

Smoking Attitudes Among Adolescents: Effect of Messages Varying on Argument Quality and Source's Expertise

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The present study examined the effectiveness of an anti-smoking message on processing and persuasion in young adolescents. Data were collected from 112 Greek adolescents 13 to 16 years of age, who were randomly assigned into a control and four experimental groups. All participants in experimental groups read a written anti-smoking message varying on the source's expertise (expert or non expert) and on the quality of the arguments (12 weak/12 strong arguments). Before and after the experimental manipulation, participants completed questionnaires assessing attitudes towards smoking, intention to smoke, perceived behavioral control, subjective norms, knowledge, and smoking behavior. Repeated measures analyses showed no significant differences between experimental groups ($p > .05$). All groups perceived they were more informed about smoking after the experimental manipulation. Results are discussed according to planned behavior theory and elaboration likelihood model, for effective anti-smoking messages addressed to adolescents.

Key Words: smoking, adolescents, message, source

Smoking is the leading cause of several preventable diseases and death in the western world (Higgins & Conner, 2003). In Western societies, experimentation with risky behaviors, such as cigarette smoking, is rather normal among adolescents (Engels, Scholte, van Lieshout, de Kemp, & Overbeek, 2006). In Greece 45% of the population over 15 years old are everyday smokers (Eurostat, 2002); this is the highest percentage of smokers in the European Union. To battle against this dangerous habit, a variety of interventions against smoking and anti-smoking campaigns have been applied in different

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settings (e.g., schools, medical centers, religion settings). These interventions target mostly children and adolescents in an attempt to either modify the unhealthy behavior, or reinforce healthy ones, through effective messages. Grandpre, Alvaro, Burgoon, Miller, and Hall (2003) advocated that today's adolescents are more informed about smoking, hold more negative attitudes toward smoking, and have greater expressed intention not to smoke, due to the large number of anti-smoking campaigns over the past decades. Unfortunately, many young people still take up smoking in spite of the widespread awareness on its long-term negative health consequences. Researchers, in order to develop effective programs against smoking, have tried to integrate different socio-psychological theories and overcome the disadvantages of using a single theory (Slater, 1999). In the present study, elements from the attitudinal theories of planned behavior and elaboration likelihood model were integrated for the development of anti-smoking messages that would persuade young adolescents against smoking.

The theory of planned behavior (TPB; Ajzen, 1988, 1991) is widely used as a framework for understanding and predicting health behavior (Conner & Armitage, 1998). The key point of the theory is that any behavior may be determined by behavioral intention and perceived behavioral control. Therefore, intention to smoke can be predicted by attitudes toward smoking, subjective norms, and perceived behavioral control. Intention reflects the individual's decision to exert effort to perform the behavior and perceived behavioral control is the extent to which the individual perceives that the behavior is under his/her control.

Relevant studies have supported the effectiveness of the TPB in predicting smoking behavior in children 11 to 12 years old (Higgins & Conner, 2003), students 15 to 16 years old (Maher & Rickwood, 1997; Wilkinson & Abraham, 2004), and in young adults (McMillan & Conner, 2003). O' Callaghan, Callan, and Baglioni (2003) found that for high school students' attitudes toward smoking, past behavior in relation to smoking, and perceptions of what significant others think they should do, were significant predictors of the students' intention to smoke. The TPB has also been used successfully to predict intention to quit smoking (Droomers, Scrijvers & Mackenbach, 2004; Norman, Conner, & Bell, 1999).

Another important factor for understanding the attitude-behavior consistency that has often been mentioned in the literature is knowledge (Ajzen & Madden, 1986; Krosnick, Boninger, Chuang, Bernet, & Carnot, 1993). Knowledge refers to the amount of information about an object that accompanies one's attitude toward it in his/her memory, and has often been mentioned as an important factor for understanding the attitude-behavior consistency (Krosnick, Boninger, Chuang, Bernet, & Carnot, 1993). Knowledge is assessed by self-reports of knowledge-ability (Kanwar, Grund, & Olson, 1990). In a relevant study, relationships between attitudes and knowledge on nicotine, nicotine replacement, and smoking cessation therapy were examined (Mooney, Leventhal & Hatsukami, 2005), using a scale that assessed objective knowledge. The results showed no significant correlation between attitudes and knowledge.

