

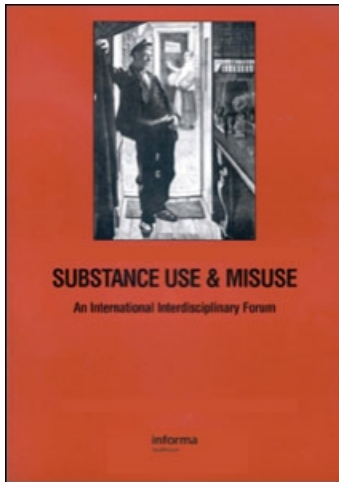
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Daily Exercise and Anabolic Steroids Use in Adolescents: A Cross-National European Study

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Anabolic Steroids

Daily Exercise and Anabolic Steroids Use in Adolescents: A Cross-National European Study

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Aim: The aim of this paper is to investigate the association between anabolic steroid (AS) use and intensive physical exercise among adolescents. Design/setting: The 1999 cross-sectional European School Survey Project on Alcohol and Other Drugs (ESPAD). Data collection by standardized methodology using anonymous self-administered questionnaires completed in the classroom. Participants: National probability samples of a total of 18,430 16-year-old high school students from six European countries (Bulgaria, Croatia, Cyprus, Greece, the Slovak Republic, and the U.K.) Measurements: Besides AS use and physical exercise, questionnaire items selected for this study included tobacco, alcohol, and illicit drug use, indicators of other deviant behavior (self-harming thoughts and behavior, truancy, aggressive behavior), friends' use of AS, and perceived availability. Backward elimination with likelihood ratio tests was used to select the variables to be retained in a multifactorial model. Interactions of other independent variables with country were checked. Findings: Logistic regression analysis of lifetime AS users compared to nonusers showed that the odds of lifetime AS use are 1.4 times higher for students who exercise almost daily and 1.8 times higher for boys compared to girls. Significant associations of AS use were also found with current frequent alcohol use, lifetime use of tranquilizers/sedatives and cannabis, and with the perceptions of friends' use of AS and of easy availability of the substance. Conclusion: Findings indicate that daily exercising appears to increase the risk of anabolic steroid use in adolescents. However, a more general pattern of closely interlinked deviant types of behavior, such as other drug use and aggressive behavior, is prominent. Preventive interventions are needed targeted towards adolescents involved in intensive exercise and sport. These should take into account both the idiosyncrasy and setting of the sporting culture and the special characteristics of this group.

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Keywords Anabolic steroids; physical activity; adolescents; drug use; risk factors; cross-national study

Introduction

The increasing use of anabolic steroids (AS)¹ among elite athletes preparing for highly competitive events such as the Olympic Games has resulted in recent years in the institutionalization of stricter monitoring and policies against AS use at both international and national levels (culminated to the 2003 Copenhagen Declaration on Anti-Doping in Sport, see www.wada-ama.org). Outside elite athletics, AS use has traditionally been associated with weightlifting (Bahrke, Yesalis, and Wright, 1990) and bodybuilding (Kanayama, Pope, and Hudson, 2001), while it has also made its way into professional club sports (i.e. soccer). AS use now seems to extend beyond professional or highly competitive sporting environments, to adolescents and young adults in high schools and in local sport clubs (Yesalis, Barsukiewicz, Kopstein, and Bahrke, 1997; Faigenbaum, Zaichkowsky, Gardner, and Michelli, 1998; Bahrke, Yesalis, and Brower, 1998; Copeland, Peters, and Dillon, 2000; Nilsson, Baigi, Marklund, and Fridlund, 2001; Laure, Lecerf, Friser, and Binsinger, 2004; Johnston, O'Malley, Bachman, and Schulenberg, 2004).

