Psicothema

Meta-analysis of the effectiveness of school substance abuse prevention programs in Spain

José P. Espada, María T. Gonzálvez, Mireia Orgilés, Daniel Lloret and Alejandro Guillén-Riquelme
Universidad Miguel Hernández

Abstract

Background: There has been an increase in adolescent substance use that has led to the development and implementation of prevention programs. New evidence is needed in order to improve them and optimize the resources. The aim of this paper is to use a meta-analysis to analyze the effectiveness of school drug prevention programs in Spain. **Method:** Twenty-one studies that evaluated drug abuse prevention programs in schools, were published between 2002 and 2013, and that met the selection criteria were identified. **Results:** Preventive program effectiveness was low ($d= 0.16$), although it was higher at the follow-up ($d= 0.30$). The programs were most effective in changing attitudes ($d= 0.44$) towards drugs. The models of health education ($d= 0.48$) and social learning ($d= 0.20$) were also very effective, especially in combination with oral, written, and audiovisual support material ($d= 0.21$) and the implementation of joint programs by health education professionals and faculty members ($d= 0.25$). **Conclusions:** Is possible to determine the need for more rigorous evaluations of interventions to establish useful programs.

Keywords: meta-analysis, prevention, drugs, school environment, teens.

Resumen

Meta-análisis de la eficacia de los programas de prevención escolares del abuso de sustancias en España. **Antecedentes:** en los últimos años se ha producido un aumento del consumo de sustancias en población adolescente. Es necesario contar con nuevas evidencias sobre programas que funcionan y mejorar aquellos que se están realizando con el fin de optimizar los recursos. El objetivo de este trabajo es analizar la eficacia de los programas escolares de prevención de drogas en España mediante un meta-análisis. **Método:** se identificaron 21 estudios publicados entre 2002 y 2013 que cumplieron los criterios de selección y que evaluaban programas de prevención del abuso de drogas en el ámbito escolar en España. **Resultados:** la eficacia preventiva de los programas fue baja ($d= 0.16$), aunque era mayor en las medidas de seguimiento ($d= 0.30$). Los programas resultaron más eficaces en la modificación de las actitudes hacia las drogas ($d= 0.44$). Los modelos de educación para la salud ($d= 0.48$) y aprendizaje social ($d= 0.20$) resultaron más eficaces, junto con la combinación de soporte oral, escrito y audiovisual del material ($d= 0.21$) y la implementación de los programas por profesionales y profesorado conjuntamente ($d= 0.25$). **Conclusiones:** A partir de los resultados es posible determinar la necesidad de evaluaciones más rigorosas de las intervenciones.

Palabras clave: meta-análisis, prevención, drogas, ámbito escolar, adolescentes.

Adolescent substance use remains a serious problem in Spain. Better prevention programs are of paramount importance in addressing this problem. However, it is first necessary to evaluate the effects of current Spanish drug prevention programs and to examine what would make them more effective.

Meta-analyses are a fast and safe way of consolidating the latest scientific evidence on any subject (Sánchez-Meca & Botella, 2010). The methodology of meta-analysis is noted for its ability to direct the replication of studies and to allow for the analysis of the sources of heterogeneity in study results (Marín-Martínez, Sánchez-Meca, & López-López, 2009).

The first meta-analysis regarding substance abuse (Tobler, 1986) found that the programs produced a moderate effect on the levels of

drug knowledge, but had a negligible effect in changing attitudes. Bangert-Drowns (1988) concluded that voluntary participation produced greater behavioral changes and the programs that used fellow group leaders as monitors did better. The meta-analysis conducted by Rundall and Bruvold (1988) agreed with Tobler that programs did not change attitudes but they increased the level of knowledge, and retention of this knowledge had a positive long-term effect on consumption.

Rooney and Murray (1996) reviewed smoking prevention programs, discovering that the most effective of these had the following characteristics: annual follow-ups, observation and feedback, random assignment of prevention groups, follow-up booster sessions in later years, peers of the same ages as the monitors, and they lasted for ten sessions or less. Shortly after this meta-analysis, Tobler, Lessard, Marshall, and Ochshorn (1999) analyzed marijuana prevention programs. This time, they concluded that interactive programs implemented by psychologists and educators produced major changes if they were supported by peers or teachers.

The reviews carried out in recent years to determine the effectiveness of substance prevention programs have established

that social influence (Cuijpers, 2002) and social skills (Faggiano et al., 2005, 2008), combined with the use of group leaders to strengthen the impact of programs (Thomas, 2004), all improve the efficacy of treatment programs. Additionally, Faggiano et al. (2005) highlighted the importance of evaluating the individual components making up the interventions (e.g., peers, parents, booster sessions). They also stated that affectivity-based programs improved decision making and knowledge, while knowledge-based programs improved mediating variables, but that neither was as effective as skills-based programs (Faggiano et al., 2008).

