

Effectiveness of an Online Intervention to Prevent Psychoactive Drug Use by Expanding Knowledge of its Effects, Enhancing Life Skills and Increasing Risk Perception Designed for Mexican Middle School Students

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ABSTRACT

Introduction. Adolescence is a vulnerable stage, but also a key time to prevent risky behaviors like drug use. It is important to address risk factors that can become protective factors by enhancing life skills (LS) and increasing the risk perception of psychoactive drug use. **Objective.** To evaluate the effectiveness of an online intervention to increase knowledge of the effects of psychoactive drug use, improve LS, and increase the risk perception of psychoactive drug use among Mexican middle school students. **Method.** A quasi-experimental, pretest-posttest study with middle school students using an online version of the intervention. **Results.** A comparison of the scores of the experimental and control groups on the post-test yielded significant differences in knowledge of the effects of tobacco, marijuana, alcohol, and ecstasy use, and in planning for the future, assertiveness, decision-making, and taking responsibility. It also revealed differences in the perceived risk of marijuana, inhalants, alcohol, and tobacco use. **Discussion and conclusion.** The results show that this online intervention modifies middle school students' risk perception of psychoactive drug use, increases knowledge of its effects, and improves LS. Its online design reduces implementation costs and increases the likelihood of its use as a psychosocial tool to prevent psychoactive drug use.

Keywords: Prevention, substance use, life skills, risk perception, adolescents.

RESUMEN

Introducción. La adolescencia es un periodo de vulnerabilidad y una etapa oportuna para la prevención de comportamientos de riesgo como el consumo de drogas. Es importante profundizar en factores de riesgo que pueden convertirse en factores de protección como el fortalecimiento de habilidades para la vida (HPV) y el aumento de la percepción de riesgo hacia el uso de drogas. **Objetivo.** Evaluar la efectividad de una intervención preventiva en línea para aumentar el conocimiento sobre los efectos del consumo de drogas, fortalecer las habilidades para la vida y aumentar la percepción de riesgo del consumo en estudiantes mexicanos de secundaria. **Método.** Estudio cuasiexperimental pretest - post test, con alumnos de secundaria, utilizando una versión en línea de la intervención. **Resultados.** En la comparación de los puntajes de los grupos experimental y control en el post test, hubo diferencias significativas en el conocimiento de los efectos del consumo de tabaco, marihuana, alcohol y éxtasis y en los puntajes de las habilidades de planeación a futuro, asertividad, toma de decisiones y toma de responsabilidades. También hubo diferencias en la percepción de riesgo del consumo de marihuana, inhalables, alcohol y tabaco. **Discusión y conclusión.** Los resultados muestran que esta intervención en línea ha probado su efectividad para modificar la percepción de riesgo hacia el consumo de drogas, aumentar el conocimiento sobre sus efectos y fortalecer HPV en estudiantes de nivel secundaria. Su diseño en línea reduce costos de implementación y aumenta la probabilidad de utilización como una herramienta psicosocial para prevenir el consumo de drogas.

Palabras clave: Prevención, uso de sustancias, habilidades para la vida, percepción de riesgo, adolescentes.

INTRODUCTION

The World Drug Report 2023 shows that use remains high, with the estimated number of users increasing from 240 million in 2011 to 296 million in 2021. This year, one in 17 people aged 15 to 64 used a psychoactive drug in the past year. Globally, adolescents and young adults have the highest usage rates, influenced by cultural, economic, and social factors, with variations across countries, ages, and genders (United Nations Office on Drugs and Crime [UNODC], 2023). Psychoactive drug use rates among Mexican adolescents aged 12 to 17 have varied. For example, the prevalence of tobacco use was 22.2% in 2012 and 22.8% in 2017; the prevalence of alcohol use was 42.9% in 2012 and 39.8% in 2017, while the percentage of those who have used marijuana was 2.4% in 2012 and 5.3% in 2017 (Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz [INPRFM] et al., 2012, 2017). The data indicate that the median age of first use of psychoactive drugs among Mexican adolescents is falling, the accessibility of drugs is increasing, and there is a low risk perception of drug use (INPRFM et al., 2012, 2017). These factors increase psychoactive drug use, negatively impacting the lives of this population. Adolescents are more vulnerable to developing addiction, which has significant public health implications (Crews et al., 2007; World Health Organization [WHO], 2017).

