psychometric tests	Revaluation of: • Sports goals • Personal goals • Identify optimal activation level. • Air • Attention
Competition	Competition	Performance assessment	Real adjustments and refinement to the competition area Identifying new obstacles and objectives Assessment Psychometric tests	• Visual feedback (videos, photos) • Group feedback (videos, photos and conversation) • Personal feedback

Stages of training		Objective	Activities	Techniques
Sports	**Psychological**			
Post competition	Post competition	Cycle Assessment Self-assessment Closing the cycle	Group assessment of set objectives Self-assessment Reformulation of individual objectives Reformulation of group goals Formal closing of the cycle Psychometric tests	• Establishing a closure • Group dynamics

Matus [18].

Table 3.
Stages of a psychological training program within a sports cycle.

lucrative human activity; physical culture usually begins in preschool and does not end in old age, so it is a way and lifestyle without forgetting non-professional and professional athletes.

Researchers dedicated to this activity have also proposed schemes, maps, and models to improve results, not only with the idea of motivation for achievement, intrinsic or extrinsic but by analyzing performance, cataloging behaviors, identifying attitudes, designing proposals, and testing them. An example of this is shown in **Table 3**.

4. Psychosocial risk

Psychosocial risk is considered to be all circumstances and adverse situations that prevent or violate biological, psychological, and social equilibrium, which can be prevented, adjusted, or improved through the economy, education, health, and in this case, sports. Under this definition, many associated concepts are found, such as nutrition, residence, and work situation, to name a few.

There are numerous stories of exemplary athletes from all sports disciplines who, despite living and interacting in contexts of psychosocial risk, managed to overcome those circumstances to become role models for children and youngsters from all corners of the world.

Many scales and questionnaires are allowing a psychosocial risk assessment, most of them are directed towards the workplace, i.e., for economically active adults, including burnout syndrome, stress, workplace harassment, alcohol, and drug use; this is because, since 1984, the International Labour Organization of the World Health Organization (WHO) presented in Geneva a paper on psychosocial factors at work: nature, incidence, and prevention.

Although WHO already contemplates sports health, the commitment made is relatively new. That is why our job is to generate a cluster of scientific knowledge that integrates motivation into sports to mitigate psychosocial risk in children and youth populations.

According to Đurović et al. [2], the role of coaches in the process of motivating athletes emphasizes psychology as a key factor, so it is the coach himself who makes the most effort since it requires a deep understanding of basic psychological processes, intrinsic and extrinsic commitment, and finally encourage, stimulate and inspire their athletes to achieve their goals.

Matus et al. [19] presented research involving young university students who wanted to join a soccer team. 72 men, enrolled in a public university in the Republic of Panama, attended the call for the men's team, from all the university's shifts and regional extensions, who were evaluated by the coach through various exercises, physical and endurance tests, forming the team with 25 students. The study aimed to evaluate the university's soccer players' motivation before and after an intervention program in psychology applied to sports.

The intervention program was based on self-knowledge, self-concept, self-esteem, proprioception, activities programming associated with the sport, group integration, emotions management, cooperation, and competition. It also includes preparatory work with the coach and coaching staff, who actively contributed at all stages [19].

The structure was built and founded on six stages: diagnostic assessment, psychological rest, general psychological preparation, specific psychological preparation, control, competitive, and post-competitive [17].

The scheduled activities were held one day before the weekly match. As a result, the team identified, assimilated, and adjusted each of the psychological

interventions, which was evident in each game, as they remained undefeated until the final match, where they were crowned as the inter-university league champions.

During the 12 weeks of activity, there were some inconveniences. Among the problems were physical injuries, participants not attending due to transportation issues, living in a remote location, personal and family troubles, overload of school work, work-related issues since some youngsters, besides studying, had to work for a living, not having their own football field, the only football field they had to train was constantly flooded by heavy rains, among other obstacles.

Research carried out by Matus et al. [19] reveals that with psychological intervention programs, purposely structured, can lead a sports team not only to victory and win a championship but also to improve individual and group expectations, build an identity, gain self-confidence and, above all, reduce psychosocial risks.

5. Covid-19 contingency in sports

Covid forever changed the way children and youngsters practice organized sports. Physical distancing policies prevent the social experience that facilitated athletes' participation and retention in sports clubs in their communities. As a result, more attention is now required in the psychology of motivation, stress, interpersonal relationships, and psychological exhaustion [20].

A pilot study was conducted on 42 Panamanian university athletes who practiced different sports (aerobics, baseball, cycling, CrossFit, physical training, soccer, gym, hapkido, Olympic wrestling, swimming, and running). From those, 85.7% were men and 14.3% women. They were surveyed about their motivation to do physical activity prior the COVID-19 pandemic compared to their motivation in April 2021 (considering the restrictions due to the pandemic). The participants answered a 42 item questionnaire with a Likert-type scale. The study showed that men were more motivated to engage in sports before the pandemic ($\bar{X}$ = 3.65, DS = 1.15), than after it ($\bar{X}$ = 3.49, DS = 1.07). As for women, the average motivation before the pandemic was higher before the pandemic ($\bar{X}$ = 2.79, DS = 1.45) than during the pandemic as well ($\bar{X}$ = 2.71, DS = 1.60). However, the difference is less than that of the men. When comparing the means between men and women, it was observed that men ($\bar{X}$ = 3.57, DS = 1.08) are more motivated than women ($\bar{X}$ = 2.75, DS = 1.50). Finally, statistically significant differences were found at 90% (p = 0.79) between the motivation of the athletes before the pandemic ($\bar{X}$ = 3.53, DS = 1.21), and in April 2021 ($\bar{X}$ = 3.39, DS = 1.15), with mobility and physical contact restrictions [21].

So far, no similar studies have been found. However, it is expected to continue with systematic research to identify the impact of COVID-19 in athletes.

For elite athletes, the challenges are greater due to lack of sponsorship, financial support from federations, laboratories specialized in sports science, performance bonuses, among other things, so that it could even lead to a generation of athletes frustrated by physical, psychological, social and economic loss [20].

Thus, under this circumstance, to resume sport activity, the 4Cs: Competence, Confidence, Connection, and Character; and the 3Ps: Performance, Participation, and Personal development are not enough. We should restart with the 4Rs: Recognition of emotional struggle, Reconnecting family units and social networks, Reinstating participants, and reimagining the purpose and meaning of youth sports [20].

For sports behavior and physical activity of elite volleyball players in Cameroon, Guessogo et al. [22] reported that covid confinement significantly

Aftereffects	Positive for COVID and recovered	COVID Negative
Physical	Muscle pain	Sleep issues and waking up constantly
	Joint pain	Nutrition issues
	Headache	Issues related to a lack of physical activity
	Fatigue	
	Low oxygen saturation	
	Sleep issues and waking up constantly	
Psychological	Antisocial emotional response	Stress
	Bad mood	Anxiety
	Stress	Frustration
	Anxiety	Tension
	Exhaustion	Sadness
	Feeling worried all the time	Anger
	Grief	Grief
	Limited motivation	Limited motivation

Table 4.
Covid aftereffects.

affected physical and sports activity, particularly among women. They also demonstrated that athletes continued to train by personal motivation, but without supervision, so physical and technical deficiencies led to inadequate training and at risk of injury. Finally, they recommend specific individualized programs to reduce physical and psychological effects and promote a safe return to the sport.

The previous case is related to the contribution of Nikolaidis and Knechtle [23], in which they mention that the covid pandemic dramatically changed all human activities. Yet, people continued to exercise without specialized physical activity monitoring, wondering whether online videos or smart devices replaced sports and health sciences, experts. If so, this behavior will continue after overcoming confinement.

On the other hand, the individual consequences left by the pandemic are divided between those in which people who tested positive for covid recovered and those who remained with negative effects, in both cases with physical and psychological consequences as summarized in **Table 4**.

Matus's own elaboration [21].

For this reason, youth sports organizations are bound to provide mental well-being to all their members through follow-ups. There will undoubtedly be other catastrophes preventing the free development of sport, so emotional contingency plans and psychological intervention programs must be tested.

6. Conclusions

Playing a sport during childhood and youth reduces psychosocial risk factors. In addition, being part of a sports team promotes protective factors; among the most common are discipline, commitment, responsibility, confidence, resilience, frustration, and failure management.

As already mentioned, sports activity requires motivation as a sine qua non condition. It also requires adequate spaces, equipment, and funds for hiring professionals. Family and society play a role to support successful athletes but also to bolster a healthy generation of community-driven citizens.

We must consider that it is not just about beating records, reaction time, becoming a high-performance athlete, or being named the best. What is expected is a

social change that transcends generations and will reduce the negative impact of the covid 19 pandemics through sports and physical activity.

Thus, we must promote academic, physical, and social spaces for young people to practice physical sports activities, not only in schools but also in family activities. Adults should be responsible for showing their children the variety of sports disciplines, and the many advantages of recreational sports between the ages of five and 12, which guarantees that children can discover the type of sport that amuses and motivates them.

Even though there is so much more to study regarding the effects of covid-19 in young patients who do sports, it is possible to venture to think that the habits acquired by them are maintained during confinement and situations of uncertainty to adapt their activities without leaving home.

In the words of Lao Tse "He who conquers others is strong; He who conquers himself is mighty."

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Chapter 5

Psychological Factors as Predictor of Sport Participation among Japanese and Foreign Students in Sendai, Japan

Akindele Abimibayo Adeoya, Adewale Olugbemiga Adeleye and Shinichi Egawa

Abstract

Sports play a functional role in human development. Regular sport participation has beneficial effects on physical, psychological and social wellbeing. It has positive effects on prevention and treatment of non-communicable diseases, physical appearance, enhance self-concept and external prestige, lower rates of suicidal ideation, reduce use of fossil fuels, and substantially increase life expectancy. The advent and excessive use of technology, academic workload coupled with the incidence of COVID-19, students become content with engaging more in sedentary activities. This chapter examined the psychological factors predicting sport participation among Japanese and foreign students in Sendai, Japan. The common choice of recreational sports are sedentary activities with a high level of performance in terms of frequency, intensity, duration and long period of participation. Psychological factors of self-confidence, value, task familiarity, perceived success significantly predicts sport participation among university students. Therefore, there is need for increased awareness on benefit of sport participation within the university. Improved reconciliation between academic and physical education programs, and development of attractive recreational sports considering the psychological process that leads to participation. To allay concerns during pandemic, self-organized, non-contact and outdoor sports should be encouraged with adequate preventive measures in place.

Keywords: Psychological factors, Physical activity, Sedentary activities, University students, Sport participation

1. Introduction

Regular physical activity, especially sport is proven to help prevent and treat non-communicable diseases such as heart disease, stroke, diabetes and breast and colon cancer. It also helps to prevent hypertension, overweight and obesity, improve mental health, quality of life and well-being [1, 2] and substantially increase life expectancy [3]. Participation in regular physical activity such as recreational sport has positive effects on both physical (appearance, slimness, conditioned body)

and psychological health and well-being (self-esteem, anxiety, depression, vitality, energy) [4, 5], enhanced self-concept [6], lower rates of suicidal ideation including both thoughts and intentions [7]. Leisure is psychological and social utilities that make it a significant influence to the quality of people's lives, which connote how good, fulfilled, cheerful and comfortable they feel [8]. It has developed an increasingly anticipated and significant component of people's lives in modern societies [8]. In addition to the multiple health benefits of physical activity, societies that are more active can generate additional returns on investment including a reduced use of fossil fuels, cleaner air and less congested safer roads [1].

Sport is a group of physical exercises that may be classified into individual or team games with specific rules [9, 10]. It is recreational in nature because it enables people to take part when they like and for entertainment for both the participants and spectators watching such performance. Sport is organized or unorganized recreation [10]. Sport develops individual physical fitness and health/wellbeing, aid mental growth, facilitates internal unity and boosts external prestige. Sports helps the participants stay in shape, improve endurance, boost self-esteem, provide guidance and aid weight control, organize their time, boost friendships, teamwork and build relationships with their peers and adults. Sports generally offers healthy decisions such as avoiding smoking or drinking and offer hidden health benefits such as lower chance of getting osteoporosis or breast cancer later in life [10, 11].