In Spain, a meta-analysis of prevention program studies published between 1985 and 2002 was performed (Espada et al., 2002), concluding that the preventive efficacy of the programs tended to increase over time. As for the substance involved, the more effective programs always focused on alcohol abuse prevention. Regarding the theoretical model of choice, the programs based on the theories of reasoned action and social learning performed better than others did.

Researchers at the international level have recently conducted several meta-analyses of school substance abuse prevention programs. However, in Spain, for more than a decade, there has been a lack of quantitative analyses on determining the effectiveness of preventive interventions. Therefore, it is necessary to find new evidence about the major characteristics of the most effective current programs in order to optimize resources. Thus, the objective of this study is to conduct a meta-analysis to integrate the results of the research carried out in this field in recent years in Spain, with the purpose of evaluating the effectiveness of programs aimed at preventing drug use in Spanish adolescents, and analyzing the variables that modulate their preventive efficacy.

Methods

Literature search and inclusion criteria

The literature search was conducted using major databases (PsychInfo, Medline, Scopus, Tripdatabase, Social Science Citation Index, Cochrane, and the databases of CSIC: ICYT, ISOC, and IME), gray literature (Google Scholar and Teseo), and a direct review of specialized journals, books, and monographs. We included theses, books, and monographs to minimize the publication bias. In all of these documents, we used the inclusion criteria, and guarantee the use of a control group or repeated measures and methodological aspects to control for the methodological quality of these documents.

The search terms were: *teen, young, youth, intervention, study, program, school, meta-analyses, Spain, abuse, drug use, illegal drugs, psychoactive substances, snuff, alcohol, cocaine, ecstasy, marijuana,* and *cannabis*. These terms were searched in full documents. Only Spanish or English studies were included. The criteria for study inclusion were:

a) The program had been implemented with Spanish adolescents.
b) The study had been published between 2002, the year in which the last meta-analysis (Espada et al., 2002) with the same objectives as this study took place, and 2013, which was the year this review was conducted.
c) The study reported on the program outcome evaluations, which were aimed at primarily preventing drug abuse in adolescents between ages 10 and 19 years within a school context.
d) The study submitted sufficient data to calculate effect sizes.
e) The study had an experimental, or quasi-experimental, design with pretest-posttest and/or follow-up measures.

The literature search identified 15,543 studies, of which 21 were finally included in the meta-analysis (Figure 1). The 18 articles were published. Fifteen expert authors in the field of study were contacted by e-mail in order to obtain information concerning unpublished work that had not yet been included in our study. Only three authors responded without providing further studies.

Coding the studies

A manual detailing of the criteria for coding the study characteristics in order to increase the accuracy of the results was developed. To avoid bias due to coding order, the studies were presented randomly to the coders.

Two reviewers read 1,078 abstracts to assess the relevance of each summarized study and to make an inclusion decision. The full text of the 103 works remaining after the abstract review was obtained. Eighty-two papers were excluded for methodological reasons (i.e., lack of preventive program control or a comparison group, insufficient data for statistical analysis, and/or duplicate data that presented in other studies).

Data from the 21 papers finally included in the meta-analysis were extracted independently by the two reviewers. The degree of agreement was found with Cohen's kappa coefficient and intraclass correlation coefficient. The average value was .714 (range: .518 to 1). Disagreements were resolved by a third reviewer.
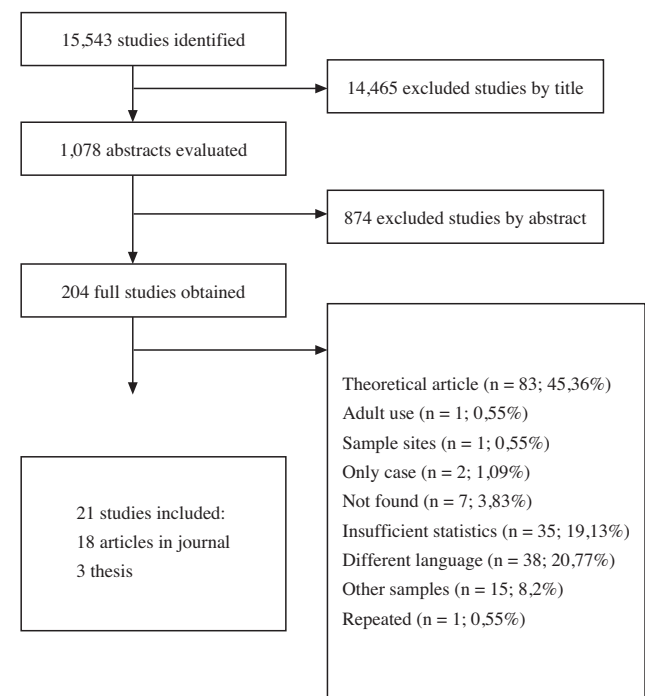

Figure 1. *Identification of included studies*

Characteristics of the studies

The year 2008 saw the highest percentage (20%) of studies compared to every other year in the period of interest. In the past two years, there has been a sharp decline in the research into this field, with a representation of 5% of the total publications in both 2012 and 2013. Three of the studies were doctoral theses, while the others were scientific articles. All the studies included had control group, to ensure the methodological quality of them.

