

Information Processing of Health Warning Messages on Cigarette Packs in Youth: An Application of Elaboration Likelihood Model

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Abstract

Background The study examined the processing route of anti-smoking messages and influencing cognitive factors by using the Elaboration Likelihood Model.

Methods The non-probability sample for the cross-sectional study consisted of 387 smokers in the age range of 18 to 30 years old in Tabriz, Iran. A researcher-designed questionnaire was used for the purpose of data collection. No causal inferences were drawn due to the non-experimental nature of the study.

Results It was found that smokers often processed warning messages through the central route. Perceived severity, smoking abstinence self-efficacy, and psychological dependence were predictors of message processing through the central route. The results supported the conceptual model of cognitional predictors of the processing route.

Conclusions To design and execute effective health warning messages to quit smoking, it is recommended to consider cognitive factors as a means to enhance critical thinking about the content of the message.

Background

Most smokers start smoking at an early age, when they think there is no need to worry about the side effects of cigarette smoking such as vascular diseases, lung cancer, chronic pulmonary disease, and other head-to-toe side effects (1). According to the literature, smokers tend to underestimate the harmful effects of smoking (2–4); consequently, health policy makers try to persuade smokers to quit smoking by providing appropriate information through effective communication channels (5).

Health warning messages are known to be effective in positively affecting the attitudes of people towards health-related issues (6); for example, on cigarette packages to inform the users of negative consequences of smoking (7), focusing on dangers of tobacco use (5, 8). In fact, pictorial health warning labels are regarded as a cost-effective medium and an effective communication method for providing health information among vulnerable groups, increasing awareness, and motivating smokers to quit cigarette smoking (5). Therefore, the content of these messages is important and must make people think about it carefully, if not, it is not taken seriously (9).

According to avoidance-oriented approach, emotions, such as fear, influence people's decision-making process. Therefore, an effective warning message may motivate people to engage in behaviors that protect them from the potential threat (7). In addition to fear, the credibility of the message and its source may influence the warning message's effectiveness (10). According to the Elaboration Likelihood Model (ELM), there are two pathways to influence the creditability and usefulness of the message.

The ELM, developed by Petty Cacioppo, is a dual process theory, describing the change of attitudes through two major routes to persuasion, namely, central and peripheral routes (11, 12). Sometimes people

tend to think carefully about the contents of a message based on their knowledge. On the other hand, there are people who are either unwilling or unable to analyze the contents of the message based on a logical manner; thus, peripheral factors, such as how and where the message is delivered and its visual impact, play a prominent role in the emotional pathway. In addition, Petty and Cacioppo assumes that motivation and ability are two influential factors affecting the occurrence of a message (11, 12). Therefore, those who are highly motivated to quit smoking and have sufficient ability to process the information follow the central route by relying on their knowledge and perceived personal relevance with a message. Whereas, people with lower motivation to quit or lower ability to process the information are likely to process the received message through the peripheral route by relying on superficial cues and less thoughtful evaluation of the information (11).

Young people believe that the unpleasant consequences of substance abuse occur at an old age and for older people and do not involve them (13). On the other hand, Te'eni-Harari et al. (2007) found that, contradictory to adults, young people are a less intellectually oriented population, who mostly enact based on peripheral route to process information and are less influenced by motivation and ability variables (14). In this regard, in spite of the presence of warning images on cigarette packets about the physical threats of smoking in Iran (15), many young people continue smoking without paying attention to health risk messages. Therefore, it may be concluded that message processing is different for young people than older ones. There is a lack of evidence in Iran about how the youth processes the tobacco-related risk messages. The primary purpose of the study was to evaluate the information processing of health warning messages on cigarette packs in a sample of Iranian youths. The following research questions guided the study: How do smokers process health warnings on cigarette packs? What role do cognitive factors play in determining processing routes?

Methods

Study setting

The non-probability sample for the cross-sectional study consisted of 387 current smokers, ranging in age from 18 to 30 years old, who were not taking any medications for psychiatric disorder, voluntarily agreed to participate in the study, and signed a consent form. The study took place between July and November of 2018 in Tabriz, Iran. A survey instrument was used to collect the data. The content validity of the instrument was assessed by a panel of experts in health psychology and health communication. The instrument was pilot-tested with 50 young smokers to examine its utility. The Ethics Committee of Tabriz University of Medical Sciences approved the study.