Mounting evidence that an increasing number of young people who exercise actively make unprescribed AS use is eroding the traditional belief in the benefits of encouraging young people's participation in sport, which has provided one of the underpinnings for planned prevention in the younger population of adolescents where substance misuse is usually initiated (UNDCP, 2002). However, the relationship between exercising and AS use is still controversial since a number of studies continue to provide evidence for a posited 'protective role' (Kulig, Brener, and McManus, 2003; Chen et al., 2004; Peretti-Watel et al., 2003; Peretti-Watel and Lorente, 2004).

There is ample evidence that the misuse of AS poses various threats to physical and mental health (Kashkin and Kleber, 1989; Landry and Primos, 1990; Yates, Perry, and Andersen, 1990; Schwerin et al., 1996; Porcerelli and Sandler, 1998). Mood disorders and adverse psychological reactions such as anger, aggressiveness, violence, drug abuse, and dependence, have all been associated with AS use (Johnson, 1990; Brower, Eliopoulos, Blow, Catlin, and Beresford, 1990; Burnett and Kleiman, 1994; Copeland et al., 2000), especially among female users (Gruber and Pope, 2000).

Implications for prevention on the type of association between AS use and exercise in adolescents could be of crucial importance. The aim of this study is to examine further this issue by investigating whether AS use by adolescents in six European countries is correlated with their physical exercising and the nature of such a relationship. Data are taken from the 1999 European School Survey Project on Alcohol and Other Drugs—ESPAD (Hibell et al., 2000). The ESPAD study aims to collect comparable data on the use of alcohol, tobacco, and other drugs by 16-year-old students in most European countries, using standardized methodology.

Method

Sample

The study is based on the data from national probability samples of 16-year-old high school students from six European countries (Bulgaria, Croatia, Cyprus, Greece, the Slovak Republic, and the UK), collected in the 1999 ESPAD study. Each country employed cluster

sampling with school class as the sampling unit. Full details of the sampling methodology and procedures are given by Hibell et al. (2000, see also www.espad.org). ESPAD's standardized methodology assures data comparability and hence lends further validity to correlates found to apply uniformly across different cultures and social milieus. The criterion for a country's inclusion in the present analysis was a reported lifetime prevalence of AS use of at least 2% among the male students; six of the ten invited countries provided us with their data files. Sample sizes were: Bulgaria 5,391; Cyprus 2,095; Greece 2,259; the UK 2,641; the Slovak Republic 2,442; and Croatia 3,602 (total 18,430 students).

Data Collection Procedures and Measures

Data were collected by anonymous questionnaires administered in school classrooms. Besides substance use items and sociodemographic data, the questionnaire included core and optional items tapping a broad range of health-related behavior and attitudes. The English version can be found in Hibell et al. (2000). The proportion of eligible students who were present in the class on the day of data collection ranged from 86% to 92% and very few of those who were present refused to participate (Hibell et al., 2000).

The two variables of central interest to this study were: any AS use was established by the question "On how many occasions in your lifetime (if any) have you used any of the following drugs?" including the item "anabolic steroids". Frequency of exercise was measured from the question "How often (if at all) do you actively participate in sports, athletics, or exercising." Response options included: Never, a few times a year, once or twice a month, at least once a week, almost every day.

Use of Other Substances

Current smoking was defined as smoking six or more cigarettes per day in the last month in response to the question: "How frequently have you smoked cigarettes during the last 30 days?" *Current alcohol use* was defined as drinking on at least 10 occasions in the last month, based on the item: "On how many occasions (if any) have you had any alcoholic beverage to drink?" *Lifetime use of any illicit drug* was calculated on the basis of the reported use of any of cannabis, amphetamines, LSD, crack, cocaine, heroin, and ecstasy in response to the series of questions on lifetime use of drugs. The *use of tranquilizers/sedatives* was assessed from the same question. The *number of illicit drugs* used was obtained from the questions on lifetime use of the above illicit drugs plus inhalants, magic mushrooms, and anabolics.

