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Original Article

Factors that encourage cigarette consumption among college students: A theory of planned behavior perspective

[Factores que fomentan el consumo de cigarrillos entre los estudiantes universitarios: perspectiva a partir de la teoría del comportamiento planificado]

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Abstract

Context: The numbers of cigarette smokers and deaths from this cause have grown rapidly in recent years. Different factors that increase cigarette smoking, college students have become a highly vulnerable population to smoking cigarette.

Aims: To examine the main factors that encourage college students to consume cigarettes by adopting the Theory of Planned Behavior.

Methods: A cross-sectional quantitative study was carried out with 300 students enrolled in public and private universities in the city of Medellín, Colombia. Kaiser-Meyer-Olkin and Bartlett's sphericity tests were used to measure the validity of the scales. The reliability of the instrument was verified by calculating Cronbach's Alpha and the model was analyzed by Confirmatory Factor Analysis.

Results: The main factors that determine the consumption of cigarettes among the population under study are experiencing new sensations and reacting to situations that cause anxiety. Regarding the model, the main factors influencing cigarette consumption are related to attitude toward the consumption behavior and perceived behavioral control. Secondary factors are related to social behaviors.

Conclusions: The Theory of Planned Behavior is a helpful tool for different fields of knowledge—including public health—to identify factors, variables and relationships that inhibit or motivate an individual's decisions. The results of this study suggest that the factors that most influence cigarette consumption in the analyzed population are related to attitude and control factors.

Keywords: behavior; higher education; intention; Theory of Planned Behavior.

Resumen

Contexto: El número de fumadores de cigarrillos y las muertes asociadas con este comportamiento han crecido rápidamente en los últimos años. Diferentes factores aumentan el consumo de cigarrillos en los estudiantes universitarios convirtiéndolos en población altamente vulnerable.

Objetivos: Examinar los principales factores que fomentan a los estudiantes universitarios a consumir cigarrillos a partir de la Teoría del Comportamiento Planificado.

Métodos: Estudio cuantitativo transversal con 300 estudiantes de universidades públicas y privadas de la ciudad de Medellín, Colombia. Se utilizaron pruebas de esfericidad de Kaiser-Meyer-Olkin y Bartlett para medir la validez de las escalas. La fiabilidad del instrumento se verificó mediante el Alfa de Cronbach y el modelo se analizó mediante Análisis Factorial Confirmatorio.

Resultados: Los principales factores que determinan el consumo de cigarrillos en la población estudiada son la experimentación de nuevas sensaciones y la reacción a situaciones que provocan ansiedad. En cuanto al modelo, los principales factores que influyen en el consumo de cigarrillos están relacionados con la actitud hacia la conducta de consumo y el control de la conducta percibida. Los factores secundarios están relacionados con los comportamientos sociales.

Conclusiones: La Teoría del Comportamiento Planificado es una herramienta útil para diferentes campos del conocimiento, incluida la salud pública, para identificar factores, variables y relaciones que inhiben o motivan las decisiones de un individuo. Los resultados de este estudio sugieren que los factores que más influyen en el consumo de cigarrillos en la población analizada están relacionados con los factores de actitud y control.

Palabras Clave: comportamiento; educación superior; intención; Teoría del Comportamiento Planificado.

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INTRODUCTION

In the 20th century, the consequences of cigarette consumption have constituted one of the main threats to health worldwide, demanding actions and alignment from several stakeholders (Fong et al., 2006). Nearly 6 million people die every year around the world from causes associated with cigarette consumption, and the greatest percentage of mortality is found in low-income countries. Furthermore, some studies indicate that, by 2030, this figure of annual deaths will rise to 8 million people around the world, 80% of them in medium and low-income nations (Erdal et al., 2015).

As a result, public stakeholders should take synergetic actions to develop and enforce measures that control and prevent cigarette consumption (Milosavljević et al., 2011). These measures should be aimed at combining the prohibition of ads at sports events, price increases, regulations, and special taxation (Bader et al., 2011), which is the most efficient way to reduce consumption (Levy et al., 2004).