Survey instrument

Demographics

The demographic variables included age, gender, living arrangement (with parents, personal home, dormitory), marital status (single or married), employment status (full-time, part-time, unemployed), and the highest level of education. Additionally, history of hookah use, alcohol use, drugs abuse, smoking among friends and family members, the number of cigarettes smoked per day, smoking behavior after waking up and the first bidder of cigarette smoking were measured.

Message Processing Route

For evaluating processing routes of peripheral and central, based on the ELM, we included two most influential factors of motivation and ability. The extent of motivation was determined by the attitude towards the message, personal relevance, and the need for cognition. Individuals' ability for elaboration was operationalized by distractions and knowledge. In our study, the midpoint of the sum of motivation and ability was used to categorize the processing route into the peripheral (less than 2016.65) and central (greater than 2016.65).

The attitude towards the message was measured by 12 items developed by the researchers; for example, "pictures motivated me to reduce my daily number of cigarettes smoked". Additionally, we developed 3-item scale to assess perceived relevance; for example, "in my opinion, the pictures on the cigarette packet talked about my health conditions." A 5-point Likert-type scaling (1 = strongly disagree, 5 = strongly agree) was used to measure the constructs. The need for cognition was measured by the 6-item version of Cacioppo and Petty's (1982) scale that was proposed by Lins de Holanda Coelho, Hanel, and Wolf (2018); for example, "I would prefer complex to simple problems" (16). A 5-point Likert-type scaling (1 = extremely uncharacteristic of me, 5 = extremely characteristic of me) was used. Reliability coefficients for the attitude towards the message ($\alpha = 0.92$), perceived relevance ($\alpha = 0.82$), and need for cognition ($\alpha = 0.71$), attested to the internal consistency of the scale scores.

Additionally, ability was measured by knowledge and distractions, utilizing two scales that were developed by the research team. Specifically, an 8-item scale was used to measure the knowledge about the potential negative consequences of smoking cigarettes; for example, "smoking can cause lung cancer." Responses were coded as 0 = no/don't know or 1 = yes. A 4-item scale was used to gauge distractions, utilizing a 4-point Likert-type scaling (1 = never, 4 = always); for example, "presence of people around me caused to lose my focus on pictures and smoking outcomes." The reliability coefficients for the knowledge and distractions were 0.67 and 0.62, respectively.

Cognitive Variables

Perceived severity. To measure the seriousness of smoking risks, Harris's four-item scale of perceptions of personal risk about smoking and health was employed (17); for example, "smokers live shorter lives than non-smokers" and "smoking increases your chance of getting lung cancer." The reliability coefficient for the scale was 0.75.

Sensation-Seeking. A published 8-item questionnaire was used to assess sensation-seeking behavior (Hoyle et al., 2002); for example, "I would like to explore strange places" (18). The estimated reliability coefficient was 0.82.

Psychological dependence. A four-item scale, derived from Autonomy Over Smoking scale (19) was used to measure psychological dependence; for example, "I rely on smoking to focus my attention" and "I rely on smoking to take my mind off being bored." The reliability coefficient for the scale was 0.80.

Smoking abstinence self-efficacy. A 12-item instrument (SASEQ) was used to assess self-efficacy(20); for example, "you feel very sad, are you confident that you will not smoke?" The reliability coefficient for this scale was 0.80.

Positive attitude toward smoking. A 9- item researcher-made instrument was used to gauge participants' attitude toward smoking; for example, "smoking makes me look attractive" and "smoking makes me feel independent." The reliability coefficient for the scale was 0.67.

We used a 5-point Likert-type scaling (1= strongly disagree, 5 = strongly agree) to measure all abovementioned scales.

Data Analysis

To analyze the data, the Statistical Package for Social Sciences (SPSS), version 23, and Mplus software, version 6, were used. Descriptive statistics, Mean (SD) and frequency (%), were used to summarize the data. Normality of all distributions was compared by examining skewness and kurtosis indices. The significance level for all analyses was set, a priori, at $p \leq 0.05$. Chi-square test was used to describe the question related to participants' perception of images on cigarette packs. To compare the cognitive constructs scores in processing routes, an independent sample t-test was applied.

Applying the Mplus software, we performed structural equation modeling (SEM), with maximum likelihood estimation, to test the hypothesized model for cognitive predictors of the processing route in full sample (Model A) and gender groups (Model B). We applied χ^2 estimate with degrees of freedom as the model fit index and the root mean squared error of approximation (RMSEA) as the absolute fit index.