According to the elaboration likelihood model (ELM; Petty & Cacioppo, 1986) there are two routes of attitude change (central and peripheral), which vary in the amount of thoughtful consideration (cognitive elaboration) that occurs in response to a persuasive communication (message). Through the central route, individuals carefully scrutinize the merits of the argument presented in a message (high elaboration) and either favor the

argument if it is strong or disfavor the argument if it is weak. This occurs when the individual is motivated and/or able to process the message. Attitudes formed through the central route last longer, resist more, and predict stronger behavior. Alternatively through the peripheral route, when individuals are not motivated and/or not able to process the message arguments, they conserve cognitive effort by relying on simple inferences, such as source characteristics rather than careful scrutiny of the issue relevant information (Petty & Cacioppo, 1986). Source's sex, source's appearance, source's expertise, or anything else that could characterize the source, could be considered as source characteristic (Petty & Cacioppo, 1986).

The most prominent motivational variable appears to be issue involvement and represents the degree to which recipients perceive an issue as personally relevant. Recipients who perceive being highly involved in an issue are motivated to elaborate on an issue-specific message to a greater extent than recipients who perceive themselves as not being involved. Another motivational variable is need for cognition (NFC; Petty & Cacioppo, 1986) that reflects one's tendency to engage and enjoy thinking. Individuals high in NFC are motivated to seek information actively and think about arguments presented to them. Individuals low in NFC tend to be less motivated to employ the cognitive effort required to process systematically the information in health communications (Williams-Piehota, Sneider, Pizarro, Mowad, & Salovey, 2003).

Petty and Cacioppo (1986) introduced the systematic variation of argument quality to study how variables influence the degree of message processing as an important methodological tool. Strong arguments were considered those that evoke predominantly favorable cognitive responses and result in more positive attitudes; whereas, weak arguments produce mainly unfavorably thoughts and lead to less positive attitudes. They suggested that the most important variable affecting one's motivation to process a persuasive message is *personal* relevance or personal involvement. Personal involvement is the extent to which an advocacy has intrinsic importance or personal meaning (Petty & Cacioppo, 1986). Under conditions of high personal involvement, individuals tend to process the arguments via a systematic or a central processing route, such as credibility or expertise of the message's source. Under conditions of low elaboration, the likelihood of receiving information from a credible source has a positive impact on the acceptance of the information (Chaiken & Maheswaran, 1994). When the source credibility is perceived as low, people discount the arguments or appeals presented in the message; whereas, when the source credibility is perceived as high, people are more easily influenced by the message (Grewal, Gotlieb, & Marmorstein, 1994).

Recently, researchers have tried to integrate different social-psychological theories to investigate health behaviors (e.g., Collins & Ellickson, 2004; Hill, Bodreau, Amyot, Déry, & Godin, 1997). Collins and Ellickson (2004) suggested that integrated models are more appropriate for examining adolescents' health behaviors, as problems from a single theory are overcome.

Most health education programs are, and must be, designed by individuals well qualified to plan such programs (McKenzie, Neiger, & Smeltzer, 2005). Many types of adult professionals (e.g., teachers, doctors, nurses, scientists) contribute to and conduct health education programs (Glanz, Rimer, & Marcus Lewis, 2002). However, adolescents think differently from adults in health matters. According to Scott (1996), adolescents typically view the negative consequences with substance abuse in much the same way

they view old age or mortality, as something that happens to older people and does not involve them. It must be mentioned that the implementation of a health education program can be also led by peers (e.g., Koumi & Tsiantis, 2001). The present study examined the effectiveness of different messages against smoking on adolescents. Messages against smoking varied on the source's expertise (expert or non expert) and the arguments' quality (weak arguments or strong arguments against smoking). We expected that messages against smoking would be effective in modifying attitudes toward smoking, and those adolescents who were lower involved in smoking, would be persuaded by the peripheral route.

Method

Participants

One hundred and twelve students of a secondary school in Greece participated in the present study. Fifty boys (45%) and sixty-two girls (55%), aged from 12 years to 15 years old ($M = 13.80$, $SD = .70$) participated. The mean age for girls was 13.79 years ($SD = .68$) and for boys it was 13.81 years ($SD = .74$). Their participation was on a voluntary basis and permission to participate was granted by the school director. The study was approved by the review board of University of Thessaly (Department of Physical Education). Considering their smoking behaviors, 83% of the participants reported that they had never smoked, not even one or two puffs; 17% had smoked one or two puffs (i.e., 17% had experimented with smoking at the time of the research).