Adolescence involves major biological, psychological, and social transitions, leading to rapid physical, psychological, sexual, and social transformations. These modifications in the brain, cognition, and emotions can mean periods of instability and vulnerability, as well as requiring adolescents to adapt to changing social contexts (WHO, 2018).

The interplay between risk and protective factors at this stage determines the levels of vulnerability in which certain risk behaviors can emerge or consolidate, such as psychoactive drug use (UNODC, 2021), which is a major public health problem. Individual, familial and social risk factors that increase the likelihood of drug use include interest in experimentation, curiosity, rebelliousness, impulsivity, low self-esteem (Lee et al., 2018), lack of emotional regulation, limited social skills, depression, anxiety, behavioral problems, poor school performance, previous experiences of use, low risk perception of psychoactive substance use, and problems with one's parents (González et al., 2014; Larsman et al., 2012; Lee et al., 2018; National Institute on Drug Abuse [NIDA], 2020; Nawi et al., 2021; Whitesell et al., 2013).

The World Health Organization Guidelines on Adolescent Mental Health Promotion and Prevention Interventions recommend the implementation of universal psychosocial interventions targeting all adolescents to promote good mental health and prevent risk behaviors such as the use of psychoactive substances (WHO, 2020). Adolescence is an ideal time for prevention and intervention, due to the

neuroplasticity of the adolescent brain and the possibility of intervening at the time of onset of risk behaviors such as psychoactive substance use and most mental health problems. In this context, two protective factors are the enhancement of life skills (LS) and a higher awareness of the risks associated with psychoactive drug use.

The health protection and risk behavior prevention approach, based on the LS model, defines these factors as positive adaptive behavioral psychosocial skills enabling adolescents to cope effectively with the demands and challenges of everyday life (WHO, 2003, 2020). This approach considers the evidence for the role of cognitive, interpersonal, and coping skills in adolescent psychosocial development; the effect of skills on young people's ability to protect their health, adopt positive behaviors, and foster healthy relationships; the applicability of skills to both health and social issues (such as education, violence, and human rights); and the reinforcement of protective factors to promote adolescents' self-confidence, self-efficacy, self-esteem, and well-being (Ross et al., 2020; United Nations Children's Fund [UNICEF], 2020; WHO, 2020). These interventions should focus on social and emotional learning, incorporating interpersonal and coping skills such as problem-solving, assertiveness, stress management, and emotional regulation (WHO, 2018, 2020, 2021).

The LS approach has been identified as an effective component of interventions focused on promoting mental health and preventing risk behaviors during adolescence (Skeen et al., 2019). Programs have proven effective in preventing early drug use (Botvin & Griffin, 2014) across settings (Tremblay et al., 2020), while LS have been identified as protective factors for adolescents (Velasco et al., 2017).

Universal prevention and early intervention programs based on LS to address psychoactive drug use in school settings have been implemented in several countries. They have shown excellent results because they are easily accessible to adolescents and conducted in appropriate spaces to promote learning and socialization (Sanchez et al., 2019; Weichold & Blumenthal, 2016). The international literature contains examples of the use of mobile applications to prevent or treat the use of psychoactive drugs, such as tobacco, alcohol, and methamphetamines among adolescents. These apps offer a range of features, including information and education, advice, strategies, and LS training, together with screening instruments for use. However, further research is required to assess their effectiveness (Birrell et al., 2018, 2021; Chapman et al., 2018; Giroux et al., 2017; Haug et al., 2021, 2023; Thornton et al., 2017).