Results

The majority of the participants (57.40%) processed the message through the central route, of which, 80.00% were female, 73.10% lived with their families, 69.40% smoke one cigarette per day, and 72.90% reported the first cigarette offered by their friends. Whereas 40.10% who processed the message with peripheral route were male, 47.00% lived in a dormitory, 56.80% smoked more than 15 cigarettes per day, and 58.80% reported the first cigarette offered by nobody. As shown in Table 1, a series of the Chi-square Test of Independence showed a statistically significant difference in processing route by gender, residency status, smoking rate, and the first bidder of using a cigarette.

Table 1

A Summary of Message Processing Routes by Demographic Characteristics (n = 387).

	Processing Rout		
	Peripheral (n = 129) N (%)	Central (n = 258) N (%)	
Gender			$\chi^2: 15.61, p < 0.05$
Female	26 (20.0)	104 (80.0)	
Male	103 (40.1)	154 (59.9)	
Marital status			$\chi^2 = 2.01, p = 0.19$
Married	97 (35.5)	176 (64.5)	
Single	32 (28.1)	82 (71.9)	
Residency status			$\chi^2: 14.26, p < 0.05$
With family	59 (26.9)	160 (73.1)	
Alone	15 (29.4)	36 (70.6)	
In dormitory	55 (47.0)	62 (53.0)	
Education level			$\chi^2: 0.67, p = 0.71$
Elementary education	12 (40.0)	18 (60.0)	
High school education	28 (33.3)	56 (66.7)	
University education	89 (32.6)	184 (67.4)	
Employment status			$\chi^2: 0.23, p = 0.89$
Full time	36 (31.6)	78 (68.4)	
Part time	29 (33.7)	573 (66.3)	
Unemployed	64 (34.21)	123 (65.8)	
History of hookah use	105 (34.0)	204 (66.0)	$\chi^2: 0.29, p = 0.69$
History of alcohol use	74 (35.7)	133 (64.3)	$\chi^2: 1.17, p = 0.33$
History of drugs abuse	31 (43.1)	41 (56.9)	$\chi^2: 3.76, p = 0.07$
History of smoking in parents	66 (35.5)	120 (64.5)	$\chi^2: 0.74, p = 0.39$
History of smoking in siblings	48 (27.9)	124 (72.1)	$\chi^2: 4.10, p = 0.05$

	Processing Rout		
	Peripheral (n = 129) N (%)	Central (n = 258) N (%)	
History of smoking in friends	114 (36.0)	203 (64.0)	$\chi^2: 5.45, p < 0.05$
The first bidder of using cigarette			$\chi^2: 21.55, p < 0.05$
Friends	67 (27.1)	180(72.9)	
Colleagues	12 (32.4)	25 (67.6)	
Relatives	13 (33.3)	26 (66.7)	
Nobody	37 (57.8)	27 (42.2)	
Smoking Consumption			$\chi^2: 16.19, p < 0.05$
1 cigarette per day	55 (30.6)	125 (69.4)	
2–15 cigarette per day	50 (39.7)	76 (60.3)	
More than 15 cigarette per day	46 (56.8)	35 (43.2)	
Earliest time to smoke			$\chi^2: 1.58, p = 0.21$
Immediate after waking up	64 (43.0)	85 (57.0)	
More than 60 minute after waking up	87 (36.6)	151(63.4)	

Insert Table 1 about here

As can be seen in Table 2, mean differences between the central and peripheral routes were statistically significant based on the attitudes towards smoking (favoring the peripheral route), while central route scored higher on perceived severity and psychological dependence. Sensation seeking did not distinguish between the two routes.

Table 2
Comparison of Message Processing Routs Based on Cognitive Variables

Variable	Mean (SD)		Mean Difference (95% CI), p-value
	Central route	Peripheral route	
Attitude toward smoking	22.67 (6.89)	25.04 (6.13)	2.36 (1.05, 3.67), < 0.001
Perceived severity	16.28 (2.84)	13.01 (3.17)	-3.26 (-3.87, -2.66), < 0.001
Sensation seeking	18.34 (6.51)	18.92 (5.96)	0.57 (-0.68, 1.83), 0.374
Psychological dependence	21.44 (5.57)	20.02 (5.55)	-1.42 (-2.54, -0.29), 0.014

Insert Table 2 about here

The respondents were provided with four distraction items: (1) presence of other people at their side distracting their attention to warning images; (2) not paying attention to risk message images on cigarette packs when doing other things; (3) becoming worried by the pictures on the cigarette packets; and (4) the severity of the thirst for smoking. As shown, “frequently” was the option endorsed the most by all subjects in general and those employing the central route in particular.