World Health Organization (WHO) recommended that in order to improve cardiorespiratory and muscular fitness, bone health, reduce the risk of non-communicable diseases and depression: adults aged 18–64 should do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week or do at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week or an equivalent combination of moderate and vigorous-intensity activity; aerobic activity should be performed in bouts of at least 10 minutes duration; for additional health benefits, adults should increase their moderate-intensity aerobic physical activity to 300 minutes per week, or engage in 150 minutes of vigorous-intensity aerobic physical activity per week, or an equivalent combination of moderate and vigorous-intensity activity; muscle-strengthening activities should be done involving major muscle groups on 2 or more days a week [2].

It has been observed that there is an increasing decline in sport participation especially with the advent and excessive use of technology, academic workload coupled with the incidence of COVID-19, students become content with engaging more in sedentary leisure activities such as gaming, social network chatting, watching television and even sleeping. Worldwide, 1 in 4 adults, and 3 in 4 adolescents do not currently meet the global recommendations for physical activity [1]. Empirical evidence revealed that sports participation decreases as age increases [12]. In addition, both males and females' sports participation declines as they move into adult life [13]. In Japan, large proportion of adults do not participate in regular leisure-time physical activity [14]. The National Health and Nutrition Surveys in Japan for 1997, 2004, and 2009 revealed that 70–80% of the working generation (aged 20–59 years) were not sufficiently active (i.e., were exercising less than 30 min twice a week) [15].

Usually, universities annually allocate funds for the development and/or maintenance of sport facilities to fulfill students' needs and encourage sport participation of the university community. Particularly, in Japan universities, there are active and viable sport clubs however, participation in such clubs required high level of commitments, hard work, obedience, tolerance and selfless devotion. Student life of participants revolves primarily around membership, which indirectly discourages students who intend to participate solely for recreational purpose.

Sports clubs in Japan universities are military in nature because of the strict rules of the club. For example, new club recruits are required to do jobs such as cleaning, maintenance of sport equipment and facilities before and after practice sessions/day [16]. For foreign students in a relatively conservative city like Sendai, who readily have language barrier to contend with, adjusting to these customs could be challenging and discourage sport participation. More also, students without club engagement tend to engage or prefer to engage in part-time job prioritizing economic reason(s) of such engagement to health benefits inherent in sport participation. Comparatively, there are also limited studies on psychological factors predicting sport participation among university students. It is on this premise this study aims to investigate psychological factors as predictor of sport participation among Japanese and foreign students in Sendai, Japan.

2. Review of related literature

Sport participation has been shown to be associated with many psychological and social benefits, beyond that derived from physical activity, including improvements to self-control and emotional regulation [6]. These distinct benefits are perhaps due to unique characteristics of sport participation, compared with other forms of physical activity [17]. Variables such as gender, age, time available to participate and motivational factors such as fun, slimness, fitness and competition have shown to increase participation [18]. Sport participation was positively related to self-assessments of physical appearance and physical competence, physical self-esteem and general self-esteem [19]. Athletes whose behavior suggested stronger psychological connections to sport engaged more in terms of frequency, depth and breadth of sport-related behaviors [20]. Organized sports activities may somewhat contribute to healthy body mass index (BMI) and while healthy BMI can lead to increased participation in organized sports, it is also possible that increased participation in physical activity can lead to healthy BMI [21]. However, all forms of physical activity can provide health benefits if undertaken regularly and is of sufficient duration and intensity [1].

Self-confidence is one of the most related variables to sport performance [22]. It has also been shown to influence behaviors, attitudes, and sporting attainment [23]. Self-confidence is simply defined to be a self-perceived measure of one's belief in one's own abilities which is dependent upon contextual background and setting [24]. It is one's belief in his courage, power and ability to take action using his own abilities as a source for his values and purposes. Self-confidence was also conceptualized as self-efficacy. Self-confidence involves people's belief to control themselves and their environment; a perceived ability that provides the possibility that athletes use their emotion appropriately to achieve sports aim [25]. Self-confidence is important in sportive performances as it affects performance positively especially in good feelings, behaviors, fast planning in competitions, undoubtedly giving the right decision in performance increase and in continuation of the competition [26]. Self-efficacy or confidence affects the choice of activities, effort expenditure, persistence in a given activity, and vulnerability to stress and depression [25].

Sport confidence influences performance through its effect on how athletes think about, feel about, and respond to everything that happens to them in sport [27]. Self-confidence is a judgment of one's ability to perform at a certain level, whereas perceived success pertains to one's judgment of the likely consequences of such a performance and or expected performance attainments [27]. This requires a detailed assessment of the level, strength, and generality of perceived self-confidence. Individuals who perceive themselves to be competent in sports

should be more likely to participate, while those low in perceived physical competence should be more likely not to participate or to discontinue participation [28]. Challenges to identity such as having to show others an unfit body, lacking confidence and competence in core skills or appearing overly masculine were barriers to participation [29].

Young athletes who perceive themselves to be highly competent in a sport, who are oriented toward mastery in sport, and who identify themselves as primarily responsible for their performance persist longer at the sport and maintain interest in mastering the skills. In contrast, those who perceive themselves to have low competence in sport, who are oriented toward extrinsic mastery, and who believe that others are responsible for their performance do not maintain task performance and interest [28]. Physical benefits, weight control, independence and social, mental and emotional benefits as the main internal motivators [30]. Self-perception is incredibly important in motivating people to participate in all types of sport and physical activity [29]. The relationship between self-confidence and performance is likely to be somewhat different depending on the performer's perception of the level of self-confidence he/she needs in order to perform the task successfully [31].

The influence that performance experiences/familiarity have on perceived success depends on the perceived difficulty of the task, the effort expended, the amount of physical guidance received, and the temporal patterns of success and failure. Task familiarity can also be obtained through observing or imagining others engaging in a task that observers themselves have never performed. Their influence on self-efficacy can be enhanced by a number of factors. Variables such as previous performance, affective self-evaluation, goal setting, and physiological states (mood or fitness) may exert a direct influence on sport performance [32]. Specifically, past experience plays a vital role with regard to participation in sport at university level [33].

Values are principles or standards considered worthwhile or desirable. They help people select and evaluate behavior, define goals, and set standards for acceptable behavior [34]. Personal values represent criteria by which people choose and assess subsequent actions, and apply to individual decision-making in virtually all compartments of our lives. Although research in mainstream psychology has attended to the concept of personal values and the role values play in resulting behaviors for over half a century, the lack of attention devoted to values and sport participation is surprising [35]. There is need to understand values associated with sport participation [34]. This is essential because variety of social, cultural and biological factors influence men and women's decision to participate in sports [12]. For example, there is a negative impact of migration background on all sport participation [36]. Consequently, with such findings, one can possibly assume that culture, national traditions and values not only play a vital role on sports participation within a country but also when comparisons are made between different countries [12].

3. Methodology

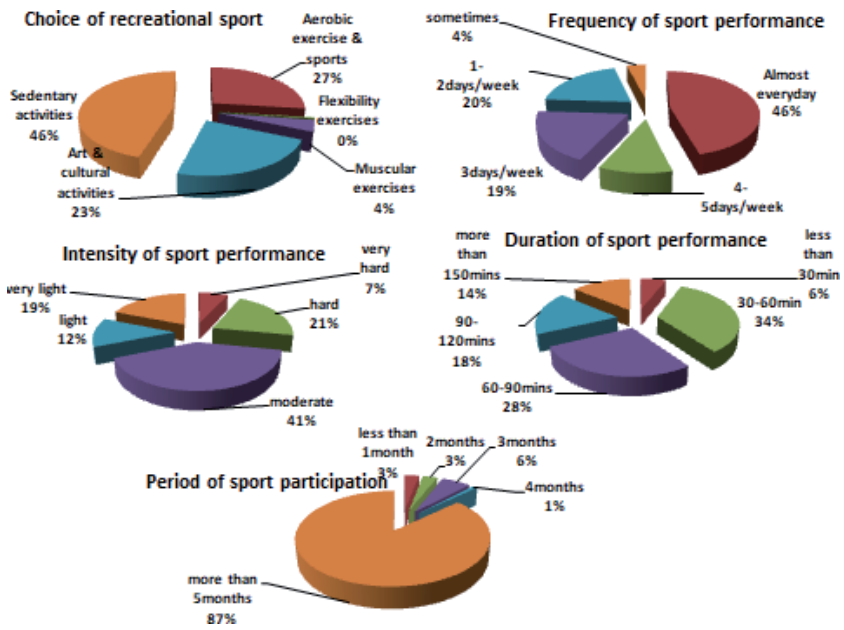
The descriptive research design was used in this study. The study population comprises of all students of tertiary institutions in Sendai. The sample for this study was two hundred and thirty-six (236) Japanese and foreign university students. Convenience sampling technique was used to select 44 foreign students who participated in the Tohoku University Foreign Student Association (TUFSA) soccer competitions prior to the declaration of state of emergency while a simple random sampling technique was used to select 192 Japanese students in Miyagi University of Education (MUE). The instrument for this study was a self-developed and modified

questionnaire structured in line with the variables of this study and translated both in English and Japanese languages. For sport participation, Min-Haeng Cho five-item physical activity questionnaire was adapted [37]. Each item has a 5-point Likert-scale. While psychological factors are self-developed items which include four subscale of self-confidence, perceived success, task familiarity and values were in a 4-point likert-scale format. Data was analyzed using descriptive statistics of frequency counts, percentages and pie charts.

4. Data presentation, analysis and discussion of findings

This part presents, analyzes and discusses findings on the psychological factors as predictor of sport participation among Japanese and foreign students in Sendai.

4.1 Sport participation of respondents



The results from the pie chart above showed 46% of the respondents engaged in sedentary activities such as sport spectator, watching movies and television, 27% engaged in aerobic exercises and sports (running, cycling, swimming, jogging aerobics and ball games), 23% engaged in arts and cultural activities (reading, writing, playing cards, dance and music, painting), 4% in muscular exercise (weight training and lifting) and 0.4% engage in flexibility exercises (stretching, yoga, pilates, calisthenics). Chart on frequency of sport participation revealed 46% participated in their choice of sport almost every day, while 20% 1–2 days/week, 19% 3 days/week, 11% 4-5 days/week and 4% sometimes. On intensity of sport performance, 41% reported moderate, 21% hard, 19%very light, 12% light and 7% very hard. Duration of sport performance by respondents range from 30 to 60 minutes at 34%, 60-90 minutes 28%, 90-120 minutes 18%, more than 150 minutes 14% and less than 30 minutes 6%. Period of sport participation by respondents revealed 87% have been performing the activity for more than 5 months, while 6% for 3 months, 3% for 2 months and less than 1 month, and 1% 4 months. This result indicates that the common choice of recreational sport participation among respondents

is sedentary activities with a high level of performance in terms of frequency, intensity and duration, and long period of participation. This finding is consistent several studies that revealed decreased sport participation and increase in sedentary activities among adults including university students [1, 12, 13].

4.2 Psychological predictors of sport participation

The results from **Table 1** above showed that 70% of the total respondents agree that self-confidence in choice of sport predicts participation while 30% disagree. Out of this, 58.5% Miyagi University of Education students agree and 41.5% disagree; and 81% of foreign students agree and 19% disagree. This implies that self-confidence significantly predicts sport participation among respondents especially among foreign students. This agrees with similar studies [25, 27, 38, 39]. For example, a study reported that self-confidence differs from athlete to athlete and event to event and that past experience, mastery in skills and the social support increases the self confidence in sports man [38]. Self-confidence plays a significant role in the success of athletes a such mental training and practicing programs should be included along with physical and skills practices on the agenda of sport coaches to create the degree of self-confidence necessary for peak performance [39].