Tables 1 and 2 show the main variables of the included studies. Eighteen of the studies reported the gender of the participants, with a high percentage of women (*M*= 53.92%; *SD*= 18.09%). Only four studies requested their participants to complete homework, and parental participation was assessed in five studies.

Table 1 Qualitative variables (n= 21)		
Variable	**Category**	**Frequency (%)**
Main substance	1. Tobacco	10 (47.62%)
	2. Alcohol	2 (9.52%)
	3. Alcohol + Synthetic drugs	2 (9.52%)
	4. Cannabis	1 (4.76%)
	5. Alcohol + Tobacco + Synthetic drugs	1 (4.76%)
	6. Drugs, in general	5 (23,81%)
Theory	1. Social learning	2 (10%)
	2. Reasoned action	1 (5%)
	3. Social influence model	1 (5%)
	4. Health education	6 (30%)
	5. Others	10 (50%)
Methodology	1. Active	17 (80.95%)
	2. Passive	2 (9.52%)
	3. Unspecified	2 (9.52%)
Assignment	1. Incidental	9 (42.86%)
	2. Random	4 (19.05%)
	3. Pseudorandom	6 (28.57%)
	4. Unspecified	2 (9.52%)
Components	1. Information	19 (90%)
	2. Modeling	11 (52%)
	3. Social skills	13 (61%)
	4. Solving problems	6 (29%)
	5. Self-control	3 (14%)
	6. Emotional education	4 (19%)
	7. Operational techniques	4 (19%)
	8. Making personal decisions	11 (52%)
	9. Public commitment	7 (33%)
	10. Normative expectations + advertising	3 (14%)
	11. Leisure	2 (1%)
	12. Leisure + advertising	1 (0.5%)
Information	1. Oral	2 (9.52%)
	2. Oral + written	3 (14.29%)
	3. Oral + written + audiovisual	8 (38.1%)
	4. Unspecified	8 (38.1%)
Administrator	1. Professional	16 (76.19%)
	2. Mixed	2 (9.54%)
	3. Unspecified	3 (14.28%)
Administrator training	1. Psychologist	9 (21.95%)
	2. Educator	6 (14.63%)
	3. Professor	18 (43.90%)
	4. University student	6 (14.63%)
	5. Other	2 (4.88%)

Of all the programs examined, only four included booster sessions. Of the 21 studies, twelve included only one program, two included two programs, three included three programs, and four included four programs. The total sample size in the posttest was n= 10,956, and in the follow-up was n= 9,149. More than one-third (38.1%) of the studies reported that they had conducted a preliminary training of administrators. In most cases, this training was conducted via a special training course before administration. In one study, the training was provided through a self-manual. One of the studies carried out follow-ups with the administrators via fortnightly meetings. There was great variability in the training times, with the longest duration being 48 hours. More than one-third (35%) of the studies used manualized programs.

As for the measurement instruments used in the evaluations, 70% of the studies used at least one objective or standardized assessment method (stable measurements), while 10% employed standardized self-reports, and 20% used unstandardized self-reports. In 55% of the cases, the psychometric data of the utilized instruments were provided. Implementation fidelity was controlled only in two of the studies, analyzed by self-reports.

Of the 21 studies analyzed, 42.9% held a cluster effect control by center and application group, controlling for contamination bias. Only 16.2% applied an experimental design.

As for the drop rate, 45% of the studies controlled for attrition. The average percentage of students who continued at posttest was 75.45% (*SD*= 31.09%).

An assessment of the average quality of the reviewed studies was made according to nine criteria [0-9]: randomization, type of design, sample size, attrition, follow-up actions, evaluator-blind procedure, average pre-post consistency, use of objective and standardized tools, and implementation fidelity. The average methodological quality of the studies was moderate (*M*= 4.88; *SD*= 1.43).

Effect size index

The effect size was calculated using the standardized difference between the pre-post mean for the intervention group. We calculated the effect size for each dependent variable included in the analysis (Knowledge of drugs, attitudes towards drugs, intention and drug consumption). This effect size was used for the efficacy in each dependent variable and for total effect. We calculated the effect size for posttest and follow up independently.

Statistical analysis

To calculate the general effect size, we used a fixed effects model, because the number of studies was lower. Moderator

Table 2 Quantitative variables					
Variable	**n**	**Minimum**	**Maximum**	**M**	**SD**
Number of sessions	14	4	20	9.71	4.84
Length of intervention (in weeks)	5	4	20	9.20	6.83
Number of intervention hours	5	2	20	10.40	6.54
Follow-up (in months)	9	6	24	12.55	5.02
Study quality (0 to 9)	18	2.5	8	4.83	1.35

analysis was done with analysis of variance and weighted continuous moderators with weighted meta-regression models. The homogeneity in the results was examined with the *Q* statistic. To analyze the publication bias, Egger's regression test was used. We used *metafor* package for *R* program (Viechtbauer, 2010).