Insert Table 3 about here

Table 3
Comparison of Message Processing Routs Based on Distraction Items

Items	Answer choice	Processing Route	
		Peripheral = 129 N (%)	Central = 258 N (%)
The presence of people around me caused to lose my focus on pictures and smoking outcomes.	Never	37 (28.7)	54 (20.9)
	Frequently	69 (53.5)	179 (69.4)
	Always	23 (17.8)	25 (9.7)
When I do something, I cannot focus on pictures and smoking outcomes.	Never	35 (27.1)	43 (16.6)
	Frequently	71 (55.1)	188 (72.9)
	Always	23 (17.8)	27 (10.5)
The pictures on the cigarette packets make me worried and I try to ignore it.	Never	58 (45.0)	43 (16.6)
	Frequently	60 (46.5)	187 (72.5)
	Always	11 (8.5)	28 (10.9)
The thirst for smoking is so severe in me, so that I ignore the picture on cigarettes packs and the smoking consequences.	Never	39 (30.2)	56 (21.7)
	Frequently	68 (52.7)	164 (63.6)
	Always	22 (17.1)	38 (14.7)

The respondents were provided with five cognition reaction items: (1) thinking to quit smoking after seeing picture on cigarette packets; (2) thinking to reduce smoking after seeing pictures on cigarette packets; (3) being attracted by picture on cigarette packets; (4) being reminded of the dangers of smoking after seeing pictures on cigarette packets; and (5) being scared by seeing pictures of self. As can be seen Table 4, the majority of those who processed the messages via the peripheral route disagreed or strongly disagreed with all items. On the other hand, central route processors agreed or strongly agreed with all items.

Table 4
Comparison of Message Processing Routs Based on Cognition Reaction Items

Items	Answer choice	Processing route	
		Peripheral = 129 N (%)	Central = 258 N (%)
I think to quit smoking after seeing pictures on cigarette packets.	Strongly agree	4 (3.1)	61 (23.6)
	Agree	11 (8.5)	107 (41.5)
	Undecided	31 (24.1)	42 (16.3)
	Disagree	59 (45.7)	39 (15.1)
	Strongly disagree	24 (18.6)	9 (3.5)
I think to reduce smoking after seeing pictures on cigarette packets.	Strongly agree	1(0.78)	41 (15.9)
	Agree	26 (20.16)	133 (51.5)
	Undecided	28 (21.7)	39 (15.1)
	Disagree	55 (42.6)	34 (13.2)
	Strongly disagree	19 (14.7)	11 (4.3)
The pictures on the packages attracted my attention.	Strongly agree	3 (2.3)	44 (17.0)
	Agree	31 (24.0)	139 (53.9)
	Undecided	36 (27.9)	47 (18.2)
	Disagree	43 (33.3)	21 (8.1)
	Strongly disagree	16 (12.4)	7 (2.7)
After seeing pictures, I remember the dangers of smoking with every time you see a cigar pack.	Strongly agree	1 (0.78)	37 (14.3)

Items	Answer choice	Processing route	
	Agree	20 (15.5)	117 (45.3)
	Undecided	32 (24.8)	55 (21.3)
	Disagree	56 (43.4)	41 (15.9)
	Strongly disagree	20 (15.5)	8 (3.1)
I felt scared after seeing my pictures	Strongly agree	2 (1.6)	45 (17.4)
	Agree	12 (9.3)	104 (40.3)
	Undecided	34 (26.4)	67 (26.0)
	Disagree	59 (45.7)	36 (14.0)
	Strongly disagree	22 (17.0)	6 (2.3)

Insert Table 4 about here

A series of SEM was performed to test the hypothesized model for cognitive predictors of the processing route. Model A is depicted in Fig. 1 and shows the predictors among young smokers. The measurement model resulted in a good model fit ($\chi^2 = 71.78$, $n = 387$, $df = 5$, $p < 0.05$, $CFI = 1.00$, $TLI = 1.00$, $RMSEA = 0.00$ (CI: 0.00, 0.05)). The direct associations between self-efficacy, perceived severity, psychological dependence as predictor of the central route were statistically significant. The association between sensation seeking and the had central route was not statistically significant. Moreover, results indicated a statistically significant direct relation between attitude toward smoking and peripheral route.