Table 2 revealed that 47% of total respondents agree that perceived success predicts sport participation while 53% disagree. Out of this, 32.5%, 67.5% of Miyagi University of Education students and 61.4%, 38.6% of foreign students agree and disagree respectively. The result indicates that while perceived success does not significantly predict sport participation among Japanese students, it significantly predicts sport participation among foreign students. Performance is likely to be somewhat different depending on the performer's perception of the level of self-confidence he/she needs in order to perform the task successfully [31].

Table 3 showed that 74.5% of the total respondents agree that task familiarity predicts sport participation while 25.5% disagree. Out of this, 63.7% Miyagi University of Education students agree and 36.3% disagree; and 85% of foreign students agree and 15% disagree. This revealed that task familiarity significantly predicts sport participation among respondents. This result concurred other findings that the past experience plays a vital role in sport participation even in the university [33, 38].

Table 4 showed that 72% of the total respondents agree that value predicts sport participation while 28% disagree. Out of this, 71% Miyagi University of Education students agree and 29% disagree; and 73% of foreign students agree and 27% disagree. This implies that psychological factor of value significantly predicts

Self-confidence	**Agree**		**Disagree**		**100%**
	70%	MUE 58.5%	30%	MUE 41.5%	
		FS 81%		FS 19%	

Table 1.
Self-confidence and sport participation among Japanese and foreign students.

Perceived Success	**Agree**		**Disagree**		**100%**
	47%	MUE 32.5%	53%	MUE 67.5%	
		FS 61.4%		FS 38.6%	

Table 2.
Perceived success and sport participation among Japanese and foreign students.

Task Familiarity	Agree		Disagree		100%
	74.5%	MUE 63.7%	25.5%	MUE 36.3%	
		FS 85%		FS 15%	

Table 3.
Task familiarity and sport participation among Japanese and foreign students.

Value	Agree		Disagree		100%
	72%	MUE 71%	28%	MUE 29%	
		FS 73%		FS 27%	

Table 4.
Value and sport participation among Japanese and foreign students.

sport participation among respondents. Similar study also emphasized the need to understand values associated with sport participation [34].

The observed difference particularly in the psychological factors of self-confidence, perceived success and task familiarity and sport participation between Japanese and foreign students could be indicative that foreign students are more conscious and anxious of others perception or judgment of their sporting skills/ability due to variations in socio-cultural backgrounds.

5. Discussion

Studies have shown psychological indices including perceived competence, self-efficacy, attitude, enjoyment, body image, self-esteem, beliefs influence students sport participation [40–42]. Thomas et al. [43] highlighted three barriers including intrapersonal (stress and perceived self-skill), interpersonal (lack of friends and peer influence), and structural (homework, class schedule, and overcrowded facilities) barriers to sport engagement among Canadian university students. Beliefs i.e. enjoyable, time consuming, friends, and family members predicted intention and behavior in sport participation [44]. Lack of confidence in performing a skill, low perceived competent and the need to feel worthy leads to withdrawal in sport [45]. Determination of the motivations that are active in sport participation increase individual participation [46]. In a survey of 1350 university students in southwestern Nigeria [47] identified the positive effects of love for sport, famous athletes as role model and family support in sport participation and stressed the need to adopt tangible and intangible motivating measures to encourage continuous participation. Time is a major reason why students do not involve in sports [48, 49]. Because student lifestyles including balancing academic life with paid work, volunteering and social activities all compete with sport participation [50]. However, [51] opined that lack of willpower could be the main reason behind lack of time. A study of college and university students sport participation in China revealed that individual preferences and economic factors influence participation [52]. Multivariate analysis revealed that the number of hours in student part-time work has a strong negative effect on sport participation [53]. Kerry [49] established that that increase in tuition fee had an impact on sports participation and consequently suggested that universities should device a means to address cost and time. In addition, ethnicity, gender, as well as religiosity, should be taken into consideration when offering sport programmes [54]. A three-year national survey report in England revealed that Black and Asian students are less likely to participate in sport [55]. Values, task

familiarity, perceived success and self-confidence are majorly reflective of barriers and concerns predicting sport participation among students. Peer encouragement could help check and overcome these concerns [50].

6. Conclusion

Based on the findings, it is concluded that psychological factors of self-confidence, perceived success, task familiarity and value significantly predict sport participation among Japanese and foreign students in Sendai. More also, there is a low level of sport participation among Japanese and foreign students in Sendai. Therefore, it is recommended that stakeholders in sports and health within the university such as physical and health, and medical science departments and university health center should collaborate more effectively for advocacy to increase awareness on benefit of sport participation and development of attractive recreational sports considering the psychological process that leads to participation. There should also be an improved reconciliation between academic and physical education programs. To allay concerns during pandemic, non-contact and outdoor sports should be encouraged with adequate preventive measures in place.

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Conflict of interest

The authors declare no conflict of interest.

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Chapter 6

Sport Practice Motives of Brazilian Pupil-Athletes

Guilherme Alves Grubertt and Helio Serassuelo Junior

Abstract

Some surveys have pointed out that only a portion of young people practice sports with some regularity, and that of those who start sport practice, there is a high rate of abandonment. In this sense, experts indicate that understanding the motives that lead to sport practice could be an important way to understand this phenomenon, especially for young ages. The expectation is that this publication can provide important information on motivational indicators related to sports practice in young ages, which may contribute significantly to the expansion of new knowledge in the area, offering a new option to aid future studies on the theme, in addition to assisting in intervention actions in the school context and in the scope of exercise and sport. Thus, the present chapter aims to present conceptual approaches that support research involving sports practice motivation in young ages. In addition, the study brings data from one of the largest investigations of sport practice motives of Brazilian pupil-athletes.

Keywords: Motivation, adolescent, school sport

1. Introduction

When any Brazilian child or adolescent is asked why they practice sports, it is common to hear: "Because I want to be a rich and famous player"; "Because my parents want me to practice sport"; or "Because I like to play with my friends". Although there are obviously other reasons, taken together these certify that sport is one of the most evident phenomena of modern society. Introduced as an extracurricular aspect, school sport enables motivation of students in the academic context, helping in the acquisition of habits of study, aiming at a healthy lifestyle and a harmonious structure in school and athletic life.

The study of what leads people to practice physical activity and sport started in the late 1970s, and is considered a fundamental area of sport psychology [1]. Currently, new perspectives for physical activity and sport, such as adherence, prevalence, continuity, physical and mental well-being, among other themes, justify the importance of the study of motivation [2].

In an epistemological context, motive comes from the Latin word *motivus*, while motivation is derived from *motus*, a verb conjugated in the past participle of *movere,* which depicts the idea of movement. Therefore, motives would be purposes that compel the individual to act in a certain way, whereas motivation is associated with the stimuli and feelings that lead someone to practice the selected actions to achieve a certain goal. Motives are directional elements of the behavior in question, that is, a relevant approach of motivation, but not motivation itself [2].

In the sports psychology scenario, the most accepted direction by experts is the interactional model of motivation for sports [3]. According to this theoretical model, motivation for sports is subordinated to an interaction between personality (personal factors) and environmental factors (situational factors) [3]. The components of personal factors are represented by personality, needs, interests, and goals. On the other hand, the elements of situational factors are related to style of technical leadership, attractiveness of facilities, and history of victories and defeats of the team. The importance of personal and situational factors can be changed throughout life according to current needs and opportunities [3].

In general, motivation is basically analyzed through a combination of theories. From this perspective, more than 30 options of motivation theories are found in the literature that seek to explain the guiding principles that govern the motivational profile that someone can present to adhere and/or remain in a specific activity [4]. In short, theories are based on a spectrum ranging from models that assign the individual a mechanistic position, such as a passive being subject to the influence of environment, to models with a cognitive-social approach that highlights the active role of the individual as an agent [4]. However, there are still two motivation theories considered in the theoretical framework for the study of motivational factors for sports practice: achievement goal theory [5] and self-determination theory [6]. Both theories have been used to gain a more detailed understanding of motivational factors in the context of physical education and sport.

Originally developed for the school context, achievement goal theory is based on subjective interpretation of success, being applied in two perspectives called task orientation and ego orientation. From the perspective of task orientation, a tendency to define and interpret success and competence is referenced by the individual himself. On the other hand, ego orientation assumes that competence and success of the individual are linked to performance, aimed at a demonstration of superior capacity.

Self-determination theory is an organicist approach of motivation, it enhances the interaction between a person and environment, seeking the evolution of internal personal resources for the development of personality and behavioral self-regulation [6]. According to this theory, motivation is categorized as intrinsic, extrinsic, and amotivation [6]. These different types of motivation are organized as a continuum, where the level of autonomy decreases when directed from amotivation towards intrinsic motivation.

It is important to note that the state of the art in sport psychology in Brazil is considered an emerging area. In reference [7], the prevalence of investigations on motivation was highlighted at Brazilian scientific conferences between 2010 and 2012, with most of these studies come from Physical Education. In addition, there is growing concern about participation in the sports context, as sports practice has been identified as an important element in the education and socialization of children and adolescents [8].

In this sense, the student-athlete is primarily inserted in a sport training activity related to different levels of competitiveness (local, regional, national, and international) projecting a possible professionalization or just development of biopsychosocial aspects; concomitantly, the student-athlete develops their schooling. This dual career must be characterized by a successful combination of education, training, or work with sport, which allows the individual to reach their full potential in life. In addition, dual career management composes policy guidelines for schooling and sports systems in some countries in Asia, the USA, Canada, and Australia [9].

Due to the content of this chapter, it is necessary to clarify the definition of some concepts. For example, student-athlete is an athlete recognized by an elite sport organization and registered as a student in a higher education institution. A pupil-athlete is an athlete recognized by an elite sport organization and registered

as a pupil in secondary education institution [10]. The information presented in this chapter is related to this population: pupil-athletes.

Unlike some European and Asian countries, in Brazil, there is a lack of studies involving aspects related to pupil-athletes. The term pupil-athlete can be characterized by two social attributions linked to the individual themself. These attributions involve two fields: school and sport. Both demand attitudes and behaviors recognized by each of the institutions they represent (schools and clubs). The union of these fields results in the intersection of two scenarios that have a common goal: the possibilities for a promising future, since the development of the young person as a citizen and future professional is directly associated with the support provided by these two scenarios [11].

Undoubtedly, it is necessary to understand the cultural proportions when it comes to investment in education and sport at various levels. For example, if we think of a dual career as a management process, in the European context, it is possible to understand the intrinsic reasons that eventually lead the pupil-athlete to prioritize school education. On the other hand, in the Brazilian scenario, the school education opportunities are uneven. Thus, investment in a sports career can be considered a unique opportunity for those who see no future for a successful school career and/or who have a recognized talent for sport.

Generally, physical activity for children starts in the school environment, characterized not only by practical physical education classes, where playful aspects are emphasized, but also by organized and systematic sports practice. For most children, sports practice reaches its peak at approximately 12 years of age [12]. In this perspective, it is highlighted that a contingent of 67.3% of young Brazilians play sports or declare themselves to be practicing physical activity [13]. However, some international surveys have pointed out that only a portion of children and adolescents practice sports with some regularity, and among those who start sports, there is a high drop-out rate [14–16]. A very important problem for professionals working with the issue of sports participation in young ages is understanding the reasons that lead children and adolescents to participate in sports [17].

In this sense, experts point out that these reasons could be considered as relevant aspects to start the practice of sports, to explain permanence in the sport, and to reduce the cases of drop-out, since they are determined as key to controlling human behavior [15, 18]. Furthermore, identifying and measuring the size of the reasons for sport practice at young ages could offer the best possible environment for pupil-athletes to enhance their experiences, i.e., a favorable motivational climate [19]. As the main hypothesis of the study, it is expected that the pupil-athletes evaluated value the motivational aspects related to physical fitness, due to the benefits of sport practice for health and well-being, especially in children and adolescents, which have been widely described in the scientific literature [20, 21]. Thus, the objective of this Brazilian investigation was to identify the reasons for the sports practice of pupil-athletes in different sports according to sex, age, and training time.