Deviant Behavior

Aggressive behavior was assessed by the question: "During the last 12 months, how often have you gotten mixed into a fight at school or at work?" *Truancy* was assessed by the question: "During the last 30 days, how many whole days of school have you missed because you skipped or "cut"? Three further variables were available from Cyprus and Greece only, as follows: *self-harming thoughts and behavior* were assessed by the questions: "Has any of the following ever happened to you?" including the items: "thought of harming yourself", "attempted suicide"; *running away from home* was assessed by the question: "Has any of the following ever happened to you?" followed by the item *run away from home for more than one day?*

Other Variables

Perceived availability of AS was assessed by grouping together the fairly easy and very easy responses to the question: “*How difficult do you think it would be for you to get anabolic steroids, if you wanted?*” Similarly, perceived popularity of AS use among friends was calculated on the basis of the some, most, and all responses to the question: “*How many of your friends would you estimate take anabolic steroids?*” School performance was based on the two highest categories of responses to the question: “*Which of the following best describes your average grade in the end of the last term?*” Response options varied between countries and this variable was not available from the UK. The perception that one’s family socioeconomic situation was better than the average was defined from the responses “very much better-off,” “much better-off,” and “better-off” to the question “*How well-off is your family compared to other families in your country?*”

Statistical Analysis

The first stage of analysis was to examine the association of lifetime AS use and daily exercise with the other variables one by one, using X^2 tests for comparing proportions and t tests for comparing means. This was done separately in each country. In the second stage, a single logistic regression analysis was carried out on the data from all six countries. The dependent variable was lifetime AS use and dummy variables were included for countries (reference category: U.K.). The other independent variables were: exercising (1 = daily, 0 = less often); last 30 days smoking cigarettes (1 = six or more cigarettes per day, 0 = less); last 30 days alcohol drinking (1 = 10 or more times, 0 = less); lifetime use of cannabis (1 = ever, 0 = never); lifetime use of tranquilizers/sedatives (1 = ever, 0 = never); perceived availability of anabolics (1 = easy to find, 0 = difficult to find); friends use anabolics (1 = some, most or all, 0 = none or few); skipped or cut school (1 = yes, 0 = no); and gender (1 = boys, 0 = girls). The other variables considered in the first stage could not be included in the second stage because they were not available for all countries. Backward elimination with likelihood ratio tests was used to select the variables to be removed from the logistic regression. Finally, interactions of all the other independent variables with country were tested.

Results

Prevalence of lifetime use of anabolics: lifetime AS use by 16-year-old students in 1999 ranges from 1.2% in the Slovak Republic to 3.5% in Croatia. In every country, except the UK, a significantly higher percentage of boys than girls reported lifetime AS use (at $p < .01$ or $p < .001$) (Table 1).

Physical exercise: The percentage of the 16-year-old students reporting almost daily physical exercise ranges from 23% in Greece to 41% in the Slovak Republic (Table 1). This percentage was also significantly higher in boys than girls ($p < .001$).

Correlates of lifetime AS use: with the exception of Bulgaria and the UK, significantly more AS users than nonusers exercise daily. Compared to nonusers, a much greater number of lifetime AS users in all countries smoke six or more cigarettes per day and have drunk alcohol 10 or more times during the last month. Significantly more AS users than nonusers report any lifetime use of illicit drugs. Compared to nonusers, more AS users admit getting involved in a fight (except in the UK). AS users are also more likely to run away from

Table 1

Lifetime use of anabolics and daily exercise in the six countries, by gender (Entries are in percentages)

	Lifetime Use of Anabolics			Almost Daily Exercise		
	Total	Boys	Girls	Total	Boys	Girls
Bulgaria	2.2	4.0	0.7***	37.3	53.7	23.5***
Croatia	3.5	4.4	2.4**	34.1	45.2	20.9***
Cyprus	2.3	4.5	0.5***	29.7	45.9	16.6***
Greece	2.0	3.2	1.2**	23.0	35.3	14.2***
Slovak Republic	1.2	2.5	0.2***	41.0	49.4	33.6***
UK	2.0	2.2	1.7	33.3	47.5	18.9***

** $p < .01$; *** $p < .001$.

home, and to report that they have thought of harming themselves and even that they have attempted suicide (data only from Cyprus and Greece) (Table 2).