Given that risk perception involves the evaluation of an object based on its favorable and unfavorable attributes, risk perception levels have been considered key determinants for addressing risky behaviors such as drug use. Since the likelihood of drug use increases when people perceive

little or no risk of harm associated with it, higher perceived risk can be considered a protective factor against psychoactive drug use (Florimbio et al., 2024).

Preventive interventions developed online and available on the Internet with research-based approaches have the advantage of accessibility, interactivity, ease of use, greater potential scope, and lower implementation costs compared to face-to-face interventions. They reach the adolescent population because young people are familiar with them, easily incorporating them into their lifestyle (Haug et al., 2017; Schwinn et al., 2018). The “What Happens if you Go Too Far?” intervention shares these characteristics and has been shown to be effective in increasing risk perception regarding psychoactive drug use among middle school students. The intervention, designed to enhance LS and increase risk perception, is based on the WHO Skills for Health model and Bandura’s Social Learning Theory and operates at the cognitive and behavioral levels. The former, containing evidence-based scientific information, uses textual and visual language to facilitate understanding and encourage critical thinking regarding drug use. At the behavioral level, it enhances LS, improving adolescents’ ability to relate to their peers, resist peer pressure to use drugs, effectively solve problems, and make responsible decisions while being aware of the consequences (Fuentes et al., 2023).

This study aims to evaluate the effectiveness of an online preventive intervention to increase knowledge of the effects of psychoactive drug use, enhance life skills, and increase risk perception of drug use among Mexican middle school students.

METHOD

Study design

A quasi-experimental pretest-post-test study was conducted. Measurements were taken at baseline and at the end of the intervention.

Participants

Two groups of third-year middle school students from a public school in the Mexican state of Querétaro were obtained through non-probabilistic convenience sampling. All the students enrolled in the same class were assigned to one of the two study groups.

A total of 73 students (65.8% female and 34.2% male), aged 13 to 15 (mean = 13.90; *SD* = .37), participated in the pretest. Sixty-nine students (63.8% female and 36.2% male) aged 13 to 15 (Median age = 13.99; *SD* = .27) participated in the post-test.

Measurements

A pre- and post-intervention questionnaire was administered using a Google form, which students completed individually using a PC. The questionnaire took approximately 50 minutes to complete, and the response rate was 100%. The pretest measurement was taken before the first session, and the posttest measurement at the end of the last session. The questionnaire included the following sections:

Sociodemographic. Questions on the sex, age, and place of residence of the participants.

Drug use. The ASSIST questionnaire was used to measure psychoactive drug use (WHO, 2010) and included the following item: “Have you ever used tobacco, alcohol, marijuana, cocaine, ecstasy, or inhalant drugs?” The responses for each drug were dichotomous.

Knowledge of drugs. The study measured participants’ knowledge of tobacco, alcohol, marijuana, inhalants, and cocaine. This was accomplished through a questionnaire inquiring about the effects and consequences of the use of these drugs. Each question was answered on a Likert-type scale: “always” = 4, “nearly always” = 3, “sometimes” = 2, and “never” = 1. Higher scores indicated greater knowledge of drugs.

Life Skills. LS were measured with the Brief Life Skills Scale for Adolescents (EHV-A), developed using 24 items from several longer scales that assess the skills separately and have been validated for Mexican adolescents (Fuentes et al., 2023). The skills included were planning for the future (three items), assertiveness (three items), expression of emotions (three items), resistance to peer pressure (six items), decision making (six items), and taking responsibility (three items). A Likert-type scale was used with the following options: “never” = 1, “sometimes” = 2, “nearly always” = 3, and “always” = 4. The score for each LS was the sum of the individual scores. The higher the score, the greater the presence of the skill being measured.