2. Research characteristics

For the preparation of the study, a database was used, which was supported by the cross-sectional research project entitled "Physical abilities of young people practicing different sports: relationship between psychosocial dimensions and somatic maturation". This project was approved by the Research Ethics Committee of the State University of Londrina in accordance with the norms of Resolution 196/96 of the National Health Council on research involving human beings report no. CEP/UEL 007/2014. In view of the objectives established for the study, a comparative associative strategy was used, with a cross-sectional design.

The reference population for the study was pupil-athletes who were part of the final phase of the Paraná School Games 2017, phases A (15 to 17 years of age) and B (up to 14 years of age). According to the Sports Department of the State of Paraná, 6000 pupil-athletes participated in this stage of the games. For the selection of the sample, the casual non-probabilistic method was used. Those responsible for the athletes were informed about the nature, objectives, and procedures of the study and signed a Free and Informed Consent Form allowing the pupil-athletes to participate in the research. Through ratification of the free and informed consent term, 2014 pupil-athletes (1050 girls and 964 boys) agreed to participate in the present study.

The data related to the reasons for the practice of sports were obtained through the application of the PMQ instrument (Participation Motivation Questionnaire). Originally designed in English [22], and subsequently validated, translated, and adapted for use in young Brazilian athletes [23], the PMQ is the most prominent instrument in the area and is composed of 30 questions equivalent to the list of possible reasons that could lead athletes to practice sports, grouped into eight reasons for practicing sports: (a) social recognition; (b) group activity; (c) physical fitness; (d) emotion; (e) competition; (f) technical competence; (g) affiliation; and (h) fun. To complete the questionnaire, the respondent indicates the degree of importance that most applies to their sport practice, using a five-point Likert scale (1 = "not important" to 5 = "very important").

The PMQ instrument translated and adapted to the Portuguese language achieved good psychometric performance compared to the sample of the present study, presenting high Cronbach's alpha coefficients calculated for the generated motivation factors. The confirmatory factor analysis with Varimax rotation enabled the generation of eight motivating factors that, together, can explain the proportion of variance by close to 67%. The factorial solution generated was similar to the original [22] and most of the published studies using the same experimental design. The participants also answered a document with general questions, such as: age, sex, sport they practice, training time, date of the assessment, date of birth, name of the school where they study, and city where they live.

The instrument was applied individually to each pupil-athlete by a team of researchers at the athlete community center (resting place available for athletes during competition days), in a room with tables and chairs provided by the Paraná Sports Department, in order to avoid situations of pre- or post-competition stress. This place is in a different area from the location where the games took place. The researcher submitted the questionnaire to each pupil-athlete, together with verbal instructions for completing the questionnaire correctly. Any doubts expressed by the athlete were answered by the researcher responsible for the delivery of the questionnaire, in such a way as to leave no more doubts about how to complete the questionnaire.

3. Results and discussion

The characteristics of the pupil-athletes with respect to the phase of the competition in which they participated, as well as age (age groups were created for the analyses; G1, G2, and G3), training time, and other information are described in **Table 1**. The final categorization was performed according to practice of the game and category, subdivided into team and individual sports. Individual sports evaluated were athletics, badminton, cycling, rhythmic gymnastics, judo, Olympic wrestling, swimming, shuttlecock, skateboarding, taekwondo, table tennis, and chess. Team sports evaluated were basketball, soccer, futsal, handball, volleyball, and beach volleyball.

Within the individual sports, a high proportion of athletics (15.2%) was observed, followed by chess (7.5%), judo (2.8%), beach volleyball (2.3%), table

tennis (2.2%), and badminton (2.2%), respectively. For team sports, the highest proportion was futsal (18.3%), followed by volleyball (17.8%), handball (16.9%), and basketball (11.3%), respectively.

Information regarding the reasons for sports practice of the pupil-athletes is described in **Figure 1**. The greatest importance was placed on the Technical Competence dimension (4.40 ± 0.70), followed by the Competition dimension (4.26 ± 0.88). The Physical Fitness dimension was next in the sequence of reasons for the practice of sports, to which the pupil-athletes assigned a great degree of importance (4.05 ± 0.92). For the presentation of the next results, it is important to emphasize the categorization performed for the age groups of the participants of this study. **Figure 2A** shows the reasons for the sports practice of pupil-athletes between 10-12 years of age and their comparisons. In the same way, **Figure 2B** identifies the results

		GIRLS (n = 1050)	BOYS (n = 964)	ALL (n = 2014)
PHASE	A	405 (38.6%)	459 (47.6%)	864 (42.9%)
	B	645 (61.4%)	505 (52.4%)	1150 (57.1%)
AGE	(G1) 10-12 years	170 (16.2%)	100 (10.4%)	270 (13.4%)
	(G2) 13-14 years	671 (63.9%)	539 (55.9%)	1210 (60.1%)
	(G3) 15-17 years	209 (19.9%)	325 (33.7%)	534 (26.5%)
TRAINING TIME	≤ 2 years	412 (39.2%)	409 (42.4%)	821 (40.8%)
	3-4 years	327 (31.1%)	250 (25.9%)	577 (28.6%)
	5-6 years	205 (19.5%)	148 (15.4%)	353 (17.5%)
	≥ 7 years	106 (10.1%)	157 (16.3%)	263 (13.1%)
SPORTS	INDIVIDUAL	204 (19.4%)	250 (25.9%)	454 (22.5%)
	TEAM	846 (80.6%)	714 (74.1%)	1560 (77.5%)

Table 1.
General characteristics of the student-athletes analyzed in the study.

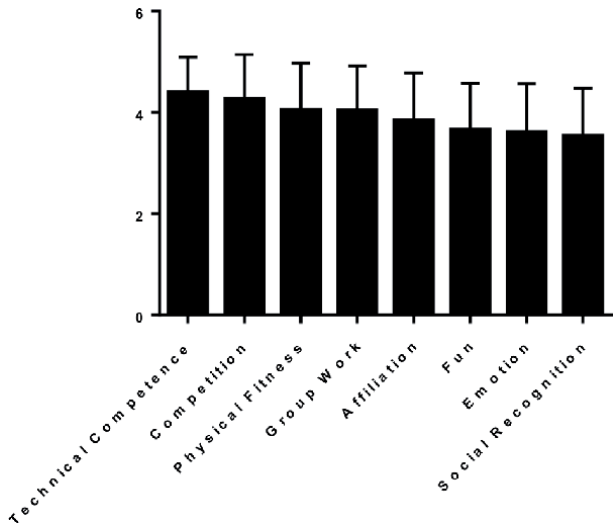

Figure 1.
Sports practice motives of the student-athletes.

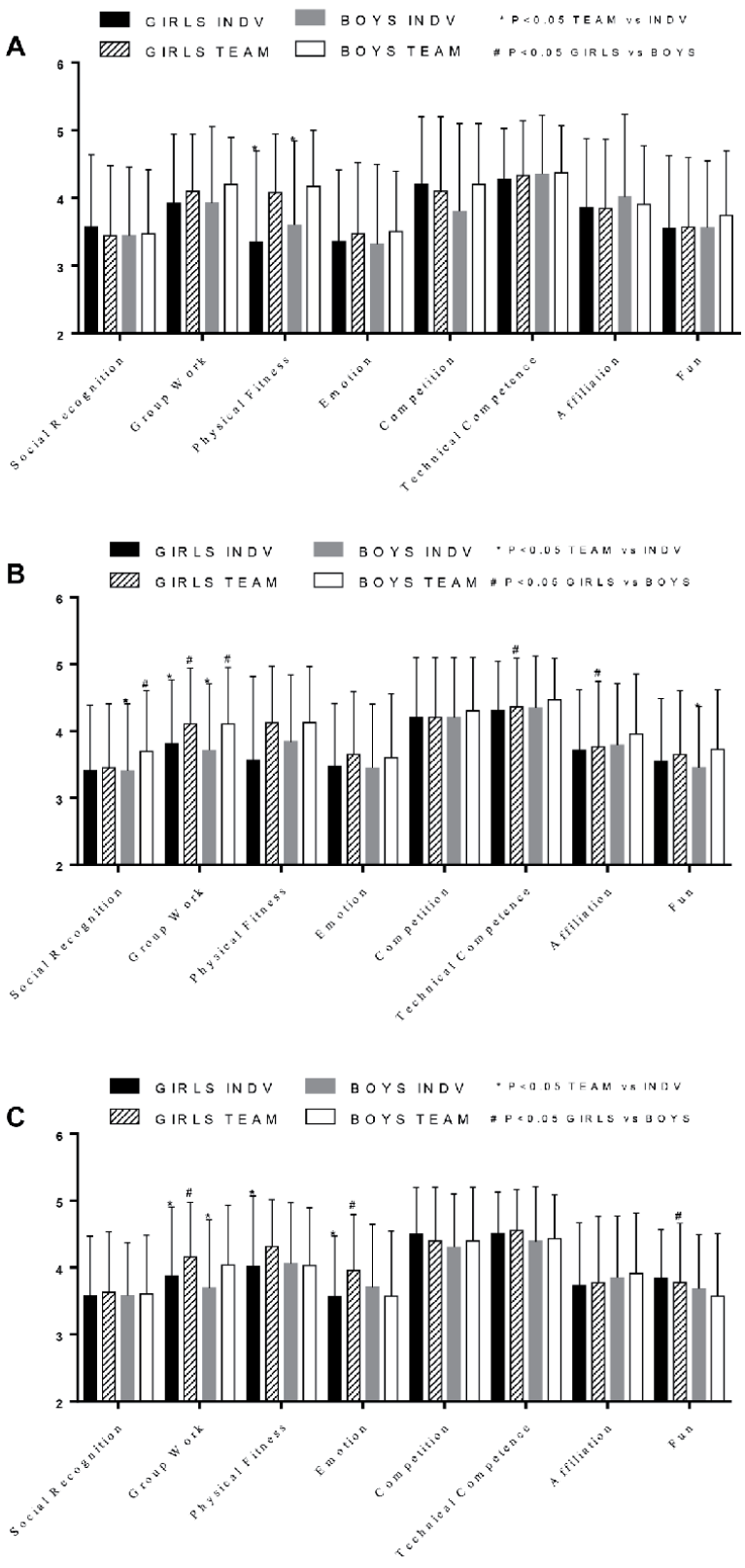

Figure 2.
Sports practice motives of the student-athletes aged 10-12 years (A), 13-14 years (B), 15-17 years (C).

of pupil-athletes between 13-14 years of age and, finally, **Figure 2C** presents the data pupil-athletes between 15-17 years of age.

The only significant difference found in **Figure 2A** was in relation to the Physical Fitness dimension in both sexes when comparing the individual and team sports. The younger pupil-athletes, who participated in the individual sports, attributed a lower degree of importance (3.37 ± 1.35) to the question of maintaining fitness or being in good physical condition.

The Social Relationship dimension showed a significant difference for boys compared to girls (**Figure 2B**), since boys ascribed a higher degree of importance (3.69 ± 0.91). In addition, the dimensions Group Activity (4.11 ± 0.83), Technical Competence (4.47 ± 0.62), and Affiliation (3.95 ± 0.90) presented a significant difference for boys when compared to girls. The data on the comparison between the individual and team sports were significantly smaller for boys practicing individual sports (**Figure 2B**) for the dimensions Social Recognition (3.40 ± 1.01), Group Activity (3.71 ± 0.99), and Fun (3.46 ± 0.91). Still in this outcome, however, for the most experienced pupil-athletes (**Figure 2C**), significantly smaller data were found for boys in the Group Activity dimension (3.69 ± 1.02). With reference to girls in this comparison, Physical Fitness (4.02 ± 1.05) and Emotion (3.57 ± 0.91) presented significantly lower values.

Another significant difference between the sexes was identified in the Social Recognition dimension (3.69 ± 0.91), where the boys attributed more importance than the girls to this dimension (**Figure 2B**). For the dimensions Technical Competence (4.36 ± 0.73) and Affiliation (3.76 ± 0.98), the girls participating in team sports declared less significant importance when compared to boys (**Figure 2B**). Girls who participated in team sports had a significantly higher result than boys of the same category (**Figure 2C**), especially for Group Activity (4.16 ± 0.82), Emotion (3.96 ± 0.84), and Fun (3.78 ± 0.88). Likewise, girls who participated in individual sports had higher scores than boys in the same category (**Figure 2C**) for the Group Activity dimension (3.88 ± 1.03).