Insert Fig. 1 about here

Next, we evaluated Model B for males and females separately and found that the conceptual model obtained from testing the goodness of fit causal structure of the hypothesized model fit the data well ($\chi^2 = 0.00$, $n = 387$, $df = 0$, $p < 0.05$, $CFI = 1.00$, $TLI = 1.00$, $RMSEA = 0.00$ (CI: 0.00, 0.05)). Among males and with respect to central route, the negative association with the attitude toward smoking and positive relations with self-efficacy, perceived severity, and psychological dependence were statistically significant. Among females, the positive associations between self-efficacy and perceived severity as predictors of the central route were statistically significant. Results are depicted in Figs. 2 and 3.

Insert Figs. 2 and 3 about here

Discussion

The young smokers in our study often processed warning messages through the central route. According to the Elaboration Likelihood Model (ELM), message processing depends on one's motivation and ability (11); thus, if people have high motivation and ability, they process messages centrally, if not, it is probably accomplished peripherally or sensationally (21–24). Since motivation depends on factors such as the attitude, need for cognition, personal relevance to the subject, and the ability of being conscious and focused (25), it can be concluded that observing images was instrumental in raising awareness/knowledge and creating a sense of concern among the study's participants. In fact, they were thinking that these consequences were relevant to their smoking behavior. Consequently, despite the tendency to smoke, it was assumed that the study subjects processed messages through central route and based on the ELM. Our review of the literature also showed that warning images in cigarette packages increase people's awareness about the negative impact of smoking, which eventually raises individuals' concerns about their health, thereby, provoking the attention to the importance of quitting tobacco smoking (26–32). Additionally, warning images may increase the attention and remind smokers of adverse effects of tobacco smoking.

We found that perceived severity, smoking abstinence self-efficacy, and psychological dependence were strong predictors of message processing through the central route. It is postulated that the perceived severity refers to one's belief that smoking can have serious and unpleasant consequences for his or her health (33) and numerous studies have shown that anti-tobacco warning images may increase people's fear perception and improve awareness of smokers about the side effects of tobacco use, thereby, being exposed to these messages may motivate smokers to quit smoking (26, 34–38). In addition, Muñoz, Chebat, and Borges (2012) believed that graphic warnings have the potential to increase the sense of being worried about adverse consequences and influence individuals' attention and intention toward stopping cigarette smoking (39). Muñoz and his colleagues also found that these warnings messages can lead to an in-depth information processing and that focusing on graphic warning messages may provoke people to not engage in this high risk behaviors (7, 39). Moreover, it seems that due to the visual clarity of illustrations about the seriousness of the damages caused by smoking, smokers may relate the health risk messages to themselves and perhaps process the message through central route, which was reported in a study about AIDS warning messages (40).

Another factor that was found to be associated with processing via central manner is psychological dependence, which postulates that an addicted person, for example, drinks or smokes to fulfill a need (41). In other words, psychological dependence arises when someone is emotionally tied to tobacco use based on her or his mental desire for it. Our findings showed that cigarette smokers who were psychologically dependent on cigarettes and were exposed to fear appeals images, they processed the scary images in a logical manner. In fact, challenges about the side effects of cigarette smoking in the mind of a smoker on one hand and psychological dependence, caused by consistent and frequent

exposure to smoking and smoking-related behaviors and dependency (42), on the other hand, may explain why one does not try to quit smoking. It seems that although addicted people process the warning messages via central route, because of psychological dependence, they are unable to quit smoking or drinking. This paradox may be explained by the ELM and other theoretical frameworks, that is, why someone who processes the messages correctly via a central route, still continues its use? Thus, future studies must be conducted to provide an answer. And it seems that the ELM works better in persuasive programs, where there is no psychological dependence for quitting behavior.