Results

Short-term efficacy of the programs

The effect sizes of the programs were calculated from the mean scores and standard deviations of the intervention. A summary of these is shown in Table 3, where it can be seen that the global average effect size is 0.16 (*SE*= 0.03). When analyzing observed variability, heterogeneity was shown to be very high (*Q*= 132.4; *p*<.01). The Egger's regression test was *Z*= 2.28 (*p*= .02) for posttest and *Z*= 0.97 (*p*= .33) for follow up.

Influence of moderator variables on short-term efficacy

Because homogeneity was observed in the effect sizes, we proceeded to analyze the source of variability. A summary of these is shown in Table 4. First, we included the underlying theory for each of the preventive programs. The model in which interventions are most effective is the *health education model*. We observed no effect sizes greater than 0.2 for the rest of the included theoretical models.

With respect to the support materials, the effect size was small for all combinations, but it was somewhat higher when the oral, written, and audiovisual materials were used together. Conversely, programs that combined the oral and audiovisual material were not effective, but the oral material alone obtained somewhat

Table 3
Average effectiveness of preventive programs

Program effectiveness	k[a]	d	95% CI Lower limit	95% CI Higher limit	Q[b]	p
Global	36	0.16	0.10	0.22	77.63	<.01
Efficacy variable						
Knowledge of drugs	18	0.34	0.23	0.45	70.66	<.01
Attitudes towards drugs	15	0.44	0.33	0.54	65.36	<.01
Intention	14	0.23	0.14	0.32	20.55	<.01
Drug consumption	20	0.18	0.11	0.26	25.42	<.01
Substance						
Alcohol	20	0.38	0.27	0.49	72.38	<.01
Tobacco	12	0.20	0.1	0.30	16.87	<.01
Cannabis	11	0.19	0.05	0.32	15.99	<.01
Other drugs	23	0.19	0.1	0.28	46.74	<.01

Note: [a] Number of studies; [b] Overall intragroup homogeneity test.

Table 4
Moderator analysis for Short-Term Efficacy of the Programs

Variable	Category	k[a]	d/b	95% CI Lower	95% CI Higger	Qb[b]	Qe	p
Theory		37				76.87	104.95	
	Social learning		0.1031	0.0102	0.1959			.0296
	Reasoned action		0.0999	-0.2253	0.4251			.5469
	Social influence model		0.1181	-0.4879	0.7241			.7025
	Health education		0.478	0.3547	0.6041			<.0001
	Others		0.1895	0.0901	0.2895			.0002
Materials		32				21.55	13.33	
	Oral		0.15	-0.5567	0.8567			.6774
	Oral + written		0.0171	-0.1611	0.1953			.8508
	Oral + written+audiovisual		0.2126	0.1214	0.3039			<.0001
	Oral + audiovisual		0.04	-0.0714	0.1514			.4816
Information		23				50.72	64.75	
	Oral		0.2596	0.1159	0.4033			.0004
	Audiovisual		0.04	-0.0714	0.1514			.4816
	Oral + written		0.0251	-0.1458	0.1961			.7732
	Oral + written + audiovisual		0.3481	0.2369	0.4594			<.0001
Program administrator		29				24.71	49.29	
	Professional		0.1348	0.0696	0.1999			<.0001
	Professional + teachers		0.2466	0.0785	0.4146			.004
Report		34				38.44	62.65	
	Journal		0.1185	0.0558	0.1811			.0002
	Doctoral dissertation		0.3465	0.2099	0.4832			<.0001
Durattion*		14	0.0031	-0.0134	0.0196	0.1336	25.54	.7147
Hours*		16	-0.0519	-0.0692	-0.0347	34.96	51.27	<.0001
Number of sessions*		26	-0.014	-0.0302	0.0023	2.8293	91.92	.0926

Note: [a] Number of studies; [b] Overall intragroup homogeneity test; * Continuous variable

better results. Regarding the type of program administrator, both in the programs run by professionals alone and in programs implemented jointly by professionals and teachers, the effect sizes were small.

Program duration, number of program hours, and number of sessions had no influence on the efficacy of the program. In contrast, programs reported in articles published in journals had smaller effects on overall program efficacy than did programs presented in dissertations. In Table 5, we summarize the moderator effects of each quality item and the total quality.