Instruments

Attitudes toward smoking, intention to smoke, perceived behavioral control and subjective norms, are variables measured with the Planned Behavior Theory questionnaire. The TPB questionnaire (Ajzen, 2002) used in the present study had been previously used in relevant studies with Greek populations (Theodorakis, 1994; Theodorakis, Natsis, Papaioannou, & Goudas, 2003). Attitude toward smoking was assessed by the mean of six items. Responses were rated with 6 bipolar adjectives (e.g., good-bad) on 7-point scale, where higher scores indicated more positive attitudes toward smoking. Cronbach's α ranged between .85 to .95. Intention to smoke was assessed by the mean score of three items; each one was measured on a 7-point scale ranging from 1 (*unlikely*) to 7 (*likely*). Lower scores indicated less intention to smoke. Cronbach's α varied from .66 to .92. Perceived behavioral control was assessed by the mean score of three items. Answers were recorded on a 7-point scale ranging from 1 (*I disagree*) to 7 (*I agree*). Higher scores indicated higher perceived control on smoking. Cronbach's α varied from .58 to .66. Subjective norm was assessed by the mean score of three items. Responses were given on a 7-point scale. Higher scores indicated that significant others approved smoking. Cronbach's α varied from .50 to .73. Knowledge was assessed by the mean of four items (Krosnick et al., 1993). Responses were recorded on a 7-point scale ranging from 1 (*not informed at all*) to 7 (*very informed*). Cronbach's α varied from .70 to .97. Higher scores indicated that a person perceived himself/herself to be more informed about smoking.

The need for cognition scale (Petty & Cacioppo, 1986) consists of 18 items and responses are given on a 5-point scale indicating one's agreement or disagreement with the items. Responses vary from 1 (*extremely uncharacteristic for me*) to 7 (*extremely characteristic for me*). Cronbach's α was .68. Personal involvement with the subject of

smoking was measured by three items, using a 6-point scale (Furlong, 1993). An answer varied from 0 (*never*) to 6 (*very often*) and Cronbach's α was .64.

Source's expertise was measured by four questions (Rosen, 2000). Answers were recorded on a 7-point scale, ranging from 1 (*very*) to 7 (*not at all*). Cronbach's α for this scale was .75. Perceived effectiveness of the message was assessed with two items. The first item was "to what extent do you think this message was effective?" and the second item was "to what degree do you think that this message convinced you not to smoke?" Responses were given on a 9-point scale and the answers varied from 1 (*not at all*) to 9 (*totally*). These two items were also used in the relevant studies of Petty and Cacioppo (1986) and Rosen (2000). Cronbach's α for this scale was calculated at .82. In a page participants had to recall as many arguments as he/she could recall from the message he/she had just read.

Experimental Design and Procedure

Participants were randomly assigned into one control and four experimental groups. Eighteen participants were assigned to the "expert source-strong arguments" group, 29 participants to the "expert source-weak arguments" group, 27 to the "non expert source-strong arguments" group, 15 to the "non expert source-weak arguments" group, and 23 participants comprised the control group. Participants responded to all questionnaires in their respective classrooms.

Three sets of measures were completed (Measure 1, Measure 2, and Measure 3). All questionnaires were anonymous and confidential. All participants were informed about the purpose of the study (as far as this information could not affect its results). A week prior to the message manipulation, participants completed all baseline questionnaires in Measure 1 (attitudes toward smoking, intention to smoke, perceived behavioral control, subjective norms, knowledge about smoking, smoking behavior, personal involvement, and NFC). At Measure 2 participants were instructed to read to themselves (not out loud) a message against smoking. Immediately following these instructions, the participants read either a strong or a weak set of arguments against smoking written by an expert or a non expert source. After this message manipulation, participants completed Measure 2 (attitudes toward smoking, intention to smoke, perceived behavioral control, subjective norms, smoking behavior, knowledge, message's effectiveness, source's assessment, and arguments' recall). Two weeks after the message manipulation, participants completed arguments' recall, attitudes toward smoking, intention to smoke, perceived behavioral control, subjective norms, smoking behavior, smoking behavior, knowledge, and arguments' recall questionnaires (Measure 3).

Anti-smoking message

A one-page text was provided to each participant as a message that comprised of four paragraphs. All messages included equal number (12) of arguments against smoking that varied on two levels: the arguments' quality and the source. Each participant's message contained only one kind of argument and one source. The strong and weak arguments were selected through pilot studies. All arguments discussed smoking consequences for the person and his/her close environment. Weak arguments presented more effects on clothes, hair, nails, etc., while strong arguments presented health consequences such as cancer, death, pregnancy problems, etc. There was no fear appeal in the messages and the wording was in a personal way. The first group read a message containing strong arguments by a credible source (expert-strong), the second group read a

message containing weak arguments by a credible source (strong-weak), the third group read a message containing strong arguments by a non credible source (non expert-strong), and the fourth group read a message containing weak arguments by a non credible source (non expert-weak). The control group had no message to read.