Due to the need to measure the effectiveness of said actions, some studies such as Almogbel et al. (2013) and Conner et al. (2019) have been conducted to reveal the importance of analyzing the characteristics of the cigarette-consuming population and thus ensure success in the implementation. As a result, more research received support to explore different methods to prevent the onset of risk behaviors that trigger consumption (Arora et al., 2015).

The theoretical framework provided by some studies (Karimi et al., 2018; Nazar et al., 2018; Tsvetkova et al., 2018) suggests that cigarette consumption is not evenly distributed among socioeconomic statuses and, in some cases, it is disproportionately greater in low-income groups (Subramanian et al., 2004). Furthermore, Asian researchers old that academic preparation influences the levels of consumption: smokers with a high school diploma present higher rates than those with a professional degree (Huang et al., 2015).

Similarly, scholars at the University of Syracuse in New York established that age and gender are highly relevant factors in the adoption of measures, such as pricing, to control the levels of cigarette consumption (Ma, 2015). In that regard, a study on cigarette consumption among college students in Turkey confirmed that young people generally smoke because they think it makes them look mature, thus boosting their self-esteem and freedom (Erdal et al., 2015).

Therefore, public policies have been implemented to reduce cigarette consumption by analyzing predictive factors and levels of consumption (Chaix et al., 2004). Eight types of policies can be identified among them: (1) taxes (2) clean air legislation, (3) advertisement restrictions, (4) anti-smoking campaigns in media, (5) labels with warnings about health risks, (6) enforcement of laws of access for young people, (7) educational programs at schools, and (8) an increase in the application of treatments to quit smoking (Levy et al., 2004).

Some countries have adopted the measure of prohibiting cigarette consumption in public places. In 2012, the United States passed comprehensive laws that prohibit smoking at workplaces, restaurants, and bars (Cummings and Proctor, 2014). This implementation of strategies and control policies has revealed several factors that influence the attitude toward cigarette consumption. Some of them include social norms, beliefs regarding positive consequences, and accessibility (MacKinnon et al., 2002).

Consequently, since there are different psychological factors that influence the start, maintenance and termination of a specific behavior (Ballester and Asensio, 2002), existing theories are called into play to explain consumers' decisions (Howard, 1993). Overall, the literature contains 10 theories that explain the use of substances, which can be divided into 5 groups (Laespada-Martínez et al., 2004):

1. Cognitive-affective theories: Theory of reasoned action (Ajzen and Fishbein, 1975;

Ajzen and Fishbein, 1980) and Theory of planned behavior (Ajzen, 1985; 1988).

2. Social learning theories: Social learning theory (Akers et al., 1979) and social learning/social cognitive theory (Bandura, 1986).
3. Theories of social attachment: Social control theory (Elliot et al., 1985; Elliot, 1989) and social development model (Hawkins and Weis, 1985).
4. Theories in which interpersonal features play a key role: Social ecology model (Kumpfer and Turner, 1990; Kumpfer et al., 1991) and self-derogation theory (Kaplan et al., 1982).
5. Theories that integrate cognitive-affective constructs related to learning, commitment, attachment and interpersonal aspects: Problem-behavior theory (Jessor and Jessor, 1977) and Peer cluster theory (Oetting and Beauvais, 1986; 1987).