Although it is assumed that high sensation-seeking people process messages through peripheral or emotional route, we found no support for it in our study. Sensation-seeking is a personal condition; for example, wanting to experience a new thing, but without thinking about its consequences (43). This feeling develops at the age range of 10 to 15 years and reaches its peak at around of the age of 20 (44–46). Young people with high levels of sensation-seeking have a high risk-taking ability to experience physical, social, and legal risks, exhibit less protective beliefs about risky behaviors, and underestimate the severity of the risks (43, 47). High sensation seekers typically do not perceive the fear of threatening situations. As a result, they do not perceive high-risk behaviors, such as, smoking, alcohol, and drug abuse as threatening behaviors (41, 48–54). It has also been reported that sensation-seeking could act as a predictor of response to a fearful condition, which may provoke a response to “fear control” that ultimately results in a defensive avoidance behavior in case of being exposed to fearful messages (55). Therefore, it seems that people with high levels of sensation-seeking are not attentive to the negative consequences of smoking presented in the delivered messages. In addition, they do not try to process the messages, because they find them irrelevant to themselves. Furthermore, in accordance with the extended parallel process model, maybe these individuals enter the fear control process and reject the message with a defensive avoidance response.

Some studies have suggested that females pay more attention to warning messages than do males (56, 57). However, others have found the same result in males (58, 59). We found that females and males process warning messages about cigarette smoking differently but in a logical manner. For example, females are more likely to process messages through the central route than do males. The structural equation modelling of the data showed that psychological dependence predicts the processing of warning messages through central route only among men. It seems psychological dependence on cigarette smoking shifts females toward peripheral route. Thus, gender differences must be taken into consideration in designing and implementing relevant messages.

Limitations

The non-experimental study was cross-sectional; thus, no causal inferences were drawn. Due to non-probability nature of the sampling technique, the generalizability/external validity of the study was limited to its participants. As in any survey research, providing socially acceptable responses could have been a threat to the internal validity of the results. To mitigate this possibility, respondents were assured at the start of the survey that all responses would be kept confidential.

Conclusion

Our non-probability sample of young Iranian tobacco smokers showed that they tend to process health warning messages through the central route, and pictorial health warning labels have the potential to encourage people to reduce or quit smoking with a logical approach. In addition, we suggest concerned individuals pay attention to messages that may positively impact people's attitudes toward quitting smoking by emphasizing the severity of the damage caused by smoking.

Abbreviations

ELM

Elaboration Likelihood Model

SASEQ

Smoking Abstinence Self-Efficacy Questionnaire

SEM

Structural Equation Modeling

Declarations

Ethics approval and consent to participate

Participants were given an information sheet on details about the research and verbal consent was collected from each participant. Verbal consent was sought to decrease the time burden on participants and increase response rates. This research and approach were reviewed and approved by the Tabriz University of Medical Sciences Institutional Review Board.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no conflict of interest.

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Author contributions

FSH, SP, HA designed the study. FSH collected survey data. FSH, SP, MAJ, HA analyzed and present statistical results. FSH, SP, MAJ, HA were major contributors in writing the manuscript. KK edited the manuscript. All authors read and approved the final manuscript.

