

SPORTS AND SUBSTANCE USE IN HIGH SCHOOL STUDENTS: DIFFERENT PERSPECTIVES OF THIS RELATIONSHIP

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The aim of this study was to describe the relationship between playing sports and substance use in high school, students. A search was conducted, without restrictions by date, in the main health databases saúde (Cochrane, LILACS, PsycINFO, PubMed, SciELO and Scopus). Analysis showed that playing sports can be both a risk and a protection factor concerning substance use, depending on a series of variables. Among these the following stand out: gender, type of sport, socio-cultural environment and motivation, both to play sport and to take the substance. Planning preventative actions that involve sport should consider the various factors involved, so as to encourage prevention of drug consumption among adolescents.

Descriptors: Sports; Substance-Related Disorders/prevention & control; Adolescent; Students.

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PRÁTICA ESPORTIVA E USO DE SUBSTÂNCIAS ENTRE ESTUDANTES DO ENSINO MÉDIO: DIFERENTES PERSPECTIVAS DESSA RELAÇÃO

O presente estudo teve por objetivo descrever a relação entre a prática de esportes e o consumo de substâncias entre estudantes do ensino médio. Realizou-se uma busca, sem restrição de data, nas principais bases de dados sobre saúde (Cochrane, LILACS, PsycINFO, PubMed, SciELO e Scopus). A análise evidenciou que a prática esportiva pode se apresentar tanto como fator associado à proteção quanto ao risco de uso, dependendo de uma série de variáveis. Entre essas se destacam o gênero, as modalidades esportivas, o ambiente sociocultural e motivação tanto para a prática esportiva quanto para o consumo da substância. O planejamento de ações preventivas que envolvam a prática de esportes devem considerar os diferentes fatores envolvidos, a fim de promover a prevenção do consumo de drogas entre os adolescentes.

Descritores: Esportes; Transtornos Relacionados ao Uso de Substâncias/prevenção & controle; Adolescente; Estudantes.

PRACTICA DEPORTIVA Y EL USO DE SUSTANCIAS ENTRE ESTUDIANTES DE SECUNDARIA: DIFERENTES PERSPECTIVAS DE ESTA RELACIÓN

El presente estudio tuvo por objetivo describir la relación entre practica deportiva y el consumo de sustancias entre los estudiantes de secundaria. Se realizo una búsqueda sin restricción de fecha, en la principales bases de datos sobre salud. (Cochrane, LILACS, PsycINFO, PubMed, SciELO e Scopus). El análisis puso en evidencia que la practica deportiva se puede presentar tanto como un factor asociado a la protección, como también un factor de riesgo para el consumo, dependiendo de una series de variables. Entre estas se destacan el genero, las modalidades deportivas, el ambiente sociocultural y la motivación tanto para la practica deportiva, cuanto para el consumo de las sustancias. La planeación de acciones preventivas que incluyan la practica de deportes deben considerar los diferentes factores implicados, con el fin de promover la prevención de el consumo de drogas entre los adolescentes.

Descriptorios: Deportes; Trastornos Relacionados con Sustancias/Prevención & Control; Adolescente; Estudiantes.

Introduction

Adolescence is a period of significant neuro-anatomical and functional change associated with behavior that is more anxious, impulsive and insecure than that of adults⁽¹⁻²⁾. On the other hand, there is also a set of new relationships that are especially important in the life of the individual, be they with parents or with friend groups. In this case, if some of these groups consume drugs, the individual may feel peer pressure to consume as well, and once an individual has entered into contact with drugs, they are exposed to the diverse risks associated with such consumption⁽³⁾.

Substance abuse in adolescents is linked with diverse social and health problems, such as road accidents, violence, academic problems and impaired memory⁽⁴⁻⁷⁾. Thus, substantial efforts are made to prevent substance use among students in this age group⁽⁸⁾. Possible drug use prevention strategies for adolescents include playing sport⁽⁹⁾.

Studies suggest that, from a neuro-biological point of view, playing sport can be an interesting alternative in avoiding or decreasing drug consumption⁽¹⁰⁾. However, substance use is not limited to this single factor, as the context in which the individual finds themselves is also important. Consequently, gaps remain in the literature on certain particularities of the relationship between playing sport and drug use⁽¹¹⁾, mainly regarding the role of sport as a risk or protection factor in drug use and abuse.

This study, therefore, aims to describe the relationship between sporting activities and drug use, exploring related variables through the literature available on the relationship between playing sport and substance use in adolescents in high school.

Methodology

This study constitutes a narrative review of the literature. The following databases were

searched: *Cochrane*, *LILACS*, *PsycINFO*, *PubMed*, *SciELO* and *Scopus*, with no limitations on dates, using the key words: “*sports*” and “*drug abuse*”, “*drug misuse*”, “*substance abuse*”, “*addiction*”. This search took place in January 2011.