Risk perception. Risk perception of psychoactive drug use was measured using a questionnaire inquiring about the perceived danger of drug use (INPRFM et al., 2017). The questionnaire employed a Likert-type scale: “not dangerous” = 1 “dangerous” = 2, and “very dangerous” = 3, with higher scores indicating a greater perception of risk.

Procedure

Health sector personnel were trained to administer the intervention before implementing it. This training was facilitated by guidelines designed to replicate the three components for each of the drugs considered in the contents of the App. Training included modules on the effects and risks of psychoactive drug use among adolescents and enhancing life skills.

The comparison groups were not randomly assigned and instead natural groups were used since the sampling

was convenience based. These were homologous in all variables except for the expression of emotion and taking responsibility.

The “What Happens if you Go Too Far?” intervention was replicated from October to December 2023 with third grade students at a public middle school in the city of Querétaro, in the state of Querétaro, Mexico. A Web version of the intervention was used to facilitate access to the intervention through PCs available at the school. The content of the intervention was only available online. Every student was assigned a computer with a previously trained health professional in each group to administer the intervention, who served as a facilitator.

The intervention was conducted during the weeks determined by the school. Prior permission was obtained from the school administration to provide access and the facilities required to implement the intervention once the objectives of the study had been explained. Students in both groups were informed of the risks and benefits of participating in the study on a voluntary basis and were assured that their responses would be anonymous and that the results would not affect their school activities or evaluations.

The intervention took place during school hours in ten one-hour sessions. Topics covered in the sessions included tobacco, alcohol and males, alcohol and females, marijuana, cocaine, ecstasy, and inhalants. Each topic covered the following intervention components: 1) knowledge of the risks and consequences of drug use, 2) life skills, and 3) risk situations associated with drug use. The intervention incorporated interactive resources, including comics, trivia, and the ASSIST questionnaire, to assess the risk of drug use.

Statistical analysis

Data analyses were performed with SPSS (version 21).

The Wilcoxon test was used to compare scores in knowledge of the consequences of psychoactive drug use, life skills, and risk perception before and after the intervention within each group.

The Mann-Whitney U test was used to compare scores on knowledge of the consequences of drug use and life skills between the experimental and control groups.

Ethical considerations

All parents of the participants provided written informed consent, and all participants provided written informed assent. The Research Ethics Committee of the Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz approved the study (Approval No. CEI/M/104/2021).

All the procedures adhered to the ethical standards of the committee responsible for human experimentation and the Helsinki Declaration of 2000.

RESULTS

Knowledge of the effects of psychoactive drug use

The experimental group displayed a statistically significant increase in knowledge of the effects of tobacco, marijuana, alcohol, and ecstasy use after the intervention. In the control group, no differences were observed between pre- and post-test scores for knowledge of the effects of using any substance.

Life skills

Table 2 shows the average scores for each skill within-group before and after the intervention. After the intervention, the experimental group displayed significant differences in scores for planning for the future, resistance to peer pressure, and taking responsibility. Conversely, the control group showed no significant differences in skill scores between the pretest and posttest.

Risk perception regarding drug use

As can be seen in Table 3, there were important within-group differences in perceived risk of using any psychoactive drug before and after the intervention.

Scope and limitations

It is necessary to replicate the study with larger samples and in various socio-cultural contexts, and to adapt it for implementation in basic education with child participants.

The component designed to influence risk perception requires review and modification, given the discrete variation