Medium and long-term program efficacy

Table 6 reports the mean effect sizes for programs that included a follow-up year (± 2 months) and for those doing track after two years of program implementation (± 2 months). At the 12-month follow-up, 27 programs were reported as effective. In this case, the medium effect size was small ($d= 0.3$; $p<.01$). Again, variability was very high ($Q= 57.4$; $p<.01$), so the sources of variability were examined. Oral and written program information together showed statistically significant results ($d= 0.69$; $p<.01$). The type of therapist implementing the program explained part of the variability, as the programs implemented by professionals alone ($d= 0.25$; $p<.01$) and those implemented by professionals and teachers together ($d= 0.48$; $p<.01$) showed remarkable differences in effectiveness. Again, duration ($bj= 0.06$; $p= .02$), number of hours ($bj= 0.01$; $p<.01$), and number of sessions ($bj= -0.06$; $p<.01$) had no impact on the effectiveness of these programs. In the 24-month follow-up, only four articles that the programs were still effective, which is a paltry proportion ($d= 0.03$; $p= 0.65$; $Q= 11.4$; $p= 0.02$).

Discussion

The aim of this study was to evaluate the efficacy of school drug prevention programs in Spain and to analyze how various modulating variables influence the efficacies of such programs. The programs implemented in the school context showed small effect sizes ($d= 0.25$), with a tendency to increase in follow-up assessments ($d= 0.3$), although there is a high variability among the studies. For global effect, the heterogeneity was very high. This result is normal because we included experimental studies and quasi experimental studies, but it is important to interpret this result with caution. In this sense, the results of scientific examinations of school-based prevention in our country have not changed substantially over the past decade, if we compare the present results to those of previous meta-analyses (Espada et al., 2002).

Similar to previous observations, the programs evaluated herein were more effective in preventing alcohol use and in changing the attitudes towards drugs in the short term. They were less effective at preventing consumption. According to Griffin, Botvin, Scheier, and Nichols (2002), variations in consumption usually are detected at follow-up.

Espada et al. (2002) found that programs based on the theories of reasoned action and social learning were the most effective, while the present review shows that the social learning and health education theories yielded the best results.

Currently, many prevention programs are implemented in the classroom by outside specialists. Several investigations have been conducted to discover the most effective preventive agent, with mixed results. In previous research, it was found that programs implemented by professionals outside the school achieved better

Table 5
Moderator analysis for quality items

Variable	Category	k^a	d	95% CI		p	Qb^b	Qe
				Lower	Higger			
Randomization		36					50.6769	131.0147
	Not randomization; no control		0.2293	0.149	0.3096	<.0001		
	Not randomization; some control		0.1436	0.0217	0.2655	.0209		
	Randomization		0.1948	0.0929	0.2968	.0002		
Design		38					49.5046	132.3632
	Quasi-experimental		0.2029	0.1361	0.2697	<.0001		
	Experimental		0.1948	0.0929	0.2968	.0002		
Mortality		13					16.7498	21.4894
	> = 20%		0.2121	-0.1641	0.5883	.2691		
	< 20%		0.1696	0.0794	0.2598	.0002		
	0%		0.1016	-0.041	0.2441	.1625		
Follow up		23					16.9061	37.9803
	No follow up		0.2861	0.0477	0.5245	.0186		
	Follow up (6-11 months)		0.1535	0.0317	0.2753	.0135		
	Follow up (before 12 months)		0.1006	0.0147	0.1865	.0217		
Instruments		36					68.4161	112.6315
	Non standarized instruments		0.4129	0.2411	0.5847	<.0001		
	1 or more standarized		0.02	-0.176	0.216	.8415		
	1 or more objetive		0.2585	0.1839	0.333	<.0001		
Global quality*		36	-0.0512	-0.0901	-0.0124	.0096	6.7007	117.0394

Note: In "sample size", "average pre-post consistency" and "blind" all studies had the same values. [a] Number of studies; [b] Overall intragroup homogeneity test. * Continuous variable

results (Espada et al., 2002; Espada, Rosa, & Méndez, 2003). Meanwhile Moral, Ovejero, Sirvent, and Rodríguez (2005) found significant results in reducing drug use when the program was applied by outside experts. Conversely, Gázquez (2010) concluded that teachers achieve results that are more favorable to reduce drug use. The present study concludes that the programs implemented

by professionals and teachers together are those with the greatest efficacy (*d*= 0.48).

Program intensity is another variable that needs to be considered when obtaining evidence about preventive program efficacy. In this paper, duration, number of hours, and number of sessions were not influential in obtaining the preventive effect,