The inclusion criteria were as follows: studies of the relationship between playing sport and use of psychotropic drugs (those that can be self-applied and are capable of causing addiction), in Portuguese, English and Spanish and high school students. The following search algorithm was used: (tw:(*sports*)) AND (tw:(*drug abuse*)) AND (tw:(*drug misuse*)) AND (tw:(*substance abuse*)) AND (tw:(*addiction*)) AND (limit: (“*secondary students*”)) AND la:(“en” OR “es” OR “pt”) AND type: (“*article*”).

Some authors study only drugs that are not described as potentially causing addiction, such as growth hormones or erythro protein, or drugs involving comorbidities. These were not considered in the review.

Results

The searches were not restricted as to dates, and 6,843 articles were found, of which duplicated references were then excluded (n=3,646). The inclusion criteria were then applied, and a further 1,774 references were excluded through the title, 38 as they were not published in scientific journals and 1,202 through the abstract. Thus, 184 potentially relevant references were found and the complete texts were assessed. A further four studies published after this date – references 22, 32, 41 and 49 –, were considered important and were thus included in the review. Thus, 28 articles (Figure 1) were collected and used in this review. Information on the authors, year published, sample, age, country of origin, type of sport and drugs studied are shown in Figure 2.

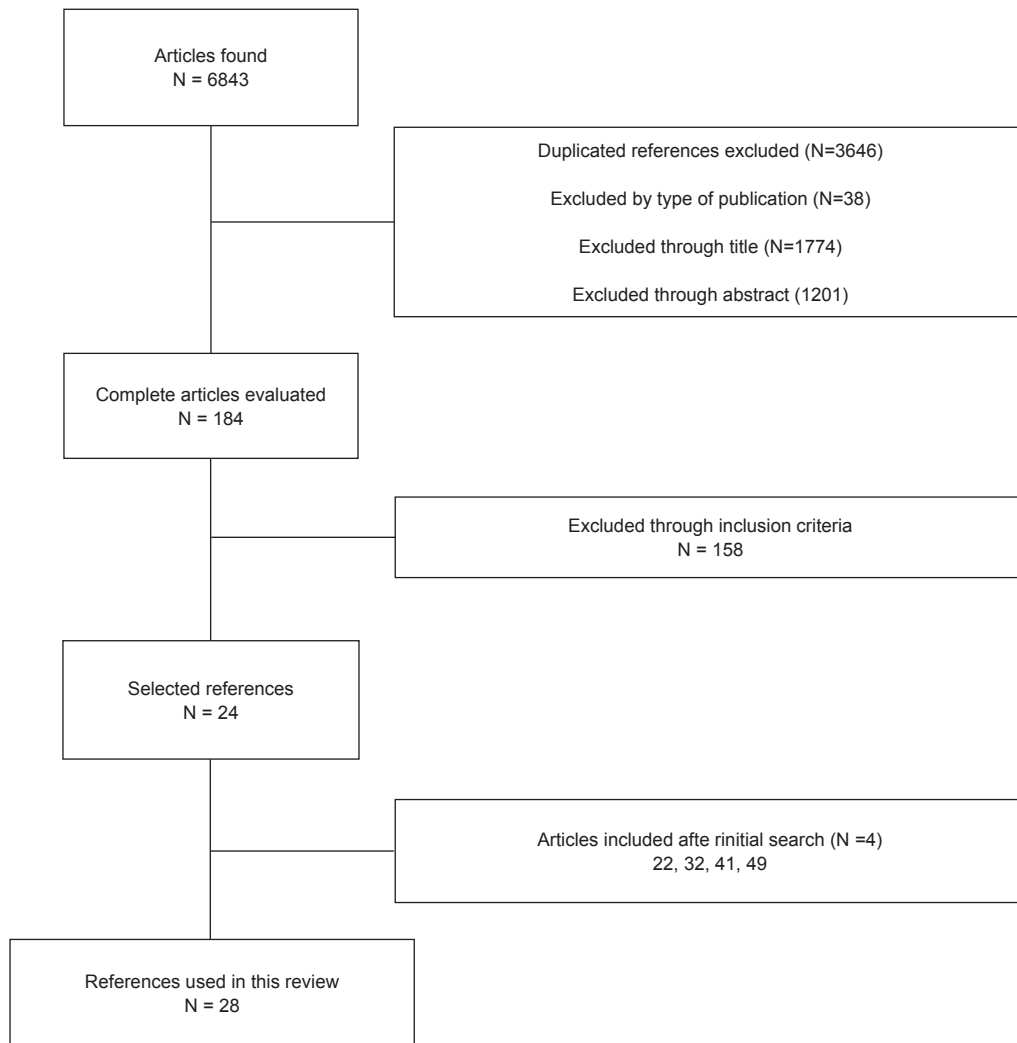


Figure 1 – Flowchart of excluding the articles

Authors	Year	Sample	Age (years)	Country	Type of study	Type of sport	Drugs
Abad et al. ⁽⁴¹⁾	2012	4332	12 to 16	Spain and Mexico	Cross-sectional	Physical or not specified sports activity	Alcohol and tobacco
Baumert et al. ⁽¹³⁾	1998	6849	14 to 18	United States	Cross-sectional	Not specified sports	Tobacco, Alcohol, marihuana and steroids
Bedendo et al. ⁽²²⁾	2013	9,886	14 to 18	Brazil	Cross-sectional	Football	Alcohol
Belanger et al. ⁽⁴⁸⁾	2012	894	16 to 20	Switzerland	Cross-sectional	Individual or team	Alcohol
Davis et al. ⁽²⁴⁾	1997	1200	Mean 15.8	United States	Cross-sectional	Golf, hunting, football, baseball, wrestling, running, volleyball, rodeo, basketball, tennis, swimming	Tobacco