The final analysis of the results is unique up to the present moment in research related to motives for sports practice and, specifically, for this instrument. To complete the questionnaire, the respondent indicates the degree of importance that best applies to their sport practice, using a five-point Likert scale (1 = "not important" to 5 = "very important"). Therefore, the frequency of responses greater than or equal to 4 on the five-point Likert scale was analyzed according to divisions between boys and girls, individual and team sports, 10-12 years, 13-14 years, and 15-17 years of age (**Table 2**). Thus, the highest percentage of most positive responses was for Technical Competency for boys between 10-12 years of age (81.8%) and female athletes of team sports between 15-17 years of age (79.9%).

Firstly, it is important to note that none of the studies analyzed and used for the discussion of this work mention the term pupil-athlete, that is, a large part of the research performed for the purpose of establishing the reasons for sports practice is carried out with young people already included in the systematized practice of training. In Brazil, despite the limited literature on this theme, the young person who is distinctive in the sport begins their sports career in school, through school games or championships.

When analyzing the results of the present study with pupil-athletes, it is notable that the reasons for the practice of sport in pupil-athletes, in general, are similar to some other studies, which also obtained results showing that the dimensions Competition and/or Technical Competence are the most important for the practice of sports [24–26]. This finding should not be seen as unusual, since it is totally understandable that this population has a preference for reasons that are associated with success in the sporting context. This intensified search for success in sports can

DIMENSIONS	&	10-12 years		13-14 years		15-17 years	
	%	IND	TEAM	IND	TEAM	IND	TEAM
Social Recognition	GIRLS	39.4%	33.6%	30.6%	29.3%	32.0%	36.5%
	BOYS	27.3%	32.1%	30.6%	39.7%	31.6%	34.6%
Group Work	GIRLS	54.5%	57.7%	40.5%	57.6%	46.0%	60.4%
	BOYS	63.6%	52.6%	43.2%	55.8%	38.5%	53.4%
Physical Fitness	GIRLS	36.4%	54.0%	42.1%	60.4%	60.0%	62.9%
	BOYS	45.5%	61.5%	45.9%	58.4%	55.6%	55.3%
Emotion	GIRLS	27.3%	32.1%	24.8%	32.0%	26.0%	48.4%
	BOYS	22.7%	25.6%	25.2%	31.5%	36.8%	30.3%
Competition	GIRLS	57.6%	57.7%	59.5%	57.5%	70.0%	66.7%
	BOYS	45.5%	55.1%	54.1%	60.5%	62.4%	64.9%
Technical Competence	GIRLS	66.7%	67.9%	60.3%	70.2%	76.0%	79.9%
	BOYS	81.8%	70.5%	69.4%	72.0%	76.9%	73.1%
Affiliation	GIRLS	42.4%	47.4%	37.2%	39.6%	34.0%	43.4%
	BOYS	59.1%	44.9%	42.3%	47.0%	41.0%	47.1%
Fun	GIRLS	39.4%	34.3%	33.1%	34.9%	36.0%	44.0%
	BOYS	31.8%	39.7%	23.4%	36.7%	30.8%	31.3%

Table 2.
Frequency of responses greater than or equal to 4 on the five-point Likert-type scale between boys and girls, individual and team sports, 10-12 years, 13-14 years, and 15-17 years of age.

give meaning to the lives of children and adolescents, both as pupils and as athletes, as there is a significant index of pupil-athletes who become socially known for their potential in sports and attract interest from talent scouts in the sports field [24]. Thus, it is possible that many students will ascend economically via competitive sport. For the pupil-athletes themselves and their caregivers, this outcome has a directly proportional relationship with the school sports system [27].

Likewise, reference [26] demonstrates that aspects related to perception of success, winning, being good in a sport, or only gaining approval from parents, are important motivating factors for adolescents to join sports practice. Since the study associates the reasons for the practice of sports and physical activity, the authors believe that from the aforementioned motivating factors it is possible to direct intervention projects aiming at a large scale increase in the level of physical activity of adolescents.

In addition, it also disregards the result of the most important reasons for the practice of sports being related to the search for improvement and maintenance of technical skills. Some investigations [25] direct attention to the dimensions that were pointed out with a lesser value of importance in this study: Affiliation and Emotion. There are hypotheses that these dimensions associated with intrinsic motivation could be responsible for the decision to practice a sport modality [28].

For example, one of the reasons that may explain the result of the present study is the possible ambition of pupil-athletes to become professional athletes in the future, making the systematized practice of training an important opportunity for students seeking social and financial ascension. This fact may change the school environment related to intrinsic (learning-oriented) motivation into an environment linked to the view that the sole purpose of sport is elevation of the social status of the victors and the search for social recognition and prizes (extrinsic rewards).

Some authors argue that the intrinsic motivation for the practice of sports is strongly associated with issues related to quality of life and health, confirming a relevant factor for the accomplishment of activities [28–30]. Moreover, they affirm that the dissemination of the practice of sport as a health promoting agent, optimizing quality of life, contributes to greater appreciation of the Physical Fitness dimension. In reference [29], young people usually care about health and seek a healthy lifestyle to acquire or maintain health and strength and develop better physical conditioning, as well as being concerned about the aesthetic issue.

In relation to the comparison of the reasons for the practice of sport among girls and boys, a contradictory result was identified regarding the scientific literature. In the present study, the boys valued the Social Relationship dimension more than the girls. This result is in contrast to another research [31, 32]. That is, for this result to be possible there is a paradigm shift in the reasons for the practice of sport between girls and boys, even if this tendency is analyzed empirically.

Another counterpoint observed in this study compared to the literature was the number of girls and boys participating in sports competitions, as the number of girls participating in this study, and consequently sporting competitions (n = 1050) was higher than the number of boys (n = 964). In reference [32] boys are more likely to have more consistent motivational factors than girls. However, the authors point out that the existing theories provide divergent perspectives on the possibility of variation in the reasons for sports practice based on the participants' sex.

The comparison between the reasons for the practice of sports and the age range of the pupil-athletes presents the Emotion dimension as more valued when compared between the phases of the competition. That is, significant differences were found in student-aged athletes. These results contradict the outcomes of other studies [25, 33].

In reference [34], younger age pupil-athletes value, to a considerably greater degree, the reasons for the practice of sports related to fun, recreation, and playfulness, and later these reasons will give rise to factors related to competition and acquisition of technical skills. This finding may be a result of the impact of socialization by age group, as, normally, these children and adolescents are situated in the period of maturity, making up the final stage of basic education: high school. It is probable that this impact of socialization is manifested in the reasons for the practice of sport for girls and boys.

Still in relation to age, the literature highlights this factor as being inversely proportional to the level of physical activity, i.e., the level of physical activity tends to decrease with increasing age, especially in the period of adolescence [35, 36]. Although the Competition and Technical Competence dimensions, in general, were the most valued in this study, the fact that pupil-athletes start practicing sports for different reasons and remain in the habit of this practice when older is justified by participation in training and competitions that are organized and systematized [37].

In reference [38], these types of practice are considered more effective for maintaining and even increasing levels of physical activity. That is, regardless of the more valued reasons for the practice of sports by the pupil-athlete, participation in training and competitions makes it possible to raise the level of physical activity of the athlete and, consequently, improve aspects related to health.

In order to provide more theoretical support for the question of the way in which the type of sport can be an important motivator for practice, it is possible to base this vision on a cultural approach. Since high-level athletes from some countries are considered as a reference for the children of these countries, the young people can mirror the attitudes of these high-end athletes, starting with the practice of the same sporting modality as the reference athlete.

Considering the relationship between training time and the phases of the competition, it was possible to contrast some data on the reasons for the practice of sports and age group. In reference [33] pupil-athletes included in younger age groups tend to show more interest in the recreational aspects of the sport, valuing playfulness, and this behavior tends to decrease in pupil-athletes of more advanced ages.

However, this behavior was not reproduced in the present study, since the pupil-athletes located in the group with more than two years of training identified to a greater intensity with social motives and teamwork, team spirit. This finding points to the recognition of the importance of group coexistence by pupil-athletes with more advanced age, as well as identification with their peers and an emphasis on personal relationships in the group in which they are included.

The specialized literature on this subject, identified through the databases selected for review studies [39, 40], confirms the importance of production in this area, evidencing an increase in scientific production. Although the majority of the identified studies present terms such as young athlete or athlete of a young age, scientific productions that address issues related to pupil-athletes are scarce, especially in Brazil.

Another unique characteristic of the present study is the analysis of the frequency of the reasons for sports practice attributed by pupil-athletes using higher values of importance on the Likert scale (frequency of responses greater than or equal to 4 on the five-point Likert scale, which are the maximum values for importance indicated by pupil-athletes). Thus, high importance for the reason Technical Competence was verified for both girls between 10-12 years of age and boys between 15-17 years of age, regardless of the type of sport. This conclusion corroborates with the conclusions of several studies presented in this article [27, 28].

This information on school and sport is considered significant as this study is one of the few that involves issues of psychology and sport in a population with a specific terminology: the pupil-athlete. In addition, there is the possibility of social attributions linked to the two fields associated with this population, sport and school, being strong influencers of the reasons for the practice of physical activity. Although the current study presents a different object of study, reasons for the practice of sport by pupil-athletes, it is worth noting the existence of some limitations that must be considered when analyzing the results.

Even though the number of pupil-athletes evaluated is considerably higher than many studies [40], generalization of the results is still limited, impeding the representativeness of the results to other pupil-athletes, from other states or countries. In addition, the fact that the instrument used is considered self-report, means the possibility of the reasons for practicing sport being overestimated or underestimated should be considered.

The results demonstrate that the pupil-athletes participating in the School Games in Paraná assigned greater importance to aspects related to improvement in technical skills, coping with challenges and exposure to risks, learning new skills, and moving to a higher level. The hypothesis supported by the study for this outcome is the bottleneck that exists in school competitions, where only the best athletes advance to the next stages, and finally, only the best pupil-athletes will reach a national level.

It should be noted that, in Brazil, the number of studies with this specific sample, pupil-athletes, is very limited, added to which, when there are particularities, such as how to identify the reasons for the sports practice of this population, the number of studies at the national level is even scarcer. The strong point of this study is precisely this particularity, since this theme has implications for social importance, where the scientific knowledge produced will contribute to knowledge of the most relevant aspects for the adoption of physical activity and sport practices.

4. Conclusion

The purpose of this chapter was to provide contact with scientific information regarding school-age sport and its characteristics, as well as psychological aspects related to the motives and motivation for sports practice and the peculiarities of the pupil-athlete. In this sense, considering these determinants of sport psychology is fundamental for the design and implementation of appropriate interventions to increase the contingent of physically active young people.

When appropriating concepts linked to the understanding of motivation and its relationship with adherence and abandonment of sport practice in young ages, we believe in the important role of engagement of the social agents that integrate this scenario. Parents, teachers, and coaches significantly influence the motivation for achievement of children and adolescents and can create atmospheres to intensify this achievement and neutralize learned impotence.

In addition, school sport is one of the most effective ways to provide pupil-athletes with attitudes, values, knowledge, and understanding for their participation in society throughout their lives. Based on theoretical models and the research results presented it is possible to develop intervention strategies that support individual needs and differences, in order to enhance the adherence and psychological well-being of pupil-athletes so that they can benefit from an active and healthy lifestyle.

The result of this chapter showed that pupil-athletes assigned greater importance to less self-determined motives. Therefore, these motives are generated by the task and the activity itself, not by the enjoyment that the activity can provide. Interventions in this context should be offered in order to address these motivational demands, providing higher socio-affective quality in training routines, allowing a greater chance to present and future adherence to the sport practice.