Table 6 Empirical studies included in the meta-analysis								
Author	**Year**	**Substance**	**Component studies**	**Average age**	**Quality**	**d posttest**	**d follow-up at 12 months**	**d follow-up at 24 months**
Adame	2005	Tobacco	Information + SKT + PS	–	4	0.55	–	–
Ariza et al.	2008	Tobacco	Information + modeling + SKT	–	5	–	0.58	0.70
Ariza et al.	2013	Cannabis	Information + modeling + SKT	14.50	5	0.12	–	–
de Vries et al.	2006	Tobacco	Information + modeling + SKT	–	5	–	–	0
de Vries et al.	2003	Tobacco	Information + modeling + SKT	–	4	-0.02	–	–
Espada, Griffin, Pereira, Orgilés, & García-Fernández	2012	Generic	Information + modeling + SKT + PS	14.30	8	0.04	0.70	–
			Information + SKT	14.30	8	0.09	0.59	–
			Information + PS	14.30	8	-0.11	0.80	–
Espada, Hernández, Orgilés, & Méndez	2010	Alcohol, tobacco and other drugs	Information + modeling + SKT + PS	14.17	5	0.56	-0.02	–
			Information + SKT	14.17	5	0	0.24	–
			Information + PS	14.17	5	-0.33	-0.16	–
Espada, Orgilés, Méndez, García-Fernández, & Inglés	2008	Alcohol, cannabis and other drugs	Information + modeling + SKT + PS	14.17	5	0.82	–	–
			Information + SKT	14.17	5	-0.19	–	–
			Information + PS	14.17	5	-0.68	–	–
Fernández, Carballo, & García	2003	Generic	Information	–	4.5	0.30	–	–
García, López, Fernández, & Catala	2003	Alcohol, tobacco, generic and other drugs	Information + modeling + SKT	15.83	4.5	0.12	–	–
García et al.	2005	Tobacco	Information + modeling + SKT	–	6.5	0.04	–	–
García-Vázquez et al.	2008	Tobacco	Information	17.40	2.5	0.02	–	–
Gázquez, García, & Espada	2011	Tobacco	Information + modeling + SKT	12.40	6.5	0.13	0.02	–
			Information + modeling + SKT + PS	12.40	6.5	0.17	0.11	–
Gómez, Barrueco, Aparicio, Maderuelo, & Torrecilla	2008	Tobacco	Information	14.24	4.5	0.33	–	–
Gómez, Luengo, & Romero	2002	Tobacco, alcohol, cannabis and other drugs	Information + SKT	14.32	4	–	-0.06	-0.12
Gómez, Luengo, & Romero	2003	Tobacco, alcohol, cannabis and generic drugs	Information + SKT + PS+ emotional training	14.42	5	0.07	0.17	-0.01
			Information + SKT + PS+ emotional training	14.42	5	0.01	0.14	0.08
Hernández	2010	Alcohol, cannabis and generic drugs	Information + modeling + SKT + PS	14.90	6.5	0.15	0.48	–
			Information + modeling + SKT + PS	14.90	6.5	0.23	0.39	–
			Information + modeling + SKT + PS	14.90	6.5	0.29	0.59	–
			Information + modeling + SKT + PS	14.90	6.5	0.35	0.45	–
Marrero	2011	Alcohol and tobacco	Information	15.80	5	0.47	–	–
Moral, Ovejero, Sirvent, & Rodríguez	2005	Generic	Information	–	3.5	0.21	0.43	–
			Information		3.5	1.29	0.36	–
			Information		3.5	0.76	0.22	–
			Information		3.5	0.60	1.20	–
Moral, Rodríguez, Ovejero, & Sirvent	2009	Alcohol	Information	14.69	3.5	1.18	0.55	–
			Information	14.69	3.5	1.74	0.35	–
			Information	14.69	3.5	1.10	0.20	–
			Information	14.69	3.5	1.14	0.36	–
Moral-Jiménez, Ovejero-Bernal, Castro, Rodríguez-Díaz, & Sirvent-Ruiz	2011	Generic	Information	–	3.5	0.52	-0.31	–
			Information		3.5	-0.32	-0.24	–
			Information		3.5	0.24	-0.03	–
			Information		3.5	0.35	-0.62	–
Note: *PS* = Problem solving; *SKT* = Social skills training								

and these results are contrary to what was observed by Espada et al. (2002), in which programs with a higher number of sessions tended to be more effective. According to Cuijpers (2002), there is no conclusive evidence that more intensive programs are more effective than are those that are less intense. This finding implies that, in order to optimize resources, it would be of interest for professionals to carry out programs distributed in fewer sessions.

This study provides data so far unknown about the effectiveness of prevention programs in Spain over the past twelve years. However, there are some limitations to consider. First, the methodological shortcomings (e.g., the lack of objective assessments, the lack of a control group, the absence of sufficient data to carry out the appropriate analyses) likely had an impact on our current results. Second, the studies in the meta-analysis are not without their own limitations; therefore, it is necessary to be cautious in concluding certain evidential aspects. Many of the studies showed only what was effective, and others have severe methodological problems (e.g., sample attrition, lack of randomness in the selection of subjects, and lack of long-term assessments). Third, the existence

of few evaluating studies, and the heterogeneity and the variability of the results obtained is evident.

However, the present meta-analysis helps to integrate the findings of the studies that have been conducted over the past decade with a common metric, which allows us to discover the relationships between the study characteristics and results. In addition, from our results, it is possible to determine the need for more rigorous evaluations of interventions, such as by controlling for the fidelity and integrity of the applications when implementing well-established programs and monitoring the effects of the variables that may influence the effectiveness of the results. In addition, such control is essential for future research in order to evaluate the results of programs and to recognize their usefulness and for possible replications.