Table 1
Knowledge of the effects of drug use, average within-group scores

	<i>Experimental group</i>		<i>Control group</i>	
	<i>Pretest</i>	<i>Post-test</i>	<i>Pretest</i>	<i>Post-test</i>
Tobacco	3.35 (± .36)	3.55 (± .41)	3.18 (± .48)	3.20 (± .38)
	Wilcoxon = -1.983, <i>p</i> = .047		<i>p</i> = .707	
Marijuana	3.12 (± .43)	3.42 (± .32)	3.07 (± .35)	3.19 (± .39)
	Wilcoxon = -2.534, <i>p</i> = .011		<i>p</i> = .230	
Inhalants	2.76 (± .43)	2.89 (± .51)	2.70 (± .36)	2.80 (± .41)
	<i>p</i> = .523		<i>p</i> = .413	
Alcohol	2.74 (± .32)	3.17 (± .38)	2.63 (± .29)	2.65 (± .30)
	Wilcoxon = -3.931, <i>p</i> = .000		<i>p</i> = .844	
Cocaine	3.34 (± .40)	3.42 (± .35)	3.30 (± .39)	3.29 (± .42)
	<i>p</i> = .617		<i>p</i> = .575	
Ecstasy	2.99 (± .44)	3.29 (± .38)	3.06 (± .40)	2.98 (± .58)
	Wilcoxon = -2.625, <i>p</i> = .009		<i>p</i> = .415	

Table 2
Life skills, average within-group scores

	Experimental group		Control group	
	Pretest	Post test	Pretest	Post test
Planning for the future	3.30 (± .73)	3.71 (± .49)	3.34 (± .57)	3.27 (± .76)
	Wilcoxon = -2.047, $p = .041$		$p = .821$	
Assertiveness	2.89 (± .77)	3.29 (± .66)	3.01 (± .69)	2.81 (± .84)
	$p = .068$		$p = .425$	
Expression of Emotions	3.03 (± .76)	3.02 (± .83)	2.67 (± .67)	2.74 (± .82)
	$p = .993$		$p = .587$	
Resistance to Peer Pressure	3.41 (± .59)	3.77 (± .31)	3.45 (± .63)	3.41 (± .76)
	Wilcoxon = -2.989, $p = .003$		$p = .724$	
Decision-making	3.18 (± .64)	3.46 (± .72)	3.11 (± .68)	2.85 (± .81)
	$p = .186$		$p = .097$	
Taking Responsibility	3.22 (± .52)	3.48 (± .53)	2.86 (± .63)	2.92 (± .78)
	Wilcoxon = -1.965, $p = .049$		$p = .390$	

Table 3
Within-group risk perception of substance use

	Experimental group						Control group					
	Pretest (n = 38) %			Post-test (n = 33) %			Pretest (n = 35) %			Post-test (n = 36) %		
	ND	D	VD	ND	D	VD	ND	D	VD	ND	D	VD
Marijuana	5.3	39.5	55.3	9.1	15.2	75.8	14.3	54.3	31.4	8.3	55.6	36.1
	$p = .149$						$p = .448$					
Ecstasy	2.6	18.4	78.9	6.1	15.2	78.8	0	31.4	68.6	8.3	27.8	63.9
	$p = .803$						$p = .275$					
Cocaine	2.6	21.1	76.3	6.1	15.2	78.8	0	31.4	68.6	2.8	33.3	63.9
	$p = .773$						$p = .655$					
Inhalants	2.6	34.2	63.2	6.1	18.2	75.8	5.7	48.6	45.7	11.1	41.7	47.2
	$p = .593$						$p = .826$					
Frequent alcohol use	7.9	47.4	44.7	6.1	30.3	63.6	8.6	62.9	28.6	5.6	66.7	27.8
	$p = .147$						$p = .782$					
Smoking five or more cigarettes daily	2.6	34.2	63.2	6.1	15.2	78.8	2.9	31.4	65.7	8.3	38.9	52.8
	$p = .317$						$p = .207$					
Smoking one or more cigarette pack daily	10.5	21.1	68.4	6.1	15.2	78.8	5.7	20.0	74.3	0	30.6	69.4
	$p = .509$						$p = .973$					
Smoking one cigarette occasionally	18.4	50.0	31.6	9.1	45.5	45.5	25.7	71.4	2.9	22.2	58.3	19.4
	$p = .174$						$p = .128$					

Note: ND = it is not dangerous; D = it is dangerous; VD = it is very dangerous.

in scores, suggesting the need to refine it to increase its potential impact.