Eccles & Barber ⁽⁴²⁾	1999	1,259	15 to 18	United States	Cohort	Baseball, basketball, football, golf, hockey, football, wrestling, swimming / diving, tennis, running, gymnastics, softball, volleyball	Alcohol and illegal drugs
Ferron et al. ⁽¹⁷⁾	1999	9268	15 to 20	Switzerland	Cross-sectional	Not specified physical activity	Cigarettes, wine and marihuana
Fredricks & Eccles ⁽¹²⁾	2006	912	13 to 17	United States	Longitudinal	Not specified sports	Alcohol and marihuana
Garry & Morrissey ⁽²³⁾	2000	3,698	11 to 14	United States	Cross-sectional	Not specified sports	Cigarettes, alcohol, marihuana, cocaine or crack, inhalants and steroids
Jones & Moberg ⁽²⁵⁾	1988	1030	11 to 18	United States	Cross-sectional	Individual or team	Tobacco, Alcohol and marihuana
Kulig et al. ⁽³⁰⁾	2003	15349	14 to 18	United States	Cross-sectional	Vigorous physical activity and team sports	Cigarettes, Alcohol, marihuana, cocaine or crack, inhalants, steroids, heroine, methamphetamine
Lorente et al. ⁽⁵⁰⁾	2004	816	Mean: 18.3 (sd=1.2)	France	Cross-sectional	Individual or team; formal, informal or formal/informal	Alcohol
Mays et al. ⁽²⁷⁾	2010	8271	12 to 18	United States	Longitudinal	Cheerleading / dance team, baseball / softball, basketball, hockey, football, soccer, swimming, tennis, running	Alcohol
Moore & Werch ⁽²⁸⁾	2005	891	13 to 14	United States	Cross-sectional	Basketball, skateboarding, surfing, tennis, dance / cheerleading / gymnastics, football, swimming, wrestling	Alcohol, cigarettes and marihuana
Naylor et al. ⁽²¹⁾	2001	1515	Not described	United States	Cross-sectional	Not specified	Alcohol, tobacco, marihuana, cocaine, hallucinogens, steroids, painkillers, barbiturates, amphetamines, creatine
Page et al. ⁽²⁰⁾	1998	12272	14 to 18	United States	Cross-sectional	Team sports	Tobacco, Alcohol, cocaine, marihuana, steroids and other drugs
Papatoannou et al. ⁽¹⁴⁾	2004	5991	11 to 16	Greece	Cross-sectional	Vigorous exercise, competitive sports, exercise in gyms, exercise out of school	Cigarettes, hashish and ecstasy
Pate et al. ⁽¹⁵⁾	1996	11631	12 to 18	United States	Cross-sectional	Not specified	Cigarettes, Alcohol, cocaine and marihuana

Figure 2 continues next page...