More AS users than nonusers say that they would find it easy to get access to AS if they wanted to and think that many of their friends use AS. Lifetime AS users also have a greater tendency to play truant from school. More nonusers in Croatia, the Slovak Republic, and Cyprus say that they do better in school than AS users. The perceived socioeconomic status of the family is statistically significantly associated with AS use only in Greece (Table 2).

Logistic regression analysis of lifetime AS users compared to nonusers (Table 3) showed that the odds of lifetime AS use are:

1. Nearly twice as high for boys than girls.
2. 1.4 times higher for students who do exercise on almost daily basis.
3. 1.8 times as high for students who have drunk alcohol 10 or more times during the last month.
4. Much increased among those who report any lifetime use of tranquilizers/sedatives and cannabis (3.6 and 4.2 times higher, respectively).
5. Very much higher among those who believe that it is fairly or very easy to find AS and who think that some or most of their friends use AS (4.5 and 6.2 times, respectively).
6. Higher in Croatia and Cyprus than in the other countries (Table 3).

Bearing in mind the very large sample size, interactions between countries and the other independent variables were only weakly significant, with the exception of the interaction between gender and country ($p = .001$), which appeared to arise because of a much greater association between gender and AS use in Bulgaria than in other countries (odds ratio for the interaction term 3.14, 95% confidence interval 1.28–7.72 compared to the U.K.). An interaction between daily exercise and country ($p = .028$) appeared to represent a lower association between daily exercise and AS use in Bulgaria than elsewhere (odds ratio for the interaction term 0.44, 95% confidence interval 0.24–0.82 compared to the U.K.). Finally, an interaction between lifetime use of tranquilizers or sedatives and country ($p = .022$) appeared to be due to a stronger association with AS use in Greece (odds ratio 2.75, 95% confidence interval 1.23–6.15) than elsewhere. The general insignificance of the interaction terms confirms that associations between AS use and other factors are basically the same in each of the countries under examination.

Table 2

Lifetime AS use in relation to other behaviors and perceptions, tested separately in each country. Entries are in percentages (Compared by X^2), except for number of drugs used (Mean, compared by t test)

	Lifetime Use of Anabolics											
	Bulgaria		Cyprus		Greece		UK		Slovak Republic		Croatia	
	Yes N = 70	No N = 3136	Yes N = 82	No N = 3478	Yes N = 44	No N = 2151	Yes N = 39	No N = 2583	Yes N = 30	No N = 2393	Yes N = 123	No N = 3401
Actively participate in sports (Almost every day)	46.4	37.1	63.0	29.0***	50.0	22.5***	33.3	33.2	66.7	40.5**	43.2	33.9*
Current smoking	41.4	22.2***	39.0	11.1***	54.5	15.6***	27.5	14.9*	30.0	12.6*	58.5	17.4***
Current alcohol use	16.4	4.5***	35.4	10.0***	42.9	13.1***	36.2	15.0***	27.6	6.7**	30.9	5.3***
Lifetime use of any illicit drug	65.2	12.5***	42.5	4.3***	52.3	8.6***	62.0	35.4***	63.3	19.9***	77.9	15.4***
Number of drugs used in lifetime (mean) [†]	3.3	0.2***	3.2	0.4***	3.6	0.3***	3.1	0.8***	3.1	0.4***	4.4	0.4***
Lifetime use of cannabis	55.9	10.9***	26.3	3.3***	40.9	7.7***	58.3	34.5**	63.3	18.2***	74.0	13.8***
Lifetime use of tranquilizers/sedatives	33.3	3.1***	32.1	5.1***	45.5	4.2***	13.7	4.1**	20.7	6.4*	45.5	6.0***
Got mixed in a fight at school	65.2	21.8***	68.0	34.5***	65.9	16.5***	36.2	26.5	—	—	59.7	20.6***
Perceived number of friends using anabolics	46.4	3.9***	29.1	1.6***	34.1	1.5***	8.0	2.1*	10.0	1.0**	26.7	2.3***
Perceived availability of anabolics (easy to find)	65.2	14.8***	75.3	16.4***	75.0	24.5***	64.7	16.6***	75.9	13.1***	39.3	9.6***
Truancy	58.3	35.9**	55.3	27.9***	64.3	31.7***	40.4	18.5**	42.9	27.6	53.5	23.2***
Perceived family's socioeconomic status (better-off)	44.8	37.5	53.8	41.4	54.5	32.8**	52.9	42.5	56.7	52.5	52.9	63.3
School performance	23.2	33.3	49.4	68.9***	20.5	18.7	—	—	43.3	64.5*	43.9	60.0***
Running away from home (for more than 1 day)	—	—	45.6	13.4***	52.3	13.4***	—	—	—	—	—	—
Thought of harming oneself	—	—	50.6	32.9*	55.8	39.0*	—	—	—	—	—	—
Attempted suicide	—	—	51.3	11.6***	30.2	14.7**	—	—	—	—	—	—