Cigarette consumption has been approached from different methodologies that explain the factors that lead to this behavior. In particular, the Theory of Planned Behavior (TPB) has been successfully used to predict the intention to smoke by college students (Karimy et al., 2013; Hanson, 2018). This model has been used to measure other behaviors such as physical activity, food consumption, and condom use, among others, making it a high-impact tool for predicting these behaviors, including smoking (Cousson-Gélie et al., 2018; Hershberger et al., 2018). In the international context, TPB has been one of the most widely used to predict cigarette consumption among young people. In this regard, Lee et al. (2018) proposed the use of TPB as a reflection of individuals' cognitive and motivational factors in predicting behavior, allowing for the inclusion of different predictors for measurement. Based on this review, the TPB was selected to treat the information. According to this theory, an individual's behavior is determined by the intention of conducting an act. Such intention, in turn, constitutes a function of the attitude and subjective norms that can be traced back to behavior and normative beliefs, respectively (Rodríguez, 2007). The principle of this model is that human behavior is future-oriented (Lee et al., 2018) and it measures three main variables: attitude toward behavior, that relates to the positive or negative evaluation of the behavior, subjective norms refer to the perceived pressure by interest stakeholders and perceived behavioral control associated with how easy or not the behavior is perceived to be (Record et al., 2018) (See Fig. 1).

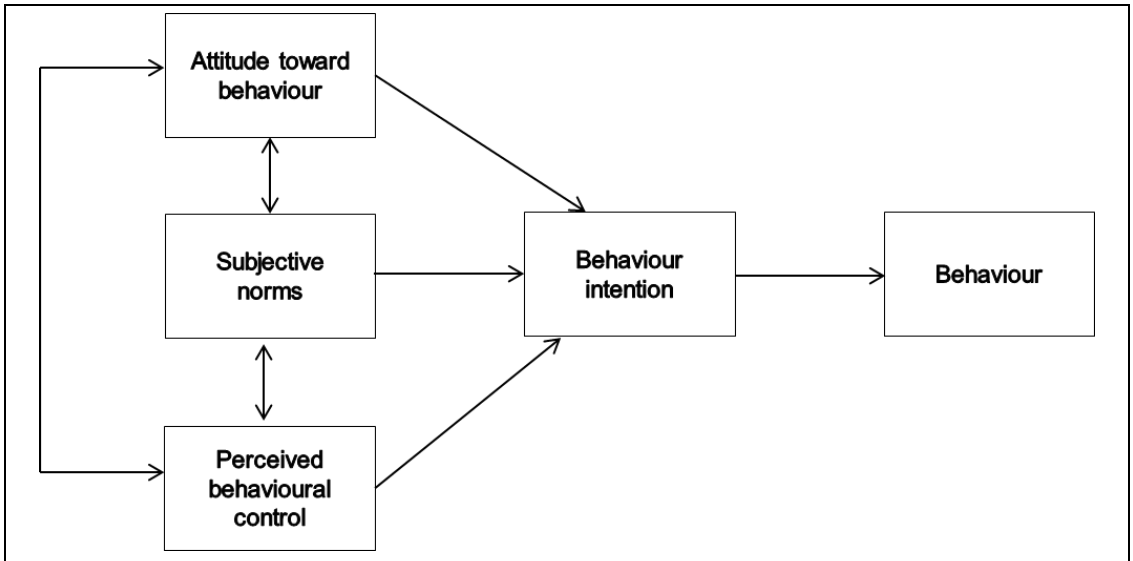

Figure 1. Model of the Theory of Planned Behavior.
Source: (Ubillos et al., 2004).

MATERIAL AND METHODS

An exploratory cross-sectional study was conducted with 300 students who had a background of technical and professional education in public and private universities in Medellin. They were informed about the aim and scope of the study, the confidential treatment of the information, and the minimum risk of their participation. The research protocol was approved by the Ethics Committee of the Institución Universitaria Escolme, with evidence in the resolution number 6/2017.

Non-probability criterion sampling was used, and the confidence interval was 95%. Additionally, a self-administered questionnaire was personally handed out to each participant. The structure of the questionnaire was based on the Theory of Planned Behavior (TPB) for consumption of addictive substances by individuals with an average age of 44. All respondents signed their informed consent and were assured about the confidentiality of individual data. In Table 1 are the questions involved in the questionnaire.

Table 1. Questions in the survey instrument.