The increasing use of virtual interventions holds promise for disseminating preventive programs focused on psychoactive drug use among young people, given their familiarity with online platforms and applications (Haugh et al., 2023; Kwame et al., 2025). It is also essential, however, to integrate the evaluation of the effectiveness of the intervention and the process of its implementation to facilitate its scaling.

DISCUSSION AND CONCLUSION

The online application “What Happens if you Go Too Far?”, whose effectiveness in increasing knowledge of the effects of psychoactive drug use, increasing risk perception of drug use and enhancing LS in Mexican middle school students was evaluated in this study, has already proven effective among middle school students (Fuentes et al., 2025). The declining age of first drug use and increased availability (INPRFM et al., 2012, 2017) underscore the need for more

effective, accessible, and affordable prevention and intervention strategies for children and adolescents.

As expected, knowledge of the effects of using psychoactive drugs such as tobacco, marijuana, alcohol, and ecstasy increased significantly in the experimental group in the posttest measurement. The post intervention measurement also showed greater knowledge of these drugs in the comparison between the experimental and control groups. These results underline the contribution of this type of universal intervention program to modifying knowledge of the consequences of drug use. They also highlight the impact they can have on the possible reduction of consumption (Ibrahim et al., 2024) and the probable delay in the age of onset, provided they are implemented at more elementary schools and at earlier ages.

Work with the LS model has proven effective in preventing risky behaviors (Skeen et al., 2019) and drug use (Botvin & Griffin, 2014; Tremblay et al., 2020) in adolescents. Specific skills, such as making positive choices and resisting peer pressure, remain important in prevention programs that continue to be evaluated (Sanchez et al., 2019). The results of this study are encouraging in this regard, as some of the LS explored through the intervention (such as planning for the future, resistance to peer pressure, and taking responsibility) showed a significant increase in the post-test measurement in the experimental group and the post-test comparison between the experimental and control groups, in addition to the fact that students increased their assertiveness and decision-making.

Evidence has shown that risk perception plays a crucial role in reducing the likelihood of using psychoactive drugs (Florimbio et al., 2024; González-Roz et al., 2022) and that it is associated with the willingness to learn about their effects (Bujalski et al., 2021). Our study found that risk perception regarding drug use increased in the experimental group after the intervention, specifically in regard to marijuana, inhalants, alcohol, and tobacco. Because risk perception influences health behavior and risk-taking, interventions should aim to increase risk awareness. These interventions could serve as effective tools for addressing drug use in this population by assessing the positive and negative attributes of this issue (Li et al., 2017). The gradual decline in tobacco use can be explained by increased risk awareness due to media campaigns, warnings on packaging, and restrictions on where tobacco can be consumed. If we add the persistent stigma surrounding marijuana and inhalants, the sum of structured and evidence-based intervention strategies increasing risk perception could feasibly bring us closer to reducing the incidence of the initiation and continuation of drug use among adolescents (Florimbio et al., 2024).

The intervention “What happens if you go too far?” has proven effective in increasing knowledge of the effects of psychotropic drugs, enhancing LS, equipping adolescents

with the tools to cope with daily challenges and risky situations, and increasing the risk perception of use, which could contribute to their healthy psychosocial development.

This intervention has the advantage of using formats that are easily updatable, dynamic, attractive, interactive (Haug et al., 2023), accessible to different populations thanks to their digital format, and effective for implementing interventions on a larger scale in school settings (Paz Castro et al., 2022; Schwinn et al., 2018). This is made possible by conventional personal computers and mobile devices (Haug et al., 2021), reducing implementation costs and increasing the likelihood of use for the prevention of psychoactive drug use.

A recent review of the available evidence on virtual interventions to prevent psychoactive drug use among young people in the United States, Europe, Oceania, and Latin America showed that this type of intervention is indeed effective (Kwame et al., 2025).

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Conflicts of interest

The authors declare they have no conflict of interest.

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