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References

(The studies marked with an asterisk were included in the meta-analysis)

*Adame, M.L. (2005). *Evaluación de la eficacia de un programa de prevención del consumo de tabaco entre adolescentes*. Doctoral Thesis. University of Granada.

*Ariza, C., Nebot, M., Tomás, Z., Giménez, E., Valmayor, S., Tarilonte, V., & de Vries, H. (2008). Longitudinal effects of the European smoking prevention framework approach (ESFA) project in Spanish adolescents. *European Journal of Public Health, 18*, 491-497.

*Ariza, C., Pérez, A., Sánchez-Martínez, F., Diéguez, M., Espelt, A., Pasarín, M.I., ..., & Nebot, M. (2013). Evaluation of the effectiveness of a school-based cannabis prevention program. *Drug and Alcohol Dependence, 132*, 257-264.

Bangert-Drowns, R.L. (1988). The effects of school-based substance abuse education-a meta-analysis. *Journal of Drug Education, 18*(3), 243-264.

Cuijpers, P. (2002). Effective ingredients of school-based drug prevention programs: A systematic review. *Addictive Behaviors, 27*, 1009-1023.

*de Vries, H., Dijk, F., Wetzels, J., Mudde, A., Kremers, S., Ariza, C., ..., & Candel, M. (2006). The European Smoking prevention Framework Approach (ESFA): Effects after 24 and 30 months. *Health Education Research, 21*, 116-132.

*de Vries, H., Mudde, A., Kremers, S., Wetzels, J., Uiters, E., Ariza, C., ..., & Candel, M. (2003). The European Smoking Prevention Framework (ESFA): Short-term effects. *Health Education Research, 18*, 649-663.

*Espada, J.P., Griffin, K.W., Pereira, J.R., Orgilés, M., & García-Fernández, J.M. (2012). Component analysis of a school-based substance use prevention program in Spain: Contributions of problem solving and social skills training content. *Prevention Science, 13*, 86-95.

*Espada, J.P., Hernández, O., Orgilés, M., & Méndez, X. (2010). Comparación de distintas estrategias para la modificación de la actitud hacia el consumo de drogas en escolares [Comparison of different strategies for changing attitudes towards drug use in school]. *Electronic Journal of Research in Educational Psychology, 8*, 1033-1050.

Espada, J.P., Méndez, X., Botvin, G.J., Griffin, K.W., Orgilés, M., & Rosa, A.I. (2002). ¿Éxito o fracaso de la prevención del abuso de drogas en el contexto escolar? Un meta-análisis de los programas en España [Success or failure of prevention of drug abuse in the school context? A meta-analysis of programs in Spain]. *Psicología Conductual, 3*, 581-602.

*Espada, J.P., Orgilés, M., Méndez, X., García-Fernández, J.M., & Inglés, C.J. (2008). Efectos del programa Saluda sobre factores cognitivos

relacionados con el consumo de drogas [Effects of Saluda program on cognitive factors related to drug use]. *Salud y Drogas, 8*, 29-50.

Espada, J.P., Rosa, A.I., & Méndez, F.X. (2003). Eficacia de los programas de prevención escolar de drogas con metodología interactiva [Effectiveness of school-based prevention programs drug with interactive methodology]. *Salud y Drogas, 3*, 61-82.

Faggiano, F., Vigna-Taglianti, F.D., Versino, E., Zambon, A., Borraccino, A., & Lemma, P. (2005). School-based prevention for illicit drugs use. *Cochrane Database of Systematic Reviews, 2*.

Faggiano, F., Vigna-Taglianti, F.D., Versino, E., Zambon, A., Borraccino, A., & Lemma, P. (2008). School-based prevention for illicit drugs use: A systematic review. *Preventive Medicine, 46*, 385-396.

*Fernández, M.J., Carballo, R., & García, N. (2003). Eficacia de un programa de intervención curricular de educación para la salud en 2º ciclo de la E.S.O. [Effectiveness of an intervention program curriculum for health education 2nd cycle of E.S.O.]. *Revista Española de Pedagogía, 225*, 285-308.

*García, P., Fernández, A., Sánchez, J.M., Carrilo, A., Alcaraz, J., & Abad, E. (2005). Ensayo controlado aleatorizado de un programa de promoción de la salud para la prevención del tabaquismo en un grupo de escolares [Randomized controlled trial of a program of health promotion for smoking prevention in a group of school]. *Revista de Calidad Asistencial, 20*, 4-13.

*García, J.A., López, C., Fernández, I., & Catala, L. (2003). Evaluación del programa de prevención de drogas "Barbacana" [Evaluation of "Barbacana" drug prevention program]. *Salud y Drogas, 3*, 33-55.

*García-Vázquez, J., Arbesú, E., Rodríguez, L., Álvarez, G., Fernández, S., & Mosquera, C. (2009). Evaluación de una intervención de promoción de espacios sin humo en el ámbito educativo [Evaluation of an intervention to promote smoke-free environments in education]. *Gaceta Sanitaria, 23*, 23-28.