Question	Construct
Cigarette consumption may help me forget my problems	Attitude towards behavior (ATB)
Cigarette consumption would help me avoid feeling sad	ATB
Cigarette consumption would help me avoid feeling lonely	ATB
Cigarette consumption would help me avoid feeling worried	ATB
Cigarette consumption is important for me to forget about my academic problems	Behavior (BH)
Cigarette consumption is important for me to forget about my family problems	BH
Cigarette consumption is important for me to forget about my emotional problems	BH
Cigarette consumption is important for me to feel part of my circle of friends	BH
Cigarette is important to avoid feeling sad	Behavior intention (BI)
Cigarette consumption is important to avoid feeling lonely	BI
Cigarette consumption is important to avoid feeling worried	BI
Cigarette consumption is important to avoid feeling distressed	BI
Cigarette consumption is important to experience doing things differently	BI
Cigarette consumption is important to free me from my pressures	BI
Cigarette consumption would help me avoid feeling distressed	Perceived behavioral control (PBC)
Cigarette consumption would allow me to experience different things	PBC
Cigarette consumption would free me from the pressures	PBC
Cigarette consumption would allow me to feel part of a circle of friends	Subjective norm (SN)
Cigarette consumption would allow me to overcome insecurity	SN
Cigarette consumption would help me be more expressive with others	SN

Source: Authors' own work supported by Theory of Planned Behavior factors.

The form of the survey contained questions about the attitude toward behavior, which included the frequency of consumption of legal substances (cigarette and alcohol), and emotional factors boosted by the consumption of said substances when it comes to relieve stress. The tool that was used included dichotomous questions and five-point Likert scale questions (very important, important, more or less important, less important or not very important) designed to measure each of the specified TPB factors (level of control, behavior intention, and subjective norms - conditioning the near environment).

Many versions of the Theory of Planned Behavior Model (TPB) have been used in different settings. It has been adapted the general model for cigarette consumption. This study aims to test the following hypotheses:

H1. There is a significant positive relationship between the 'Attitude towards behavior' and the 'Perceived behavioral control'.

H2. There is a significant positive relationship between the 'Attitude towards behavior' and the 'Behavior intention'.

H3. There is a significant positive relationship between the 'Subjective norm' and the 'Behavior intention'.

H4. There is a significant positive relationship between the 'Perceived behavioral control' and the 'Behavior intention'.

H5. There is a significant positive relationship between the 'Attitude towards behavior' and the 'Subjective norm'.

H6. There is a significant positive relationship between the 'Subjective norm' and the 'Perceived behavioral control'.

H7. There is a significant positive relationship between the 'Behavior intention' and the 'Behavior'.

Statistical analysis

SPSS Version 21 was used for all analyses (IBM, 2012). The validity of the measuring scales, each construct, and the instrument in general was tested with a statistical method, Confirmatory Factor Analysis (CFA). CFA represents a set of different technical procedures to study the relationship and interdependency among a set of variables to group them as a function of shared variability, reveal underlying structures (factors), and latent dimensions or concepts. Its goal is to summarize and reduce data. It also constitutes a useful statistical technique to evaluate the multidimensionality of a construct, because it enables empirical exploration, and it aims at selecting the items most highly correlated with the set of items measured in the construct (Mora, 2005). Bartlett's sphericity test and Kaiser-Meyer-Olkin (KMO) test for sampling adequacy were employed to identify significant correlations between variables. The latter is named after KMO and it is defined as an index to compare the values of observed correlation coefficients with the values of partial correlation coefficients; it ranges between 0 and 1 (Kaiser, 1974).