* $p < .05$; ** $p < .01$; *** $p < .001$.

—: Data not available.

†: Includes: cannabis, amphetamines, LSD, crack; cocaine, heroin, ecstasy, tranquilizers/sedatives, inhalants, magic mushrooms, and anabolics.

Table 3

Logistic regression analysis of any lifetime use of anabolics: dummy variables entered for countries and other covariates tested by backward elimination ($p = .05$)

	<i>p</i>	Odds Ratio	95% C.I. for O.R.	
			Lower	Upper
Dummy variables for country (reference UK)	<.001			
Bulgaria	0.129	1.45	0.89	2.37
Croatia	0.001	2.20	1.40	3.45
Cyprus	<.001	2.33	1.46	3.72
Greece	0.150	1.46	0.87	2.45
Slovak Republic	0.775	0.92	0.53	1.59
Active participation in sports (Almost every day)	0.015	1.40	1.06	1.85
Current alcohol use	0.001	1.76	1.28	2.42
Lifetime use of cannabis	<.001	4.21	3.11	5.70
Lifetime use of tranquilisers/sedatives	<.001	3.56	2.56	4.94
Perceived availability of anabolics	<.001	4.51	3.37	6.05
Perceived number of friends used anabolics	<.001	6.16	4.37	8.67
Gender	<.001	1.83	1.35	2.50

Discussion

Findings from the ESPAD study replicate evidence based on reports from other countries on the low but not negligible prevalence of AS use among adolescents (Yesalis et al., 1997; Faigenbaum et al., 1998; Nilsson et al., 2001; Laure et al., 2004).

The association between physical exercise and drug use remains a controversial issue in the literature (Peretti-Watel, Beck, and Legleye, 2002). A large body of research suggests that overall there is a negative correlation between sporting activity—especially in organized sports and substance use (Peretti-Watel et al., 2003; Peretti-Watel and Lorente, 2004), that is, a substantially smaller portion of adolescents who participate in sports, compared to those who do not, report licit and illicit substance use. This suggests that involvement in sports protects from early experimentation with drugs (Kulig et al., 2003; Chen et al., 2004). In contrast, other studies dispute the protective role of physical activity in substance use and provide evidence for a positive association between alcohol (Dunn, 2003) and cannabis use (Ewing, 1998; Lorente, Peretti-Watel, and Grelot, 2005), and intensive exercising. The present study shows that AS use is associated with daily physical exercising.