Finally, we have pointed out four fundamental observations derived from the theories and results presented in this chapter aiming at this adherence to the practice sport. First, pupil-athletes are motivated by both internal traits and situations. Second, it is important to understand the pupil-athletes' motives to facilitate involvement. Third, develop a structure of different situations to meet the needs of pupil-athletes is also important because it can modify behaviors that affect motivation. Fourth, the social agents involved (parents, teachers, and coaches) play a key role in the motivational environment. Since the motives may change over time, we must continue to monitor the motives for sport practice of pupil-athletes in order to have a consistent effort to promote a good discernment regarding the actions for adherence of the practice sport.

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Chapter 7

Biopsychosocial Characteristics of Elderly Adults of Latin America: Strategies of Physical Activity for the Functional Health

Magdalena Soledad Chavero Torres, Rosa María Cruz-Castruita, Norma Angélica Borbón Castro, Nancy Cristina Banda Sauceda and Oswaldo Ceballos Gurrola

Abstract

This chapter's approach to an emergent reality of the demographic transition related to a new paradigm of the active aging, demands strategies lead to improve a healthy life expectancy, autonomy maintenance and the promotion of changes in healthy behaviors. Information is provided to the professionals of health to evaluate the physical and functional condition of the elderly people, considering the biological, psychological, and social aspects. When moved to practice, results are presented in a study who analyzes the biopsychosocial characteristics of the elderly adults of Monterrey, Mexico. Furthermore, implemented a literature review to promote, maintain and improve the physical, psychological, and social health. In Addition, recommendations are presented to describe physical activity in the elderly adults considering the type of exercise about to perform, its intensity, volume, frequency, materials and how to structure the sessions to make easier its practice and achieve a physical exercise adherence. After all the previous, its recommended as necessary to foment in a higher recognition the importance of the regular physical activity among those who formulate the public politics for the promotion of strategies according to the characteristics and interests of this populational group.

Keywords: elderly adult, biopsychosocial characteristics, strategies, physical activity, health

1. Introduction

Aging is a progressive deterioration natural process that affects to all living beings by years and generates diverse, complex, and uncontrollable biopsychosocial changes [1], those who do not have a lineal end and occasionally are influenced by other person and its direct environment [2]. Although the lack of health is not an aging characteristic nor even of the elderly, the increment of longevity is at par the augmentation of sicknesses associated to elderly [3, 4] that generates more needs and demands of health, who are not only related with the appearance of morbidity

and mortality [5], not also with an habitual polypharmacy, diminution of functional capability [6] and a deteriorated psychosocial health [7] linked with affective disorder and the impairment on quality of life [8]. Joined to this are the psychosocial changes who help to the adoption of new roles and lifestyles in the elderly adult [9], being the interaction of socioeconomical and demographics variables as the lifestyles, the level of instruction and the social support network conformed by the spouse, offspring, related family, and friends the main determinants in the quality of life in the elderly life [10, 11].

In the Latin American context, the demographic changes evidences the accelerated increase of elderly population and the serious challenges this represents for the social and health care systems [12], compared to the European and North American countries where the populational changes are also evident but with a gradual increment and the social and economical conditions, the distribution of education is markedly different among developed countries and developing countries [13]. The high prevalence of chronical ailments joined to factors of psychosocial types that increments the functional compromise and the fragility furthermore to get associated in an independent way with an self-evaluated deficient health in elderly adults that resides in Brazil [14] and Colombia [15], being this last one that the residence zone, genre and the abuse increase the possibility of suffering [16]. The independence in elderly adults who habits in Mexico [17], being the sensorial and cognitive function and the wandering who are related with the 25% of dependency in basic life activities of daily life and the 21% of dependence in instrumental life activities [18]. In a difference with Chile, where the elderly maintains a certain level of physical activity and social participation are functionals and presents lower disability [19]. However, the countries with bigger levels of inequality are Puerto Rico, Argentina, Mexico, Chile, South Africa, and Brazil [20].

As the time passes the diminution of functional capability to do basic and instrumental tasks of daily life, as the role change in the elderly adult it decreases its physical activity levels, in some in a light form but others in almost its totality [21]. Nevertheless, integral promotion of health programs has achieved that trough the prescription of physical exercise, psychological attention and teaching nutrition habits a positive impact on the functional capability and the quality of life of an elderly adult [22–24]. It suggests for this age group mainly physical recreative activities or leisure, as the standout of strolls trough walking or in a bicycle, the practice of recreative games of diverse individual or collective sports, programmed exercises in the daily, familiar, and communitarian activities, as well occupational activities who make part of the working activities or household tasks [25]. Being the motive this chapter has the principal objective to describe the biopsychosocial characteristics of elderly adults in Latin America and the activity strategies to promote, maintain or improve the physical, psychological and social health, in agree with elderly adults characteristics.

2. Biopsychosocial characteristics of elderly adults in Latin America and physical activity strategies for the elderly adult's health

To show a representative context of the biopsychosocial characteristics of the elderly adults in Latin America, first it was been made a descriptive study of elderly adults in Monterrey, Nuevo Leon, Mexico and after it a literature review was made. Then, the process followed for data recollection and after it a comparison with the characteristics of the population of Mexico as the other Latin America.

2.1 Methodology to data recollection related to the biopsychosocial characteristics of the elderly adults

First it was made a descriptive-type study to know functional capacity (upper and lower body strength, aerobic endurance, upper and lower body flexibility and agility, and dynamic balance), psychological status (mental and affective state), personnel characteristics (age, sex, morbidity, schooling, weight, height, and body mass index), and social resources of an elderly [26]. The focus population were comprised by elderly registered at a welfare institution in the Metropolitan Area of Monterrey, Nuevo Leon, Mexico; included in this sample, elderly from both sexes on an apparent good state of health. To calculate the sample, 9.761 elderly registered in the 15 "Casa Club del Adulto Mayor" were considered. The sample size comprised by 353 elderly was calculated using the nQuery Advisor Package, version 4.0 [27], with a maximum acceptable standard error of 5% probability of 95%, estimated sample percentage of.50, and a power of 90%. A stratified random sample was used to select the sample for each stratum (represented by each of eight municipalities), obtaining a sample size of 2–53 to per stratum. The Participant selection was performed using a table of random numbers in Excel, with the whole list of elderly who attended the first meeting as the sample frame.

Participant selection included individuals aged 60 years and older without limitations or medical contraindications about performing light physical activity, formally registered in the Casa Club del Adulto Mayor, and consented to participate in the research and signed the informed consent form. Elderly who showed cognitive deterioration (as reported by the head of the Casa Club); showed physical limitations in performing the SFT; used pacemakers; had a history of congestive heart failure; and had joint pain, chest pain, or vertigo at the time of the interview, angina during exercise, or high blood pressure (160/100 mm/Hg) according to the measurement obtained using the technique described in NOM-030-SSA2–1999 for prevention, treatment, and control on hypertension were excluded.

The biopsychosocial characteristics were evaluated on physical tests and six computerized instruments (general information sheet, MMSE, Yesavage GDS, OARS Scale, Body Composition [record designed for this investigation], and the SFT Battery). Before starting to collect data, the research project was approved by the Ethic in Health Sciences Research Committee of the Universidad Autonoma de Nuevo Leon (Approval no. 19-CEI-01920131218).

Sociodemographic information such as occupation, dependency, ailments, fear of falling, falls in the last year, fractures in the last 2 years, and blood pressure was collected in the general information instrument created for this investigation.

Cognitive state was assessed with the MMSE, it is a screening test that allows the establishment of the elderly cognitive state. This test analyzes temporal and spatial orientation, registration, attention and calculation, recall, language, repetition and comprehension, reading, writing, and drawing. The Spanish language version of the test was validated, with a sensitivity of 80% and specificity of 77.5% [28]. For interpretation of results, the cutoff points considered to be normal from 25 to 30 points, mild deterioration from 20 to 24, moderate deterioration from 16 to 19, and serious deterioration for those with 15 points or fewer [29].

The Yesavage GDS, a 15-question abbreviated version, being a hetero-administered instrument frequently used on an international scale to identify depressive symptoms in the elderly, was applied to measure the affective state [30] and to narrow down depression. It comprised questions with yes/no dichotomy answers. Initially, a self-evaluation scale with 30 questions was designed and validated for Spanish language version, reporting a sensitivity of 84% and specificity of 95%. Later, the authors proposed an abbreviated version with 15 questions (10 positive

and 5 negative). The results were interpreted as normal from 0 to 5 points and the risk for depression from 6 points onward [30].

Social resources were determined with the OARS Scale, which is a multidimensional scale comprising nine closed-ended questions and one open-ended question, frequently used to determine the social status of elderly. It evaluates the family structure, social visits, and availability of persons who can provide help and friendship to elderly. The questionnaire showed in the re-test that 91% of the items were identical after an interval of 5 weeks, and an intra-evaluator dependability test showed 80% of intra-class correlations at 0.8 or more [31]. Anthropometric measurements of weight (kg), height (m), and body mass index [(kg) /height (m2)] were obtained and recorded with calibrated equipment validated for the study.

Physical Functional and capacities were assessed with the SFT Battery, which included the following tests: sitting down and getting up from to chair, with the purpose of assessing to lower body strength, arm flexion, which assesses to upper body strength, 2 minutes walking test, to evaluate aerobic endurance, seated torso flexion, which measures lower body flexibility (primarily the biceps femoris), joining hands behind the back, which assesses upper body flexibility (primarily the shoulders), and stand up, walk, and sit down again, which evaluate agility and dynamic balance. To interpret the information, the values reported by Rikli and Jones [32] were used according to sex and age. For Reliability and validity the battery vacillate between 0,79 and 0,97 [33].

Secondly, it was made a literature review related to the study variables associated with elderly in Latin America was performed through a search on the PubMed, Google Scholar, and Dialnet databases, which was limited to 5 years old publications. The descriptors for database searching about age status were as follow: older person, elderly, Senior Fitness Test (SFT), Mini-Mental State Examination (MMSE), for depression search, the descriptors used were: Geriatric Depression Scale (GDS), Older Americans Resources and Services (OARS), to measuring the Scale, Social Support Scale, social resource, and Latin America were used. In sum, 385 articles were found; from these ones, 15 articles that were cited in the contents of this to chapter were selected.

2.2 Personal characteristics: sociodemographic

Average participant age was 71.93 years (SD = 6.66): 83.30% (f = 294) were female and the rest were male (16.70%; f = 59). The average number of offspring reported by elderly was 4.78 (SD = 2.72). The level of schooling of the majority of participants was basic education, reporting an average of 5 years of study (SD = 3.74) To greater to number of elderly reported not being economically dependent on anyone (46.50%; f = 164). Those who reported to be depending on someone depended mainly on the offspring, followed by their spouse. **Table 1** shows data based on sex.

The sociodemographic data for the population in this study shows that the mean age range of participants varies between 65 and 77 years, and that the majority are women with an incomplete basic education, which is remarkable when considering that the average study range is from 1st grade in elementary school till nineth grade. The sample divided based on sex, men showed to higher mean age as well as years of study than women. The age rates do not agree with the Mexican census report, which indicates that the current life expectancy is higher for women (79.77 years) than for men (75.06 years) [34].

Levels of schooling are similar to those reported in a study that demonstrated that schooling levels in the majority of this population vacillate around 5 years,

Sociodemographic characteristics	Female $n_1 = 294$		Male $n_2 = 59$	
	f	%	*f*	%
Occupation				
Homemeker	197	67.0	11	18.6
Pensioner	28	9.5	6	10.2
Retired	9	3.1	5	8.5
In the workforce	60	20.4	37	62.7
Economically dependent				
Not dependent	113	38.4	51	86.4
Spouse	100	34.0	1	1.7
Offspring	91	31.0	8	13.60
Siblings	0	0.0	0	0.0
Other	3	1.0	0	0.0

Note: n = sample; f = frequency; % = percentage.