Authors	Year	Sample	Age (years)	Country	Type of study	Type of sport	Drugs
Peck et al. ⁽³⁹⁾	2008	1000*	12 to 28	United States	Cohort	Not specified sports	Alcohol
Peretti-Watel et al. ⁽²⁸⁾	2002	10807	14 to 19	France	Cross-sectional	Collective (football, rugby, basketball, volleyball, handball); athletics (cycling, running, gymnastics, dance); strength and combat (weightlifting, bodybuilding, boxing, judo, karate); other individual sports (tennis, golf, horseback riding, skiing, surfing, skating)	Alcohol, cigarettes and marihuana
Peretti-Watel et al. ⁽³¹⁾	2003	460	16 to 24	France	Cross-sectional	Collective (handball, rugby, volleyball); individual (judo, cycling, running, gymnastics etc.); other sports (snowboarding, skiing, parachuting, sailing, kayaking etc.)	Alcohol, cigarettes and marihuana
Rainey et al. ⁽¹⁶⁾	1996	7,846	14 to 18	United States	Cross-sectional	Not specified sports	Alcohol and tobacco
Ruiz-Juan et al. ⁽⁴⁵⁾	2009	3840	12 to 27	Spain	Cross-sectional	Individual or team	Alcohol and tobacco
Terry-McElrath et al. ⁽³²⁾	2011	45000*	13 to 18	United States	Longitudinal	Sports activities or physical exercise, team sports	Alcohol, tobacco, marihuana and steroids
van den Berg et al. ⁽²⁶⁾	2007	2516	Mean: 12,8 (sd:0.8) to Mean: 17,2 (sd:0.6)	United States	Longitudinal	Not specified physical activity	Steroids, cigarettes, Alcohol, marihuana and other drugs (acid, crack, cocaine etc.)
Werch et al. ⁽⁹⁾	2003	465	13 to 14	United States	Experimental randomized	Not specified sports	Alcohol
Wichstrøm & Wichstrøm ⁽¹⁹⁾	2009	3251	13 to 19	Norway	Longitudinal	Power sports (bodybuilding, weight lifting, boxing, gymnastics, wrestling or martial arts); endurance sport (skiing, orienteering, skating and swimming); technical sports (e.g., football, handball, aerobics, horseback riding)	Alcohol, tobacco and marihuana
Winnail et al. ⁽¹⁸⁾	1997	4800	14 to 18	United States	Cross-sectional	Team sports	Alcohol, tobacco, marihuana, cocaine, steroids and other drugs

Figure 2 - Authors, year of publication, N, age, country of origin, types of sport and drugs studied

s.d.: standard-deviation

Types of drugs

Various studies have sought to clarify the relationship between playing sport and substance use in adolescents. In other studies, it was playing sport was seen to be related to lower alcohol⁽¹²⁾, tobacco⁽¹³⁻¹⁸⁾, marihuana^(13,19-20) and cocaine⁽²⁰⁻²¹⁾ consumption. Other studies, in turn, report a higher prevalence among those who play sport compared with those who do not. Among the substances used are alcohol^(16,18,22-23), tobacco⁽²⁴⁻²⁵⁾ and anabolic steroids⁽²⁶⁾.

Such contrasting results may be related to methodological factors, including different populations or samples, variations in the research instruments used or between the variable studied and even to the different objectives of each study. Moreover, the relationship between playing sport and drug use does not appear to be so direct, as there are different tertiary variables involved. Among the main variables observed in this review, the influence of gender, type of sport (team or individual), motivation (to do sport or to consume the substance) and the social and cultural environment in which the individual finds themselves.

Gender differences

Some authors suggest that the relationship between sport and alcohol abuse is independent of being male or female^(20,27). On the other hand, most of the studies indicate gender differences. In one longitudinal study higher alcohol consumption was observed that women who had played sport during high school, whereas the same was not observed among males⁽¹²⁾. Another study, evaluating French high school students, observed differences both in patterns of alcohol, tobacco and marihuana consumption⁽²⁸⁾ and in relation to the sport practiced. Men played more power and combat sports (combat, weight lifting etc.), whereas the females did more athletic sports (gymnastic, dance etc.). Thus, the authors highlighted that gender differences, related to drug consumption, appear to be partially related to the type of sport played. Another study indicated that females who played school sports were at lower risk of alcohol consumption, whereas males in the same condition had a higher risk of substance

use. however, these relationships were strongly influenced by the type of sport practiced⁽²⁹⁾.

Although there may not be any impediments, many sports tend to be considered as masculine more masculine than feminine, and vice versa. For example, in Brazil, football is, culturally, a predominantly masculine sport, whereas dance and gymnastics tend to be predominantly female. For males, sport is often a form of showing their masculinity, for example through demonstrating strength or aggression⁽³⁰⁾. Likewise, exaggerated alcohol consumption has also been described as a way of expressing masculine values.

Team and individual sports

Some studies indicate that the relationship between playing sport and substance use also varies depending on the type of sport played⁽³¹⁾. These studies demonstrate that certain sports such as swimming, diving, snowboarding and skydiving are more associated with consumption of certain substances, such as alcohol and marihuana, compared with other sporting activities.

A 13-year-long study following high school students showed that those who played team sports had a greater increase in the number of incidents of alcohol poisoning over the years, compared with those who did individual sports⁽¹⁹⁾. A cross-sectional study of a representative sample of North American students (between 1991 and 2009), found high levels of playing team sports was associated with higher use of non-smoked tobacco (for example, chewed or sniffed) and low (monthly) levels of cigarette and marihuana use. Higher alcohol and anabolic steroid consumption within the last month was only observed in students in their final years at high school⁽³²⁾. However, these authors did not analyze data for individual sports. Moreover, in neither of the above mentioned studies did the authors describe in detail which sporting activities were included in the scope of team sports, making it more difficult to interpret the results.