Convergent and Discriminant Validity were calculated when the model was analyzed. The former describes correlations between measurements of the same construct; the latter refers to correlations between different constructs (Lévy-Mangin et al., 2006). As a result, the factors that influence cigarette consumption by the population under study were identified. Discriminant validity is one of the usual criteria for assessing the scales of latent construct measurement in social sciences. In this research, discriminant validity analysis was implemented by checking that the confidence interval in the estimation of the correlation between each pair of factors did not contain the value 1 (Anderson and Gerbing, 1988), finding that this criterion was met in all cases. Additionally, for that purpose, several hypotheses were proposed and evaluated with Somers' Delta, which is a measure of association between two ordinal variables that ranges from -1 to 1 where the values close to 1, in absolute value, indicate a strong relation between the two variables and values close to zero indicate that there is little or no relation between the two variables (López-Roldán and Fachelli, 2015).

Likewise, this study considered the reliability of the model defined as the extent to which an in-

strument accurately measures error-free, i.e., the capacity to produce true and constant results in similar measuring conditions when used repeatedly (Arribas, 2004). Reliability should be measured at two levels: observable items and constructs (Porral et al., 2013). Regarding its value, measurements above 0.6 are considered evidence that the model is reliable (Bagozzi and Yi, 1988).

RESULTS

The survey was applied to 300 college students, 40% of whom were women and 60% men. In the study is highlight that the average age they started smoking was 18 years old. In total, 77.08% of the participants felt attracted by experiencing new sensations, and 10.42% carried out that behavior in situations that cause anxiety. Following a method based on the model TPB, this work delved into the reasons that motivate the use of substances such as cigarettes.

In this study, it was not necessary to eliminate any question because the results of their standardized factor loadings were in line with the reviewed literature, and the average construct loadings were above 0.7 (Hair et al., 1998) (see Table 2). Moreover, the results of the sampling adequacy ranged between 0.600 and 0.900, which is suitable according to the literature (Lévy-Mangin et al., 2006).

The result of the KMO test meets the criteria described in the methodology section. In addition, it is important to mention that the data also met Bartlett's sphericity test (see Table 3).

Based on this outcome, a discriminant validity analysis was implemented by verifying that the confidence interval in the estimation of the correlation between each pair of factors did not contain a value of 1 (see Table 4) (Anderson and Gerbing, 1998).

Subsequently, the reliability of the measurement scale was calculated, and the explanatory capacity of the model was verified. For that purpose, the Cronbach's alphas of attitude, control, behavior, intention, and subjective norm were estimated: 0.908, 0.889, 0.977, 0.907, and 0.930, respectively.

According to the literature, these results of the items under analysis indicate high internal consistency in terms of Cronbach's alpha values (see Fig. 2) (Frías and Pascual, 2012).

Based on these Somers' Deltas (see Fig. 2) it was identified that there is an important association between the variables that explain the factors that encourage cigarette consumption by college students. From these results, the 7 hypotheses were accepted as they showed a level of association between the variables close to 1 and therefore indicate a strong association between them.

The survey used included questions to probe for elements associated with cigarette consumption. In that sense the results of this study reveal that most surveyors (74%) started to consume cigarettes out of curiosity and only 11% did it due to external reasons such as peer or family pressure. This confirms that attitude toward behavior has a significant influence, not only on behavior intention, but also on the general behavior of the individual.

Besides, most participants (57%) agree that there is no single factor that motivates them to smoke and only 30% responded that they do so when they are nervous. Similarly, 37% consume the substance when they are stressed out, 38% when they are in a gathering with friends, 24% when it is cold, and 45% when they drink beer. This indicates that cigarette consumption is not as dependent on cultural practices as on the individual's desire to carry out the behavior.

DISCUSSION

These results led to accept all the 7 hypotheses about the correlation between constructs in the model, since their Somers' Delta values were over 0.5. In that sense, the strongest relationships were found between **Attitude toward behavior** and **Perceived behavioral control**, and **Attitude toward behavior** and **Behavior intention**.

Table 2. Initial convergent validity of standardized factor loadings.