Through a pilot qualitative study, five experts in psychology evaluated the two types of source. The expert source presented in the study was a medical doctor with a doctoral degree, active as a researcher for the World Health Organization. The introductory text provided information about his/her publications and research on smoking in adolescence. In the same text it was explained to the participants that the text was part of an article written by him/her soon to be published in a scientific journal. The non expert source was a university student who volunteers in a Student Health Organization and has written articles in newspapers. The written message was part of a presentation he/she would do at his/her neighborhood's high school. The sex of the source was either female or male according to participant's sex. The same procedure was also used in other studies (Jones, Sinclair, Rhodes & Courneya, 2004; Rosen, 2000).

Results

Participants scored higher than the median on NFC ($M = 3.11$, $SD = .50$) and reported low involvement with smoking ($M = 1.68$, $SD = 1.55$). Being less involved was reported by 63% of the participants and 24% reported being more involvement.

The mean scores of each group in Measure 1, Measure 2, and Measure 3 are presented in Table 1. Repeated measures were calculated to test differences between experimental groups in Measure 1, Measure 2, and Measure 3. The significance criterion was at least $p < .05$. In Table 2 the results of within-subjects effects in subjective norms, knowledge are presented. Post-hoc analyses showed that in subjective norms differences were significant between Measure 1 and Measure 3, $F(1,86) = 11.28$, $p = .001$. In knowledge, post-hoc analyses showed that differences were significant between Measure 1 and Measure 2, $F(1,83) = 26.02$, $p = .000$ and between Measure 1 and Measure 3, $F(1,86) = 17.83$, $p = .000$.

Two judges, blind to the experimental hypotheses, evaluated the arguments recalled by the participants. The interrater reliability was computed and the agreement was high ($rs > .88$). There were no significant differences in the number of arguments recalled between the four experimental groups. It appears that weak arguments could more easily be recalled regardless of the source (non expert-weak: $M = 3.54$, $SD = 1.66$; expert-weak: $M = 3.54$, $SD = 1.60$; non expert-strong: $M = 2.72$, $SD = 1.10$; expert-strong: $M = 2.53$, $SD = 1.74$). Participants high in NFC (\geq mean) recalled about 3 of the 12 arguments ($M = 2.94$, $SD = 1.52$), while participants low in NFC ($<$ mean) also recalled about 3 arguments ($M = 3.18$, $SD = 1.57$).

Two weeks after the experimental manipulation revealed no significant differences in the number of arguments recalled between experimental groups. However, the expert-strong group scored slightly higher than the other groups $M_{\text{expert-strong}} = 2.00$, $SD = 1.41$; $M_{\text{non expert-weak}} = 1.77$, $SD = 1.79$; $M_{\text{non expert-strong}} = 1.52$, $SD = 1.44$; $M_{\text{expert-weak}} = 1.50$; $SD = 1.29$). Examining the differences in arguments recalled between participants high and low in NFC, it was found that participants high in NFC scored higher than participants low in NFC ($M_{\text{high}} = 1.70$, $SD = 1.42$; $M_{\text{low}} = 1.60$, $SD = 1.45$), yet these differences were not significant ($p > .05$).

Table 1
Means and Standard Deviations in all Variables of Planned Behavior Theory in Measure 1, Measure 2 and Measure 3, for each Experimental Group