Male adolescents who play team sports consume fewer drugs such as cocaine, heroin, methamphetamine or crack than their peers who play non-team sports, although no significant associations with alcohol use were found⁽³⁰⁾. The authors point out that the relationship between

risky behavior and team sports appears to function differently in males and females. Moreover, they highlight the fear of damaging the team, as drug use tends to negatively affect sporting performance, and may be a factor in voiding consumption.

Playing sports, team or otherwise, always involves a certain level of socialization. The main difference lies in how the participant relates with other participants as, in team sports, there are both opponents and team members. The possibilities for social conflict and interaction tend to differ, therefore, for team sports and individual sports, producing environments that also differ as to what they offer. In team sports, interaction between the athletes on the team may often occur in contexts that do not necessarily involve the sport played (for example at gatherings or parties). Some studies indicate that athletes appear to engage more in alcohol consumption with other sports players as a way of increasing team cohesion⁽³³⁾. Moreover, it may be that playing team sports, when associated with trips away from home, for example, for a competition, facilitates adolescent experimentation with alcoholic drinks.

More socializing does not necessarily mean more drug use, if such consumption is not seen as a norm, or encouraged within the group. The self-determination theory postulates that the individual's need for autonomy, competence and relationships is based on extrinsic and intrinsic motivation⁽³⁴⁾. Thus, adolescents who want to feel part of the group, in this case the team, tend to act in the same way as their peers, to encourage acceptance. If the group looks askance at substance use, the adolescent tends not to consume, or decreases use. Thus, in order to plan preventative activities in the sporting environment, it is necessary to evaluate the socio-cultural context in which the team as a whole is involved.

Social and cultural aspects

Various studies highlight the importance of social components in substance use among adolescents⁽³⁵⁾. Bronfenbrenner's ecological theory⁽³⁶⁾ encompasses levels of social influence that may act on the individual, from the microsystem (changes occurring through interpersonal

relationships and on the immediate level) to the chronosystem (changes over time within the family structure, socio-economic status, place of residence). This theory has also been used as the theoretical base in studying substance use in adolescents⁽³⁷⁻³⁸⁾ and helps us to understand the complexity involved in relating this behavior with playing sports.

Sport as a factor associated with risk of or protection from drug use is an area that remains inconsistent in the literature⁽³⁹⁾. Thus, the differences in results may be partly explained by social and cultural differences in the samples. However, a great many studies fail to clearly describe the type of sport and the patterns of drug use, factors essential to better understanding this relationship.

In Brazil, playing football is widespread, as is consumption of alcoholic drinks, even among adolescents in different socio-economic contexts. In Brazil, beer is associated with football, as in the USA, where the relationship is with American football and baseball⁽⁴⁰⁾. However, this strong cultural relationship between playing sport and alcohol consumption also exists in other countries and tends to affect adolescents irrespective of whether they play sport or are sedentary, as such values are highly prevalent in the culture of certain countries.

In a study of 12-to-16-year-old students in Spain and Mexico, the authors observed that, among the Spanish students, being active in playing sports was shown to be a protection factor against alcohol and tobacco use. However, the same was not observed among Mexican students⁽⁴¹⁾. Two other studies by the same researchers showed diverging results. The first observed that those who played sport reported higher alcohol use in the preceding six months, compared with those who did not play sport⁽⁴²⁾. In contrast, the second study observed that sports players were associated with lower alcohol use in the same period⁽¹²⁾. The authors themselves highlight that a significant difference between the two populations studied did not lie in playing, or otherwise, sport but rather in historical and demographic differences. The first study included a sample of predominantly white North American adolescents, whereas the second consisted almost entirely of adolescents of Afro-American and

European descent. Thus, the authors suggested the possibility that alcohol use is less culturally relevant among Afro-Americans adolescents than among their white peers.

Athletes generally have more opportunities to attend parties and the number of social events attended is associated with the risk of consuming alcohol. Moreover, they have more friends who consume alcohol⁽⁴³⁾. As a way of maintaining or increasing their social status, the athlete may cut out or decrease drug consumption, as substance use is not accepted as appropriate behavior in a sports player. On the other hand, substance use may increase in order to improve social status in a group in which drug use is the norm.

Adolescents are more susceptible than adults and engage in more risky behavior, such as drug use, because of a series of functional and structural changes in their brain, principally in the socio-emotional system and when they relate with their peers⁽⁴⁴⁾. It is therefore essential to examine social relations and factors in the dynamics of playing sport that may encourage the increase of decrease of substance use. Intervention and prevention projects may benefit from this knowledge, encouraging the creation of more specific and effective programs for the adolescent population.