Construct	Item	Standardized factor loading	Average standardized factor loadings
Attitude towards behavior (ATB)	ATB1	0.781	0.833
	ATB2	0.882	
	ATB3	0.834	
	ATB4	0.836	
Perceived behavioral control (PBC)	PBC1	0.885	0.829
	PBC2	0.756	
	PBC3	0.847	
Behavior (BH)	BH1	0.951	0.949
	BH2	0.970	
	BH3	0.966	
	BH4	0.909	
Behavior intention (BI)	BI1	0.831	0.775
	BI2	0.797	
	BI3	0.819	
	BI4	0.870	
	BI5	0.614	
	BI6	0.716	
Subjective norm (SN)	SN1	0.856	0.885
	SN2	0.927	
	SN3	0.873	

Source: Authors' own work supported by SPSS statistical software.

Table 3. Kaiser-Meyer-Olkin (KMO) values.

Construct	KMO value
Attitude towards behavior (ATB)	0.677
Perceived behavioral control (PBC)	0.655
Behavior (BH)	0.862
Behavior intention (BI)	0.781
Subjective norm (SN)	0.694

Source: Authors' own work supported by SPSS statistical software.

Table 4. Discriminant validity of the measurement model.

	ATB	PBC	BH	BI	SN
ATB	…				
PBC	[0.818; 0.905]	…			
BH	[0.563; 0.737]	[0.771; 0.879]	…		
BI	[0.711; 0.876]	[0.509; 0.705]	[0.564; 0.739]	…	
SN	[0.653; 0.803]	[0.574; 0.757]	[0.698; 0.861]	[0.537; 0.734]	…

Source: Authors' own work supported by SPSS statistical software. ATB: Attitude towards behavior; PBC: Perceived behavioral control; BH: Behavior; BI: Behavior intention; SN: Subjective norm.

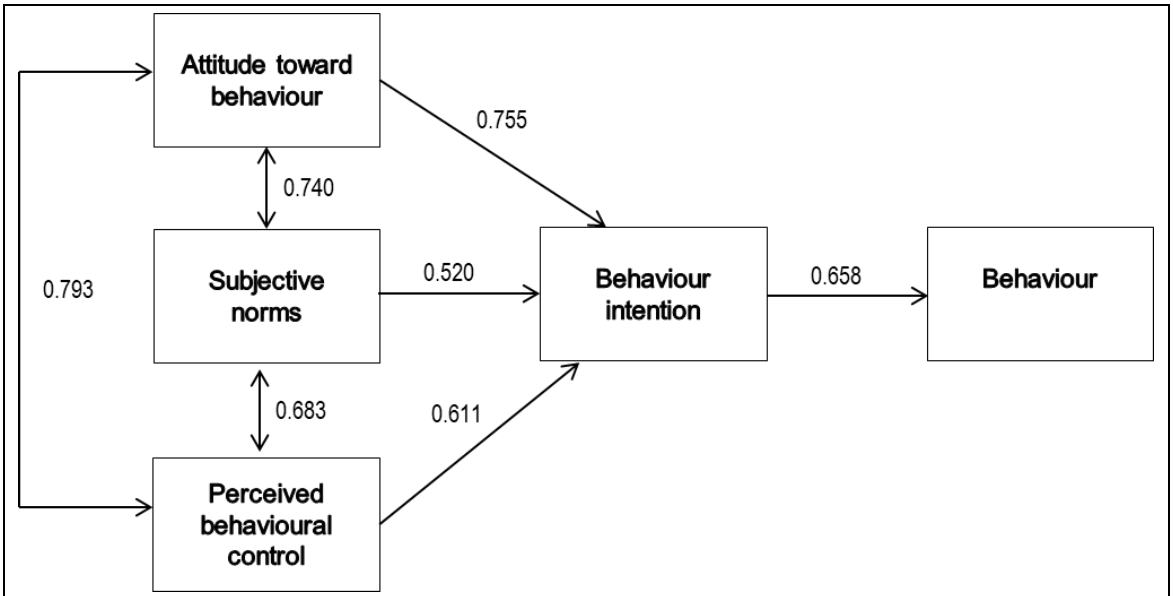

Figure 2. Theory of Planned Behavior, Somers' Delta.
Source: Authors' own work.