Table 1.
SC sociodemographic characteristics based on sex.

which is a possible cause of the above-mentioned higher number of women who dedicate the majority of their time to households and may come across fewer opportunities to finish basic studies [35]. Schooling levels were higher in the research with 84% of SCs having finished elementary school [36], as well as in the study with 66.4% of SCs having finished elementary school [37]. This data may be attributed to the higher number of male participants in these studies, which for cultural reasons present with a higher education level. The illiteracy level reported in the last national census, at 6.9%, is congruent with the results of this sample [38]. It is important to consider the positive influence of schooling on the quantity of physical activity in this age group [35], a situation that is highly related to the level of functionality among elderly.

The majority of the population in the present study reported no economic dependency, which differs from what was reported by Gomez [35], with more than half (63%) of their sample stating that they received economic assistance from family members A possible determining factor in the lack of economic dependence in the last study was the age range of up to 101 years. The specific features of this study should be taken into consideration owing to the fact that not being economically dependent can be a protective factor against loneliness and illness.

2.3 Biological characteristics: anthropometrical, clinical, and morbidity

Participant anthropometric data showed an average weight of 67.95 kg (SD = 12.24), height of 152.50 cm (SD = 8.10), and BMI of 29.20 (SD = 4.71); in accordance with the body mass index, majority of the elderly can be classified as obese (Secretaria de Salud, 1998). Average blood pressure data obtained from the participants classifies them under normal systolic pressure (123.00 mm/Hg SD = 14.44) and optimal diastolic pressure (74.19 mm/Hg; SD = 88.36; Secretaria de Salud, 2009). **Table 2** shows data based on sex.

The diagnosis of obesity according to the body mass index found in this study (29.20 kg/m2) is similar to the reported in a study with more than 80% of the

Clinical and anthropometric	Female $n_1 = 294$				Male $n_2 = 59$			
Characteristics	**m**	**SD**	**Min**	**Max**	**m**	**SD**	**Min**	**Max**
Current weight (kg)	69.90	11.85	39.30	108.10	73.19	12.87	40.6	113.00
Height (m)	150.26	5.79	134.0	170.00	163.66	8.78	138.0	192.00
BMI (Kg/m2)	29.59	4.73	18.37	46.01	27.29	4.14	19.70	40.53
SP (mm/Hg.)	122.95	14.28	75.00	181.00	123.29	15.32	75.00	162.00
DP (mm/Hg.)	74.06	8.42	55.00	95.50	74.88	8.09	55.00	94.00

Note: n = muestra; kg = kilograms; m = meters; BMI = body mass index; SP = systolic pressure; DP = diastolic pressure; mm/Hg = millimeters of mercury; M = median, SD = standard deviation; Min = minimum; Max = maximum.

Table 2.
Anthropometrical and clinical characteristics of SCs based on sex.

sample constituted by women [39]. However, there is also a study that reports a greater percentage of the population classified as overweight and implying Colombians to be healthier (body mass index = 25.2; SD = 2.5) despite the similarities in cuisine [40]. The average obesity present in the sample is related to reports of 40% obesity rates present at a global level [41]. This suggests that obesity also complicates the health conditions of this population group because it is an ailment that exacerbates to other ailments, which may affect an elderly.

The musculoskeletal history reported by elderly showed that almost half of them (f = 172; 48.7%) had a fear of falling and 42.5% (f = 150) presented with at least one fall in the last 12 months. Upon questioning about the number of fractures in the last 2 years, 92.4% (f = 326) did not report fractures. Reports of fear of falling and falls are in agreement with data on persons with functional dependency for daily life activities in Mexico City [42] as well as on the Nuevo Leon disability statistics reported by INEGI [34], showing 20.1% of elderly indicating advanced age being the cause of disability, with 59.7% of disabled stating that their disability is with regards to walking or movement. **Table 3** presents the musculoskeletal history for the sample based on sex.

Prevalence of elderly self-reported ailments were as follows: hypertension 53.8% (f = 190) diabetes mellitus 38.2% (f = 135), insomnia 34.3% (f = 121), hypercholesterolemia 33.1% (f = 117) gastritis 26.1% (f = 92), depression 22.1% f = 78), and respiratory illness 11.9% (f = 42). In the sample divided based on sex, a morbidity of 77.2% (f = 227) for women and 67.8% (f = 40) for men was observed.

Studies performed on populations living in border area provide data to infer that Mexico, particularly Nuevo Leon, being to region close to the United States to border may be a factor that encourages to high prevalence of illnesses such as diabetes and hypertension [42].

2.4 Social characteristics

Social resources data are presented below according to the dimensions: cohabitation, interaction, affection, and dependence. The cohabitation report showed that overall, the marital status of widow (er) predominates the sample (f = 165; 46.7%), followed by that of married (f = 143; 40.5%) According to sex, a greater percentage of widowed women was identified (f = 143, 48.6%), followed by that of married women (f = 143, 48.6%), whereas majority of the men reported being married,

Musculoskeletal history	**Female** $n_1 = 294$		**Male** $n_2 = 59$	
	f	%	*f*	%
Fear of falling				
Yes	158	53.7	14	23.7
No	136	46.3	45	76.3
Falls in the last year				
None	168	57.1	35	59.3
Three or less	116	39.4	20	33.8
More than three	10	3.4	4	6.7
Fracture in the last 2 years				
None	269	91.5	57	96.6
One fracture	21	7.1	2	3.4
Two fractures	4	1.4	0	0.0

Note: n = sample; f = frequency; % = percentage.

Table 3.
Elderly musculoskeletal history based on sex.

followed by being widowed (*f* = 33, 55.9% and *f* = 22, 37.3%, respectively). Women primarily lived with their offspring, followed by their spouse (*f* = 161, 54.7% and *f* = 106, 36.0%, respectively); men primarily lived with their wife and offspring (*f* = 32, 54.2% and *f* = 30, 50.8%, respectively).

Elderly interaction with non-relative people who they have a close interpersonal relationship to be able to be visited for elderly was reported to be with five or more persons for 60.9% (*f* = 215) of the sample, whereas 78.5% (*f* = 277) reported made phone callings two or more times per week and 77.6% *f* = 274) saw persons who they did not live with 2–7 days per week.

Related to affection, 12.7% (*f* = 45) of elderly's were identified to feel lonely often. Upon questioning elderly's regarding if they see their family and friends as often as they would like, 62.9% (*f* = 185) of the women and 62.7% (*f* = 37) of the men answered yes.

In the dependency dimension, 92.1% (*f* = 325) of elderly's were identified to have one person to confide in and 92.4% (*f* = 326) had someone to take care of them in the event they become incapacitated, with an indefinite care period. **Table 4** shows the data based on sex.

In Mexican culture and in accordance with the OARS scale, elderly' s who were married live primarily with their spouse; however, live women tend to live with their offspring, given widowhood and the fact that paid caretakers are generally not hired by relatives or elderly their selves; this shows that elderly care is the responsibility of their offspring after the spouse' s death [43]. Upon comparing elderly living in their house at will (sample used for this study) with those living in nursing homes in the city of Chihuahua, Mexico [44], a predominance of widowed (43%) and single (47%) elderly can be identified as opposed to those living in nursing homes at will or in their homes, among whom the widowed marital status predominates according to sex, followed by a married status for men and widowed status for women, followed by married; 5 of 10 live with their offspring and 2 of 10 live alone.

Dependency	Female $n_1 = 294$		Male $n_2 = 59$	
	f	%	*f*	%
Do you have anyone to confide in?				
Yes	269	91.5	56	94.9
No	22	7.5	3	5.1
No response	3	1.0	0	0
If, at any point, you needed help because you became incapacitated, would you have someone to give you that help?				
Yes	270	91.8	56	64.9
No	24	8.2	3	5.1
Would that person take care of you?				
	$n_1 = 270$	$n_2 = 56$		
Indefinitely	201	74.4	40	71.4
A short period of time	39	14.4	11	19.6
Just briefly	29	10.7	5	8.9
No response	1	0.4	0	0.0

Note: n = sample; f = frequency; % = percentage.

Table 4.
Dependency according to the Older Americans Resources and Services (OARS) Scale.

Elderly interaction in the population investigated is greater because they report greater frequencies regarding to people, they know each other well enough to visit and talk on the phone to see persons who does not live with them. Stated dependency about having someone to confide in is greater among elderly's in the study (92%) in comparison with those in a nursing home (75%); having someone to take care of them if they become incapacitated (92.3% versus 88%); with a similar figure for care during an indefinite period, at 68.2% of SC living at will and 64% for those in a nursing home, a situation which could be influenced, in the case of the elderly in nursing homes, by the confidence they feel having a person to attend to them.

For the dimension of affection, elderly's living at will reported a lower rate of feeling alone quite often (12.7% vs. 31% of those living in nursing homes). The advantages for elderly living at will are only valid if they maintain functional and physical independence [45].

2.5 Psychological characteristics

When evaluating the cognitive state of elderly's, a normal state was identified on 48.2% of the overall population, mild risk of cognitive deterioration was found on 34.6%, moderate risk on 13.3%, and grave risk on 4% of people. Population data organized based on sex are shown in **Table 5**.

Depression assessment on overall sample showed 18.1% of elderly is at risk of depression. Population data organized based on sex are shown in **Table 6**.

Risk of cognitive deterioration in Monterrey, Nuevo Leon, Mexico population of the study shows a higher mean than obtained in the State of Mexico (22.3 ± 3.4), but lower of the obtained from the Lima population (27.6 ± 2.77).

Risk of cognitive deterioration	Female $n_1 = 294$		Male $n_2 = 59$	
	f	%	*f*	%
Normal	139	47.3	31	52.5
Mild	104	35.4	18	30.5
Moderate	38	12.9	9	15.3
Severe	13	4.4	1	1.7

Note: n = sample; No. = number; f = frequency; % = percentage.

Table 5.
Risk of SC cognitive deterioration based on sex.

Risk of depression	Female $n_1 = 294$		Male $n_2 = 59$	
	f	%	*f*	%
Not risk	239	81.3	50	84.7
At risk	55	18.7	9	15.3

Note: n = sample; No. = number; f = frequency; % = percentage.

Table 6.
Risk of depression based on sex.

When reviewing the numbers based on category, mild and moderate cognitive deterioration was less compared to those in elderly's in Antioquia (mild deterioration at 49.6% and moderate deterioration at 31.5%). The higher rates of risk of mild or moderate cognitive deterioration may be related to the fact that elderly' s present with higher rates of depression [37] in addition to the prevalence of morbidity higher than three ailments, which could function ace to risk for factor decrease in functionality, occurrence of depression, and cognitive deficit [46].

The risk data for cognitive deterioration are similar for elderly' s in this study and those in Queretaro, Mexico, which was expected because the variables of age, schooling, and the existence of chronic ailments in these studies presented related prevalence [47].

The rates of risk of depression among elderly' s in this study plows less than those reported in studies on populations in Havana [48] and Paraguay [36]. Likewise, a study performed in Bogota reported that 77.9% of men and 71.2% of women did not present a risk of depression, whereas the values were 81.3% for women and 84.7% for men in other study [35].

2.6 Functional physical capacity

Elderly functional physical capacity as a numerical variable showed a 9.84 repetition average for lower body strength (SD = 3.05), a 11.56 repetition average for upper body strength (SD = 3.48), aerobic endurance at 58.09 full steps (SD = 22.12), lower body flexibility at −6.02 cm (SD = 9.01), and upper body flexibility at −18.15 cm (SD = 12.38), and agility and dynamic balance at 7.55 s (SD = 2.08). The functional physical capacity assessment data based on age group for women is shown in **Table 7**.

Variable	60–69 years *n* = 132		70–79 years *n* = 128		80–89 years *n* = 34	
	f	%	*f*	%	*f*	%
Lower body strength						
Low	76	57.6	62	48.4	14	41.17
Normal	54	40.9	66	51.6	20	58.82
Excellent	2	1.5	0	0	0	0
Upper body strength						
Low	69	52.3	59	46.1	14	41.17
Normal	61	46.2	67	52.3	18	52.94
Excellent	2	1.5	2	1.6	2	5.88
Two-minute march						
Low	92	69.7	98	76.6	28	82.35
Normal	39	29.5	29	22.7	6	17.64
Excellent	1	.8	1	.8	0	0
Lower body flexibility						
Low	64	48.5	61	47.7	15	44.11
Normal	67	50.8	67	52.3	19	55.88
Excellent	1	.8	0	0	0	0
Upper body flexibility						
Low	107	81.1	93	72.7	27	79.41
Normal	21	15.9	30	23.4	5	14.70
Excellent	4	3.0	5	3.9	2	5.88
Agility and dynamic balance						
Low	92	69.7	74	57.8	15	44.11
Normal	40	30.3	53	41.4	18	52.94
Excellent	0	0	1	.8	1	2.94

Note: n = sample; f = frequency; % = percentage.