Motivation to play sport and to use drugs

Motivation to play some kind of sport, as well as to use drugs, appears to be an important parameter in understanding the relationship between drug use and sports. In a study of 12-to-16-year-old adolescents, extrinsic motivation to play sports, such as social acceptance, had no relationship with alcohol or tobacco use. Intrinsic motivation (sense of pleasure and satisfaction from playing and competing), however, was more associated with players who did not consume alcohol or tobacco⁽⁴¹⁾. In contrast, a study conducted with Spanish adolescents in the public school system showed significant difference regarding motivation (intrinsic and extrinsic) to play sport and to consume alcohol or tobacco⁽⁴⁵⁾. In this study, however, the authors analyze a sample of students aged from 12 to 27 years old, at different levels of the education system. In consequence, the sample may be too heterogeneous,

making it difficult to compare the two studies with adolescent populations.

There are various motives that may encourage drug consumption in adolescents. The majority tend to report that they consume alcohol for social reasons, to get drunk, relax, or as a coping strategy⁽⁴⁶⁾. Certain contexts of playing sport can be extremely stressful, especially those that continuously demand results. Thus, higher substance use among those who play sport may be linked to a strategy of alleviating symptoms of anxiety and stress related to the routine of training and competitions⁽⁴⁷⁻⁴⁸⁾.

On the other hand, motives for consumptions may be based more on the environmental context than on the individual's own internal motivation, such as alcohol use for social reasons or to feel good mediating the relationship between the type of sport and the various levels of alcohol use. Moreover, those who play team sports may drink in order to avoid group disapproval⁽⁴⁹⁾. Likewise, the adolescent tends to shape themselves to be similar to their peers in order to feel more welcomed and fit in better with a specific group.

Final considerations

The aim of this study was to present some of the variables involved in playing sport and substance use, in order to support discussion of the topic. In the literature reviewed, the main variables involved were gender, type of sport (team or individual), motivation (to play sport or to consume substances) and the social and cultural environment.

The main contribution of this study is to demonstrate that the relationship between playing sport and substance use is not linear, but depends on a series of variables referring to both the context in which the sport is played and to the players' characteristics. Consequently, playing sport, per se, should not be considered a risk or a protection factor for substance abuse in adolescents.

In almost all of the studies examined in this review, the relationship between playing sport and drug use was studied in populations in the United States or Europe, with few studies from Latin America. This reflects the gap in knowledge of the relationship between sport and drugs

in developing countries and suggests the need for more studies in these cultures.

Some of the main gaps observed in studies of the area lie in the fact that the majority do not correctly differentiate between the types of sport evaluated⁽¹¹⁾. Moreover, it has already been shown that the relationship between consuming substances and playing sport depends on the type of sport, with peculiarities observed, such as specific relationships between certain sports and substances⁽²⁸⁾. In relation to the specificities of sporting activities, the frequency with which the sport is played tends to vary from one study to another, this being a factor that has already been shown to be a differentiator in substance consumption⁽⁵⁰⁾.

The majority of studies focused on the use of tobacco and alcohol. When other drugs are approached, they are generally classified into one single category covering all illegal drugs which, in reality, differ in their effects and the social contexts in which they are used. Moreover, consumption patterns are not always duly reported, making it still more difficult to compare studies. This may be due to the lower prevalence of other drug use. However, future studies are essential to better understanding their relationship with playing sport.

Knowledge of the factors associated with substance abuse is considered one of the main elements in planning preventative actions⁽⁸⁾. This review showed that, although it is not known exactly which factors are associated or not with higher drug use in adolescents who play sports, there are certain variables that appear to modify this relationship, such as gender, type of sport, motivation to play sport or to take drugs, and the social and cultural environment. In addition to these variables, other factors appear to be related to substance use and playing sports. For example, concerns for health and legal, social and self-imposed sanctions may encourage lower consumption in sports players. On the other hand, acceptance of use by peers and seeking status and individual identity may encourage higher drug use. Other factors may also act as triggers to start or increase use, such as social pressure, the culture of each sport and the need to demonstrate masculinity.

Diverse national and international campaigns on preventing drug use make use of sport as a vehicle, an activity that protects from substance consumption. However, in order to make prevention programs including sport more effective, the different perspectives involved in the issue must be considered. The studies making up this review indicate that the association between playing sport and substance use in students is a complex process involving a series of factors, meaning it can be both a protection and risk factor. From this perspective, sport should not be considered as one single construct. The peculiarities of each sport and of those who play it should be considered when planning more appropriate preventative interventions. Thus, sporting practices evaluated as protective can be used in preventative campaigns. In contrast, recognizing the contexts associated with risk may also aid in guiding public policies.