Likewise, studies conducted by Leon et al. (2013) and McMillan and Conner (2003) identified the main predictor of cigarette consumption by young students: their attitude toward that behavior. Therefore, they proposed to adopt strategies that aim at changing the positive attitude of students toward the behavior of consuming cigarettes.

In this sense, **Perceived behavioral control** and **Behavior intention** exhibited a secondary level of direct relationship with the intention of consuming cigarettes; their Somers' Delta reached 0.611. Control refers to the presence of constraints to carry out the behavior, i.e., the degree to which its realization is perceived as easy or difficult. This factor was identified as an important predictor of the intention of smoking cigarettes in studies conducted by Record (2017) who specializes in theories of behavior change and the design of intervention strategies to promote healthy behaviors, particularly reducing cigarette consumption. Control was also highlighted in a study on the intention of starting smoking cigarettes among Iranian male teenagers (Karimy et al. 2012).

Since the relationship between **Perceived behavioral control** and **Attitude towards behavior** in this study presented a Somers' Delta of 0.793 (the highest in the validated model), programs should be developed to control cigarette consumption by correcting the attitude of college students

toward such behavior. Another study that used an extended version of the TPB to predict the behavior of Iranian medicine students toward cigarette consumption determined that control played a key role in consumption intention (Karimy et al., 2015).

Additionally, it should be mentioned that the weakest relationship in this study was found between **Subjective Norms** and **Behavior intention** (Somers' Delta, 0.520). Although this hypothesis was accepted according to the established criterion, the expectations of reference groups about the behavior under analysis did not present a significant influence on consumption intention. In that sense, Hassandra et al. (2011) concluded that such construct did not constitute a significant predictor of the intention to smoke cigarettes. Moreover, recent studies by Rachel Record produced a similar result: participating students did not perceive social norms (included in the construct Subjective Norms) as highly relevant to cigarette consumption (Record, 2017).

The participation of a limited number of universities in Medellin in this study may reduce the possibility of designing broader strategies based on these results. In this sense, future research should include more institutions to also consider other important demographic, socioeconomic and cultural features, thus increasing the impact of the findings.

CONCLUSIONS

This study confirms that the Theory of Planned Behavior constitutes a useful tool for several fields of knowledge, including public health, because it enables to identify factors, variables, and relationships that inhibit or motivate an individual's decisions. Finally, the results of this study could influence the design of strategies to reduce cigarette consumption based on the main factors identified in our work: Behavioral control and Attitude towards behavior. As evidenced in the discussion section, these conclusions coincide with other studies that have been conducted on the subject. In that sense and taking into account the public health problems that cigarette consumption represents, it is necessary that strategies be designed to target public policies that reduce the attitude of the young population toward cigarette consumption. Such campaigns should take advantage of the constant interaction of young people with social networks in order to segment prevention campaigns in a more effective and segmented manner to the specific interests of young people. Perceived behavioral control refers to people's perceptions of their ability to perform a given behavior. Therefore, restrictions should not only be aimed at strengthening controls on cigarette sales and distribution to the youth population, but also at generating dynamics of autonomous self-control over cigarette consumption as a decision that can be postponed to a more adult age where there is greater awareness of the dangers of such consumption.

CONFLICT OF INTEREST

The authors declare no conflicts of interests.

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Contribution	Valencia-Arias A	Bermúdez-Hernández J	Bran-Piedrahita L
Concepts or ideas	x	x	x
Design	x	x	x
Definition of intellectual content	x	x	
Literature search	x		x
Experimental studies	x	x	x
Data acquisition	x	x	
Data analysis	x		x
Statistical analysis	x	x	x
Manuscript preparation		x	
Manuscript editing	x		x
Manuscript review	x	x	x

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