	Measure 1 (pre-test)					Measure 2					Measure 3				
	Experimental groups*														
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Intention</i>	1.81 (1.33)	1.91 (1.43)	1.68 (1.08)	1.37 (.97)	1.87 (1.33)	1.53 (.87)	1.62 (1.22)	1.35 (.62)	1.63 (1.39)	1.43 (.80)	1.36 (.81)	1.75 (1.02)	1.42 (.68)	1.82 (1.36)	1.61 (1.12)
<i>Attitude</i>	1.25 (.50)	1.54 (.72)	1.32 (.47)	1.69 (1.11)	1.43 (.61)	1.47 (.84)	1.48 (.70)	1.52 (.93)	1.72 (1.12)	1.45 (.58)	1.43 (.88)	1.41 (.69)	1.32 (.65)	2.00 (1.86)	1.49 (.85)
<i>Perceived Behavioral control</i>	5.42 (1.71)	5.48 (1.89)	5.16 (2.18)	5.18 (1.51)	5.39 (1.92)	5.64 (1.26)	5.45 (2.03)	5.46 (2.00)	5.53 (3.81)	5.76 (1.81)	4.11 (1.98)	4.80 (2.09)	4.02 (2.02)	3.58 (1.82)	4.74 (2.29)
<i>Subjective norms</i>	1.69 (.76)	2.29 (1.20)	1.87 (.99)	2.67 (1.31)	2.30 (1.19)	1.53 (1.08)	1.72 (1.47)	1.56 (1.10)	1.57 (1.07)	1.28 (.70)	1.75 (1.17)	1.86 (1.75)	1.46 (1.16)	1.96 (1.63)	1.66 (1.54)
<i>Knowledge</i>	4.60 (1.55)	4.35 (1.59)	4.60 (1.41)	3.78 (1.66)	4.31 (1.32)	5.43 (1.26)	4.91 (1.55)	5.08 (.96)	4.78 (1.65)	4.92 (1.04)	5.11 (1.27)	4.95 (1.32)	5.12 (1.32)	5.21 (1.00)	4.73 (1.49)

Note. * “1”= “expert source-strong arguments” group, 2=“expert source-weak arguments” group, 3=“non expert source-strong arguments” group, 4=“non expert source-weak arguments” group, 5=control group

Table 2
Means and Standard Deviations of Subjective Norms and Knowledge in Measure 1, Measure 2 and Measure 3

	<i>Measure 1</i>	<i>Measure 2</i>	<i>Measure 3</i>			
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>F</i>	<i>df</i>	η^2
Subjective norms	2.15 (1.11)	1.58 (1.14)	2.24 (1.32)	10.19**	2,172	.11
Knowledge	4.30 (1.47)	5.07 (1.38)	4.96 (1.28)	14.61**	2,166	.15

Note. ** $p < .001$

All types of messages were perceived as effective by participants ($M_{\text{expert-strong}} = 7.28$, $SD = 1.47$; $M_{\text{expert-weak}} = 7.24$, $SD = 1.86$; non expert-strong $M_{\text{non expert-strong}} = 6.98$, $SD = 2.03$; $M_{\text{non expert-weak}} = 6.87$, $SD = 2.13$). No significant differences were found in message's perceived effectiveness between groups.

Both sources were evaluated by participants as experts (scores exceed the median). The expert source was evaluated higher than the non expert source ($M_{\text{expert}} = 6.12$, $SD = 1.25$; $M_{\text{non expert}} = 6.02$, $SD = 1.02$). Between the high and low in personal involvement variables, significant differences were found for the source's knowledge, $t(86) = 2.26$, $p = .03$. Participants high in personal involvement perceived that the source knew a lot about smoking ($M = 6.71$, $SD = .74$). On the contrary, participants low in personal involvement perceived that the source did not know enough about smoking ($M = 6.12$, $SD = 1.67$). For participants low in personal involvement, the expert-weak group knew more about smoking than the expert-strong and non expert-weak groups, $F(3,35) = 3.21$, $p = .01$.

Discussion and Conclusion

The purpose of the present study was to explore if different anti-smoking messages could have influenced adolescents' attitudes toward smoking or any other variable from planned behavior theory. In brief, the results of the present study showed that there were no significant differences between messages against smoking varying on source and arguments' quality. The experimental manipulation increased subjective norms and knowledge about smoking for all experimental groups.

No significant differences were found before and after the manipulation procedure between experimental groups in attitudes toward smoking. Perhaps there was a ceiling effect as participants' attitudes toward smoking were already very negative from the pre-test measure. In a study by McMillan, Higgins, and Conner (2005), attitudes toward smoking and intention to smoke were assessed in 803 schoolchildren (aged 12 to 13 years old) and found to be strongly skewed towards not smoking, as in our study. Children in early adolescence have still negative attitudes toward smoking and reported that they did not intent to smoke.

Message's source is a very important factor that may influence not only one's attitudes but also his/her intention to smoke. In a qualitative inquiry (Crawford, 2001), anti-smoking messages from schools, provided by teachers, were perceived by adolescents as inconsistent or hypocritical. Adults, in general, are persons of authority whom are often questioned by adolescents, thus although adolescents perceive the messages from adult sources as correct, they resist them. In a study examining the source's effect on quitting smoking, the results showed that lacking good reasons to smoke increased smokers' intention to quit smoking when the message was attributed to a non expert source (Falomir-Pichastor, Butera, & Mugny, 2002). It must be mentioned that the age of the participants in their study was slightly older than in the present study. Furthermore, in this study it is possible that the non expert source was perceived by adolescents as an expert too, which may limit our findings. In our study there was no evidence that message's source affected attitudes toward smoking. For this there are two possibilities. First, of all each message contained too many arguments, so source's effect was minimized. Second, messages were written and the effectiveness of written messages is questioned (Bakker, 1999), especially about issues on which adolescents are low involved.