References

1. Chambers RA, Taylor JR, Potenza MN. Developmental neurocircuitry of motivation in adolescence: a critical period of addiction vulnerability. *Am J Psychiatry*. 2003;160:1041-52.
2. Toga AW, Thompson PM, Sowell ER. Mapping brain maturation. *Trends Neurosci*. 2006;29(3):801-9.
3. Marques ACPR, Cruz MS. O adolescente e o uso de drogas. *Rev Bras Psiquiatr*. 2000;22(2):32-6.
4. McKinnon SA, O'Rourke KM, Thompson SE, Berumen JH. Alcohol use and abuse by adolescents: the impact of living in a border community. *J Adolesc Health*. 2004;34(1):88-93.
5. Silverman JG, Raj A, Mucci LA, Hathaway JE. Dating violence against adolescent girls and associated substance use, unhealthy weight control, sexual risk behavior, pregnancy, and suicidality. *JAMA*. 2001;286(5):572-9.
6. Brown SA, Tapert SF, Granholm E, Delis DC. Neurocognitive functioning of adolescents: effects of protracted alcohol use. *Alcohol Clin Exp Res*. 2000;24(2):164-71.
7. NHTSA. Traffic Safety Facts. 2010 Data; 2012.
8. Noto AR, Moreira FG. Prevenção ao uso indevido de drogas: conceitos básicos e sua aplicação

- na realidade brasileira. In: Silveira D, Moreira F, organizadores, editors. *Panorama atual de drogas e dependências*. São Paulo: Atheneu; 2006. p. 313-8.
9. Werch C, Moore M, DiClemente CC, Owen DM, Jobli E, Bledsoe R. A sport-based intervention for preventing alcohol use and promoting physical activity among adolescents. *J Sch Health*. 2003;73(10):380-8.
 10. Van Rensburg KJ, Taylor A, Benattayallah A, Hodgson T. The effects of exercise on cigarette cravings and brain activation in response to smoking-related images. *Psychopharmacology*. 2012;221(4):659-66.
 11. Lisha NE, Sussman S. Relationship of high school and college sports participation with alcohol, tobacco, and illicit drug use: A review. *Addict Behav*. 2010;35(5):399-407.
 12. Fredricks JA, Eccles JS. Is extracurricular participation associated with beneficial outcomes? Concurrent and longitudinal relations. *Dev Psychol*. 2006;42(4):698-713.
 13. Baumert PW, Jr., Henderson JM, Thompson NJ. Health risk behaviors of adolescent participants in organized sports. *J Adolesc Health*. 1998;22(6):460-5.
 14. Papaioannou A, Karastogiannidou C, Theodorakis Y. Sport involvement, sport violence and health behaviours of Greek adolescents. *Eur J Public Health*. 2004;14(2):168-72.
 15. Pate R, Heath G, Dowda M, Trost S. Association between physical activity and other health behaviors in a representative sample of US adolescents. *Am J Public Health*. 1996;86(11):1577-81.
 16. Rainey CJ, McKeown RE, Sargent RC, Valois RF. Patterns of tobacco and alcohol use among sedentary, exercising, non-athletic, and athletic youth. *J Sch Health* 1996;66(1):27-32.
 17. Ferron C, Narring F, Cauderay M, Michaud PA. Sport activity in adolescence: Associations with health perceptions and experimental behaviours. *Health Educ Res*. 1999;14(2):225-33.
 18. Winnail S, Valois R, Dowda M, McKeown R, Saunders R, Pate R. Athletics and substance use among public high school students in a southern state. *Am J Health Stud* 1997;13:187-94.
 19. Wichstrøm T, Wichstrøm L. Does sports participation during adolescence prevent later alcohol, tobacco and cannabis use? *Addiction*. 2009;104(1):138-49.
 20. Page R, Hammermeister J, Scanlan A, Gilbert L. Is school sports participation a protective factor against adolescent health risk behaviors? *J Health Educ* 1998;29:186-92.
 21. Naylor AH, Gardner D, Zaichkowsky L. Drug use patterns among high school athletes and non-athletes. *Adolescence*. 2001;36(144):627-39.
 22. Bedendo A, Opaleye ES, Andrade AL, Noto AR. Heavy episodic drinking and soccer practice among high school students in Brazil: the contextual aspects of this relationship. *BMC Public Health*. 2013;13:247.
 23. Garry JP, Morrissey SL. Team sports participation and risk-taking behaviors among a biracial middle school population. *Clin J Sport Med*. 2000;10(3):185-90.
 24. Davis T, Arnold C, Nandy I, Bocchini J, Gottlieb A, George R, et al. Tobacco use among male high school athletes. *J Adolesc Health* 1997;21(2):97-101.
 25. Jones RB, Moberg DP. Correlates of smokeless tobacco use in a male adolescent population. *Am J Public Health*. 1988;78(1):61-3.
 26. van den Berg P, Neumark-Sztainer D, Cafri G, Wall M. Steroid use among adolescents: longitudinal findings from Project EAT. *Pediatrics*. 2007;119(3):476-86.
 27. Mays D, DePadilla L, Thompson NJ, Kushner HI, Windle M. Sports participation and problem alcohol use: A multi-wave national sample of adolescents. *Am J Preventive Med*. 2010;38(5):491-8.
 28. Peretti-Watel P, Beck F, Legleye S. Beyond the U-curve: the relationship between sport and alcohol, cigarette and cannabis use in adolescents. *Addiction*. 2002;97(6):707-16.
 29. Moore MJ, Werch CEC. Sport and physical activity participation and substance use among adolescents. *J Adolesc Health*. 2005;36(6):486-93.
 30. Kulig K, Brener ND, McManus T. Sexual activity and substance use among adolescents by category of physical activity plus team sports participation. *Arch Pediatr Adolesc Med*. 2003;157(9):905-12.
 31. Peretti-Watel P, Guagliardo V, Verger P, Pruvost J, Mignon P, Obadia Y. Sporting activity and drug use: Alcohol, cigarette and cannabis