The findings from the present study are also in line with other studies that observe a close link between AS and the use of other licit or illicit drugs (Kindlundh, Isacson, Berglund, and Nyberg, 1999; Yesalis, Kennedy, Kopstein, and Bahrke, 1993; DuRant, Rickert, Ashworth, Newman, and Slavens, 1993; DuRant, Ashworth, Newman, and Rickert, 1994; DuRant, Escobedo, and Heath, 1995; Bahrke, Yesalis, Kopstein, and Stephens, 2000; Kanayama, Pope, Cohane, and Hudson, 2003; Nilsson et al., 2001) and between AS use and a broader range of problem behaviors (Choi and Pope, 1994; Copeland, Peters, and Dillon, 2000; Miller, Barnes, Sabo, Melnick, and Farrell, 2002).

Study's Limitations

Our study has its limitations.² The measurements of AS use are based on self-reports. There are however studies demonstrating that self-reports provide valid measures of substance use (Brener, Collins, Kann, Warren, and Williams, 1995). Another limitation is that our findings are school based and cannot be extended to adolescents outside school. However, it should be underlined that large majority of adolescents of this age are enrolled in the school system. Finally, the restricted number of variables available for all countries did not allow a more in-depth account of both AS use and exercise patterns.

The major strengths of the study are its cross-national character, the large size of the samples, and the standardized methodology followed. On these grounds, findings of this study provide evidence on factors associated with AS use by adolescents that can be generalized. They could consequently have important implications for prevention. Prevention programs should approach adolescents involved in intensive exercise as a potential high-risk group. This implies the development of targeted interventions that take into account both the idiosyncrasy of the sporting culture and the special characteristics of this group.

Notes

1. The reader is reminded that the use and misuse of AS is but one example of the increased use of a range of 'enhancer substances' which in a very broad sense are used both to give someone an 'edge' over 'the other' as well as to permit a 'have not' to have some type of an opportunity to try to equalize. There are a range of caffeine-based drinks, etc. used for their enhancer effects . . . including for 'cognitive enhancement' as well as sacramental substances for 'spiritual enhancement'. Editor's Note
2. An additional limitation of this study, as with many studies in the area of substance use intervention, is the inadequate description of the sample which does not present a sense of a functioning person, in this case an adolescent student, with strengths (skills, abilities, knowledge, energy levels, etc.) and limitations as s/he adapts and functions, daily, in various roles, contexts, environments, networks, etc. adequately as well as inadequately, appropriately as well as inappropriately, etc. Creating, maintaining and change pro-social life styles, as well as anti-social ones 'demands' resources which are available and accessible. Editor's Note.

RÉSUMÉ

Exercice Quotidien et utilisation de Stéroïdes Anabolisants Chez Les Adolescents: Une Étude Européenne Transnationale

Objectif: Cette étude a pour but d'examiner la relation qui existe entre l'utilisation de stéroïdes anabolisants (SA) et l'exercice physique intensif chez les adolescents. Conception/cadre: L'enquête transversale ESPAD 1999 (le projet européen d'enquête sur l'alcool et les autres drogues en milieu scolaire). Rassemblement de données par le biais d'une méthodologie standardisée, utilisant des questionnaires autogérés et anonymes, complétés en classe. Participants: Echantillons de probabilité nationaux sur un ensemble de 18.430 élèves du secondaire, âgés de 16 ans, dans six pays européens (Bulgarie, Chypre, Croatie, Grèce, République slovaque et Royaume Uni). Evaluation: Au-delà de l'utilisation de SA et de l'exercice physique, le questionnaire reprend dans le cadre de cette étude des points tels le tabac, l'alcool et l'utilisation de drogues illicites, les indices d'autres comportements déviants (pensées et comportement autodestructeurs, absentéisme, comportement agressif),