The literature on persuasion clearly indicates that increasing the number of arguments in a message is often an effective way to increase persuasion (e.g. Maddux & Rogers, 1980), yet most researchers have argued that this happens because people generate and/or integrate more favorable issue-relevant beliefs with more arguments. The mere number of arguments in a message would serve as a simple peripheral cue to the validity of the message, but only when the personal relevance of the message is low (Petty & Cacioppo, 1986). In the present study, adolescents' involvement with smoking was rather low and the number of arguments in the messages was rather large (12 arguments per message). That could mean that all messages were considered valid. Further research must be conducted to examine whether shorter messages against smoking could be more or less effective than longer ones.

Most of health education programs place emphasis on giving a great amount of information about the consequences of smoking on health. Nevertheless, information on smoking effects on health come out of everywhere (e.g., television, magazines, newspapers) and this information may lead adolescents to perceive that they are well informed about smoking. The fact that the perceived amount of information (i.e., knowledge) increased from measure to measure, even for the control group, may be a result of the questionnaires' completion frequency. Another possible explanation of knowledge's increase is that completing the questionnaires in Measure 1 intrigued them to pay more attention on information about smoking afterwards. This could not be controlled and is another limitation of the present study.

If there is low personal involvement around the issue of smoking, it may be that most students are more likely to respond to peripheral cues than to central and the credibility or attractiveness of the message source would be important (Scott, 1996). Results from the present study are consistent with ELM (Petty & Cacioppo, 1986). Participants, low in NFC, were persuaded by source's expertise, as they thought that even as expert source with weak arguments knew more about smoking. When personal involvement was high, the source was assessed as a person with great knowledge about smoking, regardless of the arguments' quality. On the other hand, when personal

involvement was low, source was assessed acquiring low knowledge. According to Lien (2001), when motivation to think is low or involvement is low, then the expert source can serve as a peripheral cue but when motivation to think or involvement is high, the source's expertise does not seem to play a significant role.

According to Petty and Cacioppo (1986), when argument recall takes place a short time after one's exposure to the message (as happened in the present study), no differences between participants are expected. Results of the present study are consistent to that belief. In Petty and Cacioppo's study (1986), although differences between high and low elaboration likelihood conditions generally did not produce significant differences in the number of message arguments recalled, high elaboration likelihood tended to be associated with more arguments recalled than low elaboration likelihood. However, it was not examined whether the source played a significant role in arguments' recall in that study. In this study source did not play significant role in argument recall.

A few more limitations exist for the present study. First of all, the results can not be generalized to all adolescents and to different cultures. Secondly, the messages were in text format and so the results can not be generalized for other kind of messages (e.g., audio, cartoon images). For example, Bakker (1999) examined the effectiveness of messages about AIDS, an issue in which adolescents were low in personal involvement, too. The results of her study suggested that the cartoon message was more effective for participants low in need for cognition and the written message was more effective for participants high in need for cognition. Further investigations must look into which kind of anti-smoking messages are effective for Greek adolescents. Messages should be examined separately for adolescents entering secondary school and older adolescents. The messages should contain few arguments and perhaps the questionnaires should have another form than written (e.g., electronically or oral).

All participants had formed attitudes toward smoking and it is quite difficult to change strong attitudes toward a taboo subject, as smoking. Another limitation was internal consistency for subjective norm and perceived behavioral control. Cronbach's α was lower than the acceptable level in one of the three measures. It is not a surprise that these two variables have giggered researches' interest, as they appear to have low internal consistency more often than the others (e.g., Higgins & Conner, 2003). Subjective norm and perceived behavioral control must be examined more extend in Greek population. Finally, the present study must be replicated with more participants.

In conclusion, anti-smoking messages ought to be included in health education programs. These messages should be designed properly for the recipient's age and interests. Early adolescence is an age group in which attitudes toward smoking are still negative and involvement with smoking is still low, so according to the ELM, emphasis must be placed on the message's source. More research would also be the appropriate step in order to understand whether the properties of anti-smoking messages on Greek adolescents can help experimentation with smoking.

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