- use among elite student athletes. *Addiction*. 2003;98(9):1249-56.
32. Terry-McElrath YM, O'Malley PM, Johnston LD. Exercise and substance use among American youth, 1991-2009. *Am J Prev Med*. 2011;40(5):530-40.
33. Grossbard J, Hummer J, LaBrie J, Pederson E, Neighbors C. Is substance use a team sport? Attraction to team, perceived norms, and alcohol and marijuana use among male and female intercollegiate athletes. *J Appl Sport Psychol*. 2009;21(3):247-61.
34. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am Psychol*. 2000;55(1):68-78.
35. Locatelli D, Sanchez Z, Opaleye E, Carlini C, Noto AR. Socioeconomic influences on alcohol use patterns among private school students in São Paulo. *Rev Bras Psiquiatr*. 2012;34(2):193-200.
36. Bronfenbrenner U. Ecological models of human development. 2nd ed. New York: Elsevier Science; 1994.
37. Hong JS, Huang H, Sabri B, Kim JS. Substance abuse among Asian American youth: An ecological review of the literature. *Child Youth Serv Rev*. 2011;33(5):669-77.
38. Hong JS, Lee NY, Grogan-Kaylor A, Huang H. Alcohol and tobacco use among South Korean adolescents: An ecological review of the literature. *Child Youth Serv Rev*. 2011;33(7):1120-6.
39. Peck SC, Vida M, Eccles JS. Adolescent pathways to adulthood drinking: Sport activity involvement is not necessarily risky or protective. *Addiction*. 2008;103(Suppl 1):69-83.
40. Pinsky I, El Jundi SA. Alcohol advertising and alcohol consumption among youngsters: review of the international literature. *Rev Bras Psiquiatr*. 2008;30:362-74.
41. Abad JRR, Ruiz-Juan F, Rivera JIZ. Alcohol y tabaco en adolescentes españoles y mexicanos y su relación con la actividad físico-deportiva y la familia. *Rev Panam Salud Pública*. 2012;31(3):211-20.
42. Eccles JS, Barber BL. Student council, volunteering, basketball, or marching band: What kind of extracurricular involvement matters? *J Adolesc Res*. 1999;14(1):10-43.
43. Barber B, Stone M, Hunt J, Eccles J. Benefits of activity participation: The role of identity affirmation and peer group norm sharing. In: Mahoney J, Larson, RW, Eccles, JS, organizadores, editor. *Organized activities as contexts of development: Extracurricular activities, after-school and community programs*. New Jersey: Erlbaum; 2005. p. 185-210.
44. Steinberg L. A Social Neuroscience Perspective on Adolescent Risk-Taking. *Dev Rev*. 2008;28(1):78-106.
45. Ruiz-Juan F, Cruz-Sánchez E, García-Montes ME. Motivos para la práctica deportiva y su relación con el consumo de alcohol y tabaco en jóvenes españoles. *Salud Publica Mex*. 2009;51(6):496-504.
46. Kuntsche E, Knibbe R, Gmel G, Engels R. Why do young people drink? A review of drinking motives. *Clin Psychol Rev*. 2005;25(7):841-61.
47. Smoll F, Smith R. Psychology of the young athlete, stress-related maladies and remedial approaches. *Sports Med*. 1990;37(5):1021-46.
48. Frade IF, De Micheli D, Monezi Andrade AL, de Souza-Formigoni ML. Relationship between stress symptoms and drug use among secondary students. *Spanish J Psychol*. 2013;16:E4.
49. Belanger RE, Ohl F, Berchtold A, Akre C, Suris JC. Social contexts of sports-practicing youths' hazardous drinking. *Swiss Med Wkly*. 2012;142:w13526.
50. Lorente FO, Souville M, Griffet J, Grelot L. Participation in sports and alcohol consumption among French adolescents. *Addict Behav*. 2004;29(5):941-6.

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