l'utilisation de SA par les amis et la perception relative à la disponibilité. La sélection des variables à retenir, au sein d'un modèle multifactoriel, a été réalisée par élimination progressive, au moyen de tests de rapport de vraisemblance. Les interactions d'autres variables indépendantes selon le pays ont également été vérifiées. Résultats: L'analyse de régression logistique, menée auprès d'utilisateurs à vie de SA en comparaison avec des non utilisateurs, a démontré que les chances d'utilisation de SA à vie sont 1,4 fois plus élevées pour les élèves faisant de l'exercice sur un plan quasiment quotidien, et 1,8 fois plus élevées pour les garçons par rapport aux filles. Cela a été démontré qu'il existe une relation considérable entre l'utilisation de SA et la consommation fréquente habituelle d'alcool, l'utilisation à vie de tranquillisants - calmants et de cannabis, ainsi qu'avec la perception de l'usage de SA par les amis et de la disponibilité aisée de la substance. Conclusions: Les résultats indiquent que l'exercice quotidien semblerait augmenter les risques d'usage de stéroïdes anabolisants chez les adolescents. Il émerge, néanmoins, un modèle plus général de modes déviants de comportement qui sont étroitement liés, tels l'utilisation d'autres drogues et le comportement agressif. Des interventions de prévention sont nécessaires, visant les adolescents qui font de l'exercice et pratiquent du sport de manière intensive. Ces interventions doivent prendre en considération aussi bien les éléments distinctifs et le cadre particulier de la culture athlétique, que les caractéristiques spécifiques de ce groupe de personnes.

Mots-clés: Stéroïdes anabolisants; activité physique; adolescents; usage de drogues; facteurs de risque; étude transnationale

RESUMEN

El Ejercicio Diario y el Uso de Esteroides Anabólicos Entre Los Adolescentes: Un Estudio Internacional Europeo

Propósito: Este estudio tiene el propósito de investigar la conexión entre el uso de esteroides anabólicos (EA) y el ejercicio físico intenso entre los adolescentes. **Proyecto/ambiente:** El estudio transversal del 1999, Proyecto de Encuesta Escolar Europea sobre el Alcohol y Otras Drogas (ESPAD, siglas en inglés). **Acumulación de datos por metodología estandarizada** usando cuestionarios anónimos rellenos de manera autónoma en el salón de clases. **Participantes:** Ejemplares nacionales de probabilidad de un total de 18.430 alumnos de escuela superior de 16 años desde seis países europeos (Bulgaria, Croacia, Chipre, Grecia, la República Eslovaca y el Reino Unido) **Medidas:** Además del uso de EA y el ejercicio físico, los asuntos del cuestionario escogidos para este estudio incluyen el uso de tabaco, alcohol, y drogas ilegales, indicadores de otro comportamiento desviado (pensamientos y acciones de lesionarse, ausencia intencional, comportamiento agresivo), el uso de EA de parte de amistades y la disponibilidad percibida. Se usó eliminación al revés con pruebas de proporción de probabilidad para seleccionar las variables a retenerse en un modelo de factores múltiples. Se revisaron las interacciones entre otras variables independientes y el país. **Observaciones:** La análisis de regresión logística de consumidores de EA de por vida, comparado a los no consumidores, demostró que las probabilidades de uso de EA de por vida son 1,4 veces más altas para alumnos que hacen ejercicio casi a diario y 1,8 veces más altas para los muchachos comparado a las muchachas. Se encontraron también conexiones significativas entre el uso de EA y el uso actual y frecuente de alcohol, el uso de por vida de tranquilizantes o sedativos y marihuana, y también la percepción del uso de EA de parte de amistades y de la facilidad de conseguir la esencia. **Conclusiones:** Las observaciones indican que el ejercicio diario parece aumentar el riesgo del uso de esteroides

anabólicos entre los adolescentes. Sin embargo, se destaca una tendencia más general de tipos de comportamiento desviado estrechamente entrelazados, como el uso de otras drogas y el comportamiento agresivo. Se necesitan intervenciones preventivas orientadas hacia los adolescentes que participan en ejercicio intensivo y en los deportes. Estas deberían tomar en cuenta tanto la idiosincrasia y el ambiente de la cultura deportiva como las características particulares de este grupo.

Palabras clave: Esteroides anabólicos, actividad física, adolescentes, uso de drogas, factores de riesgo, estudio internacional.

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