Gázquez, M. (2010). *Comparación de tres programas de prevención de drogas en el ámbito escolar* [Comparison of three drug prevention programs in schools]. Doctoral Thesis. Miguel Hernández University.

*Gázquez, M., García, J.A., & Espada, J.P. (2011). Eficacia diferencial de dos programas de prevención escolar sobre el consumo de tabaco, según el tipo de aplicador [Differential effectiveness of two school-based prevention programs on the consumption of snuff, according to the type of applicator]. *Psicothema, 23*, 537-543.

*Gómez, G., Barrueco, M., Aparicio, I., Maduelo, J.A., & Torrecilla, M. (2009). Programa de prevención del tabaquismo en alumnos de

Enseñanza Secundaria [Smoking prevention program in secondary school students]. *Archivos de Bronconeumología, 45*, 16-23.

*Gómez, J.A., Luengo, A., & Romero, E. (2002). Prevención del consumo de drogas en la escuela: cuatro años de seguimiento de un programa [Prevention of drug use in school: Four-year follow-up of a program]. *Psicothema, 14*, 685-692.

Griffin, K.W., Botvin, G.J., Scheier, L.M., & Nichols, T.R. (2002). Factors associated with regular marijuana use among high schools students: A long-term follow-up study. *Substance Use and Misuse, 37*, 225-238.

*Hernández, O. (2010). *Análisis de los componentes del programa Saluda: compromiso público, resistencia a la presión publicitaria y fomento del ocio saludable* [Component Analysis of Saluda program: Public commitment, resistance to advertising pressure and promoting healthy leisure]. Doctoral Thesis. Miguel Hernández University.

Marín-Martínez, F., Sánchez-Meca, J., & López-López, J.A. (2009). El metaanálisis en el ámbito de las Ciencias de la Salud: una metodología imprescindible para la eficiente acumulación del conocimiento [The meta-analysis in the field of Health Sciences: An essential methodology for efficient accumulation of knowledge]. *Fisioterapia, 31*, 107-114.

*Marrero, M.M. (2011). *Diagnóstico de la situación y eficacia de una intervención educativa ante el consumo de tabaco y alcohol en adolescentes del municipio de Arucas* [Analysis of the status and effectiveness of an educational intervention to snuff consumption and alcohol in adolescents of Arucas township]. Doctoral Thesis. Las Palmas de Gran Canaria University.

*Moral, M.V., Ovejero, A., Sirvent, C., & Rodríguez, F.J. (2005). Prevención e intervención psicosocial sobre el consumo juvenil de sustancias psicoactivas: comparación de la eficacia preventiva de cuatro programas [Prevention and psychosocial intervention on youth substance use: Comparing the preventive efficacy of four programs]. *Intervención Psicosocial, 14*, 189-208.

*Moral, M.V., Rodríguez, F.J., Ovejero, A., & Sirvent, C. (2009). Cambios actitudinales y reducción del consumo de alcohol en adolescentes a partir de un programa de intervención psicosocial [Attitudinal changes and reduction of alcohol consumption in adolescents from a psychosocial intervention program]. *Adicciones, 21*, 207-220.

*Moral-Jiménez, M.V., Ovejero-Bernal, A., Castro, A., Rodríguez-Díaz, F.J., & Sirvent-Ruiz, C. (2011). Modificación de actitudes hacia el consumo de sustancias en adolescentes: seguimiento de las diferentes inter-género [Changing attitudes toward substance use in adolescents: Tracking different inter-gender]. *International Journal of Clinical and Health Psychology, 11*, 291-311.

Rooney, B.L., & Murray, D.M. (1996). A meta-analysis of smoking prevention programs after adjustment for errors in the unit of analysis. *Health Education Quarterly, 23*, 48-64.

Rundall, T.G., & Bruvold, W.H. (1988). A meta-analysis of school-based smoking and alcohol use prevention programs. *Health Education Quarterly, 15*, 317-334.

Sánchez-Meca, J., & Botella, J. (2010). Revisiones sistemáticas y meta-análisis: herramientas para la práctica profesional [Systematic reviews and meta-analyzes: Tools for professional practice]. *Papeles del Psicólogo, 31*, 7-17.

Thomas, R. (2004). School-based programmes for preventing smoking (Cochrane Review). The Cochrane Library, Update Software. Oxford, Capítulo 2.

Tobler, N.S. (1986). Meta-analysis of 143 adolescent drug prevention programs: Quantitative outcomes results of program participants compared to a control or comparison group. *Journal of Drug Issues, 16*, 537-567.

Tobler, N.S., Lessard, T., Marshall, D., Ochshorn, P., & Roona, M. (1999). Effectiveness of school-based drug prevention programs for marijuana use. *School Psychology International, 20*, 105-137.

Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software, 36*, 1-48.