Table 7.
Functional physical capacity of senior women based on age group.

The functional physical capacity assessment data based on age group for women is shown in **Table 8**.

The results of physical tests on elderly's in this study in Monterrey, Nuevo Leon, Mexico evidence a lower physical capacity than that, in the studies that reported average lower body strength values of 15 ± 4.71 and 17.54 (95% CI = 3.9–13.19) repetitions, respectively; upper body strength values of 13.76 (95% CI = 4.7–11.62) and 22.0 (±4.12) repetitions, upper body flexibility values of –7.01 (95% CI = 11.5–2.08) and – 9.18 (±7.62) cm, and 5.7 (95% CI = 1.09–5.27) and 4.20 (±0.61) s for agility and dynamic balance [29]. Study data report showed a better average value than the data reported in this study regarding lower body flexibility, with a value of –1.14 cm (95% CI = 3.6–11.04) [49]. On the other hand, a study reported a value of –7.27 (±7.1 cm), which was like the values in this population [40]. With respect to flexibility, a study reported that women may be between 20% and 40% more flexible than men [50]. At the same time, given the predominance of females in our population, when comparing

Variable	60–69 years *n* = 14		70–79 years *n* = 28		80–89 years *n* = 17	
	f	%	*f*	%	*f*	%
Lower body strength						
Low	9	64.28	16	57.1	3	17.64
Normal	4	28.57	12	42.9	14	82.35
Excellent	1	7.14	0	0	0	0
Upper body strength						
Low	8	57.14	14	50.0	8	47.05
Normal	5	35.71	14	50.0	8	47.05
Excellent	1	7.14	0	0	1	5.88
Aerobic capacity						
Low	9	64.28	18	64.3	12	70.58
Normal	4	28.57	10	35.7	4	23.52
Excellent	1	7.14	0	0	1	5.88
Lower body flexibility						
Low	3	21.42	15	53.6	7	41.17
Normal	9	64.28	13	46.4	10	58.82
Excellent	2	14.28	0	0	0	0
Upper body flexibility						
Low	9	64.28	20	71.4	9	52.94
Normal	5	35.71	8	28.6	6	35.29
Excellent	0	0	0	0	2	11.76
Agility and dynamic balance						
Low	7	50.00	13	46.42	3	17.64
Normal	6	42.85	13	46.42	13	76.47
Excellent	1	7.14	2	7.14	1	5.88

Note: n = sample; f = frequency; % = percentage.

Table 8.
Functional physical capacity of senior men based on age group.

the study performed only on women, our average values were lagging by 4.88 cm, which indicates a lower functional physical capacity among our population [49].

According the classification by Rikli and Jones, the results show values lower than normal for both sexes, with the best values for aerobic capacity and upper body flexibility and for agility and dynamic balance only in women; this situation suggests the need to implement intervention programs that will contribute to and/or improve elderly functional and physical capacities [33].

2.7 Strategies for promoting, maintain or improve elderly adults health

In the actuality, the social interaction dynamics and the activities of daily life have been modified leading to a suddenly change of the activities that are realized in special vulnerable groups as the elderly adults because of the social restriction, situation that has affected the practice of the physical exercise due to the temporary

closure or the reduction of capacity in public places and more in closed spaces intended to the physical activity practice [51], as well as other recreational, educative and cultural activities that are usually taught in centers for retired, pensioners, clubhouses, geriatric stays and institutes for the care of the elderly [52]. This has led to changes in the lifestyle due to the modification of the type, amount, intensity, and frequency of physical activity performed, as well as the adoption of irregular eating and sleep patterns [53–55].

The dissemination of measures to promote the health in the elderly adults focuses mainly to increment the volume of physical activity because it is inversely associate with the risk of death [56], other measures include the healthy diet, meditation, relaxing, reading and in case of living in alone, the daily programming of telephone calls with friends and relatives [57].

An important strategy that can be used to promote the health among the elderly adult population are to adapt programs of physical activity for the home, which are an accessible and efficient tool in the modification of the conduct by their influence on the people and their biopsychosocial health [58]. When making physical exercise in a regular and controlled form we help to the improvement of a healthy physical condition in their cardiorespiratory, metabolic, morphological and motor components, as well as reduce the symptoms, anxiety and stress [59–61], and slowing the aging effects at the motor, physiological and mental levels. Besides to prevent chronic diseases, to favor the post-surgical recovery and the maintenance of the basic measures of security and hygiene in the execution of movements [62].

The World Health Organization promotes the active aging through the practice of physical activities by a minimum of 30 minutes per day [63], which is due to organize in a program of physical exercise according to the functional capacity of the elderly adults, specifying the type of exercise, intensity, volume and frequency [64], besides to orient on the structure that must have the session of exercises and use materials readily accessible in the home. In attention to these recommendations it is considered pertinent to use multicomponent programs by its positive impact in the functionality and the improvement of the physical capacities of aerobic resistance, force, balance, agility and amplitude to articulate, besides to contain activities that stimulate the cognitive functions and help to improve the mental health [65–67]. Proceeding, we will summarize the recommendations to prescribe physical activities in the home for elderly adults:

- Type of exercise: slight walks or with change of the speed inside the home, dance that implies low impact moves, to go up and low on stairs, flexion of arms using resistance bands or small bottles with water, push-ups against the wall, to seat down and stand of a chair, extension of legs in chair, rise of leg backwards and to the flanks, standing on toes, exercises of articular mobility trough rotation, flexion or extension of the diverse joints of the body (mainly neck, shoulders, elbows, wrists, hip, knees and ankles), exercises of monopodial and bipodal balance, in addition to exercises of deep breathing.

- Intensity: To guarantee that the physical exercise is safe to be practiced by healthy elder adults or with a controlled chronic disease and to optimize its protective function, it is suggested to include low intensity exercises, but with a predominance of moderately intense exercises (40–60% of heart rate reserve or 65–75% of maximum heart rate), in a range of three to six degrees in the Rating of Perceived Exertion [53].

- Volume: in normal situations the World Health Organization [68], suggests to practice for 150 minutes weekly of moderate physical activity or 75 minutes

of intense physical activity, also, with the goal to obtain greater benefits for the health of the elderly it encourages to make up to 300 minutes of moderate physical activity per week. However, due to the increase of sedentary behaviors by the confinement one sets out to fit to an average of 350 minutes of physical exercise per week, which could be divided in seven sessions of 50 minutes each one, during the seven days of the week.

- Frequency: from five to seven days per week.

- Materials: the exercises could be made using self-carry, bands of resistance, balls, canes, chairs, small bottles with water, among other materials readily accessible in the home, and in case that availability exists, machines for cardiovascular exercises can be used. In addition, to add fun to the exercise routine it is recommended to listen to music.

- Structure of the physical activity sessions: the order of execution of the exercises during a session is based on the phase; initial phase: exercises of mobility are made to articulate and calisthenics; medullar phase: the exercises that represent a greater degree of complexity like those of balance or greater physical effort like the cardiovascular ones and of force are included. Later, in the final phase: exercises of breathing and stretching's are made. The duration of the initial, medullary and final phases is recommended to be adjusted to 10, 30 and 10 minutes respectively.

3. Conclusions

Now that the biopsychosocial characteristics and functional status of elderly's in Mexico and some Latin American countries have been evaluated, we can critically identify values that are lower compared to those obtained in other countries; furthermore, it is of utmost importance that government authorities take these findings into consideration and implement social and healthcare strategies to improve physical, mental, and social conditions for a satisfactory aging process and better life quality for elderly's.

Within the characteristics identified in the elderly adults, it is important to consider sociocultural and environmental conditions that allow a worthy and safe aging in the community. In Latin American countries, studies have observed the relation of the surroundings of the EA with its health and the few information is related more to the characteristics of the house and on the other hand its networks of familiar and non-familiar support like components that rebound in their well-being. In other countries mainly in Europe the collaboration of the EA in third age clubs has been contemplated, attendance to cinemas, theaters, museums, cafeterias, bars, celebrations of district among others, which consider like part of the incorporation to the society [69].

In Latin America despite doing the effort to unify the criteria considering the social participation, as much in civil associations as voluntary activities, as a part that repels in the quality of life of the EA, the results until now demonstrates that differences are presented in the collaboration of the EA in organizations, excelling the low participation in Mexico in comparison with Chile and Spain. The sociodemographic characteristics of the active population do not vary much between countries, so it seems that these are not determining factors for the elderly population to remain active in organizations, however, health conditions should be more controlled as a determining component in their participation, since those active

elderly people in the community show a level of satisfaction with the community and its important as a means of integration and coexistence with society and their perception of the quality of life [69].

A risk factor that deteriorates the unfolding of the potential of the EA is the internationalization of the ageism since it influences the perception of the EA in the society and how the EA on itself is perceived. It is considered essential to exhaustive observe our representations of the aging in the society and to have possibility of being able to question those that are implanted under the tradition and the common sense [70].

3.1 Recommendations for the readers

Habitually the boarding of this problematic of the public health has been in a corrective sense treating the symptoms or complications derived from the own aging of the body and mind. Without a doubt some of the immediate actions are centered in the physical and mental rehabilitation in search of the social reintegration of the EA (Elderly Adult) with autonomy and independence, leaving in background the prevention. In that sense, there is too much to do, one of the best allies of the prevention is the promotion of the health and the access to the information, prescribed from the consultation by a multi-disciplinary group in the institutions of the Secretaría de Salud and institutions of social welfare like part of a public policy of social welfare that emphasizes in the following points:

1. The maintenance and development of the muscular mass and the articular capability with activities like basic gymnastics and yoga.

2. Fortification of the cardio-respiratory system through playful activities as the dance, long walks, bicycle strolls, visits to public parks and natural parks.

3. To develop the balance to diminish the fear to fall [68] and to help in the prevention of falls and injuries as fracture of hip, shoulders and arms [71], derived from the own fall.

4. Promote, maintain or improve levels of physical activity in general, because in a physical level it improves rest and sleep in elderly adults, blood glucose level, and cardio vascular resistance. In psychological level it reduces stress and the anxiety sensations, it improves the mood. In the social subject, it promotes the interpersonal and intergenerational relations, increase the social relations and improves integration in the community, aid to maintain the cognitive capacities like the memory, the attention and the language, as well as to generate positive emotions, it improves the self-esteem and aid to the greater adults to feel useful.

5. To make a valuation and nutritional direction, with a food preparation-balance course to help to prevent the loss of muscular mass without apparent reason, to maintain mineral density, as well as the appearance of other symptoms because of deficit of micro and/or macronutrients

All these activities guided by professionals of the physical activity and the health, taken to the practice on a group form favor the development of social interaction and bows of friendships, at the same time that promote an active aging that allow the EA to reach the maximum physical, mental and social well-being with independence and autonomy.

The gerontological investigation, is an option that can contribute to scientific discernment, that must be transmitted and extended to contribute the growth of public policies of the active aging. The transformation can be done day with day from the language with which the society talks about the EA, finding out as they wish that they speak to them and treat; eliminating the negative representations like the absence of roles and to encourage the creation of a project of life in the oldness [70].

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Conflicts of interest

The authors declare no conflicts of interest.

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Sports psychology is an interdisciplinary science for the purpose of increased participation in sports and physical activity to improve health and wellbeing. It addresses everything from optimal performance and wellbeing of athletes to developing mental and social aspects of participation to systemic issues associated with sports settings and organizations. This book introduces readers to topics within sports psychology with a special focus on motivation, behavior change, and personalities.

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