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Figures

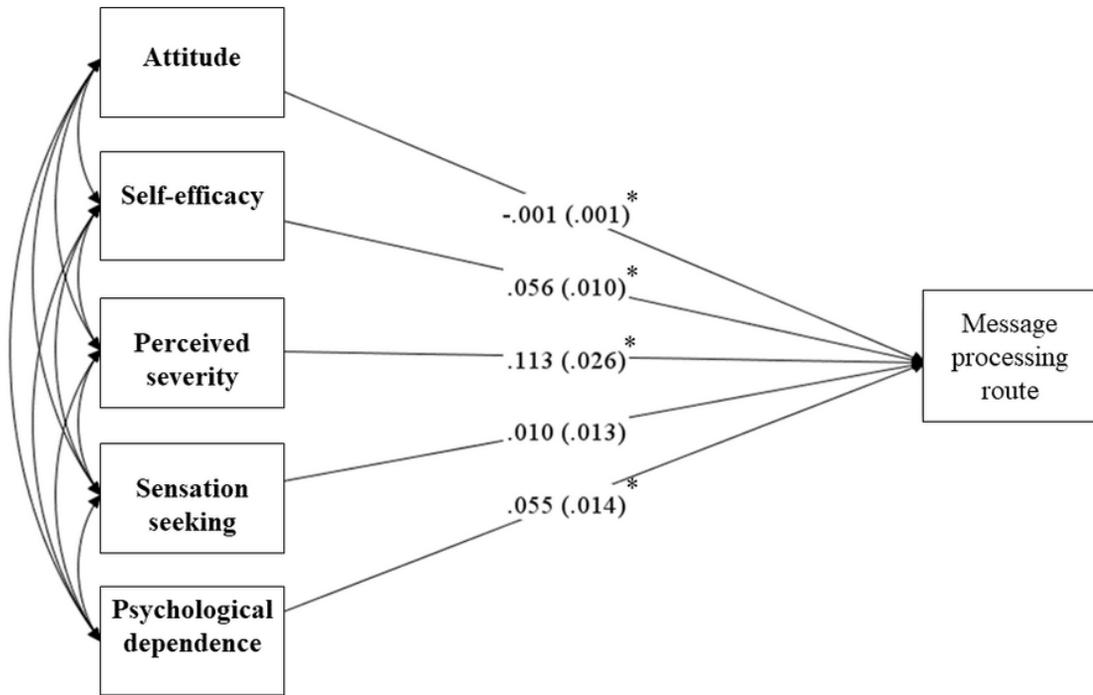


Figure 1

Structural equation model for the full sample: CFI=1.00, RMSEA= 0 (90% confidence interval: 0.00, 0.05). Parameter values are expressed as maximum likelihood estimates (standardized solution). Numbers in parentheses indicate values for parameter estimates. Message processing route coded as 0 = peripheral route, 1 = central route.

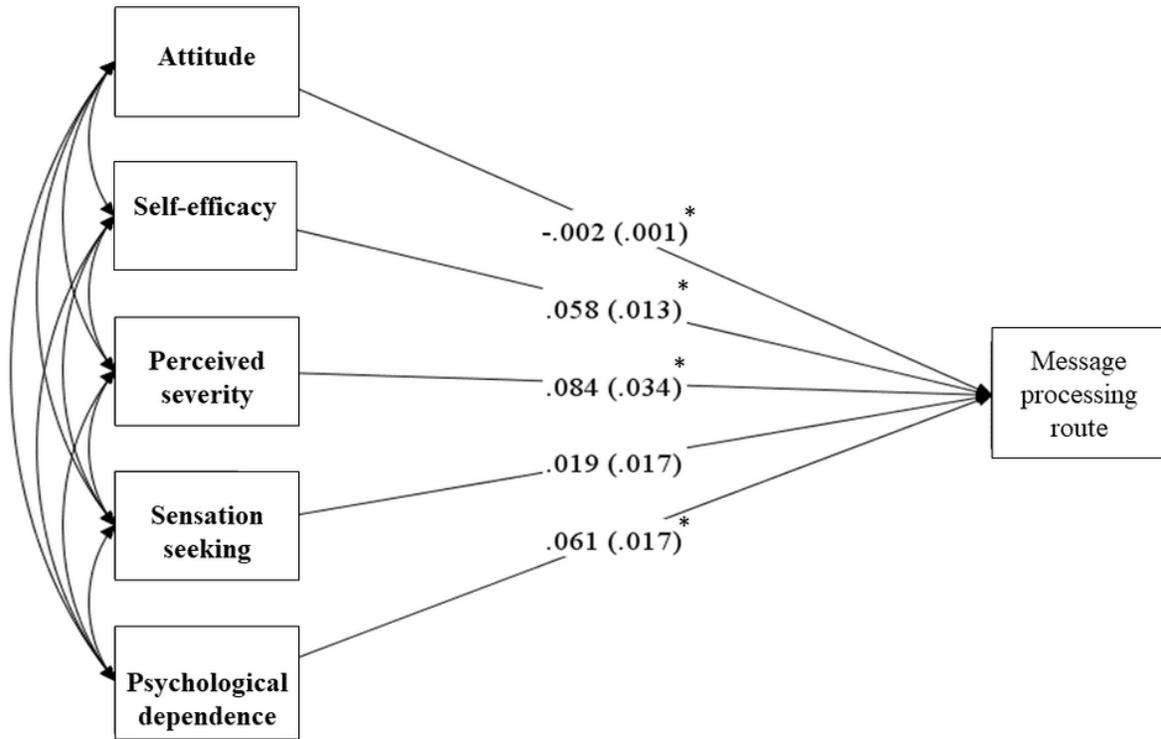


Figure 2

Structural Equation Model B for the male sub-samples: CFI=1.00, RMSEA= 0 (90% confidence interval: 0.00, 0.05). Parameter values are expressed as maximum likelihood estimates (standardized solution). Numbers in parentheses indicate values for parameter estimates. Message processing route coded as 0 = peripheral route, 1 = central route.

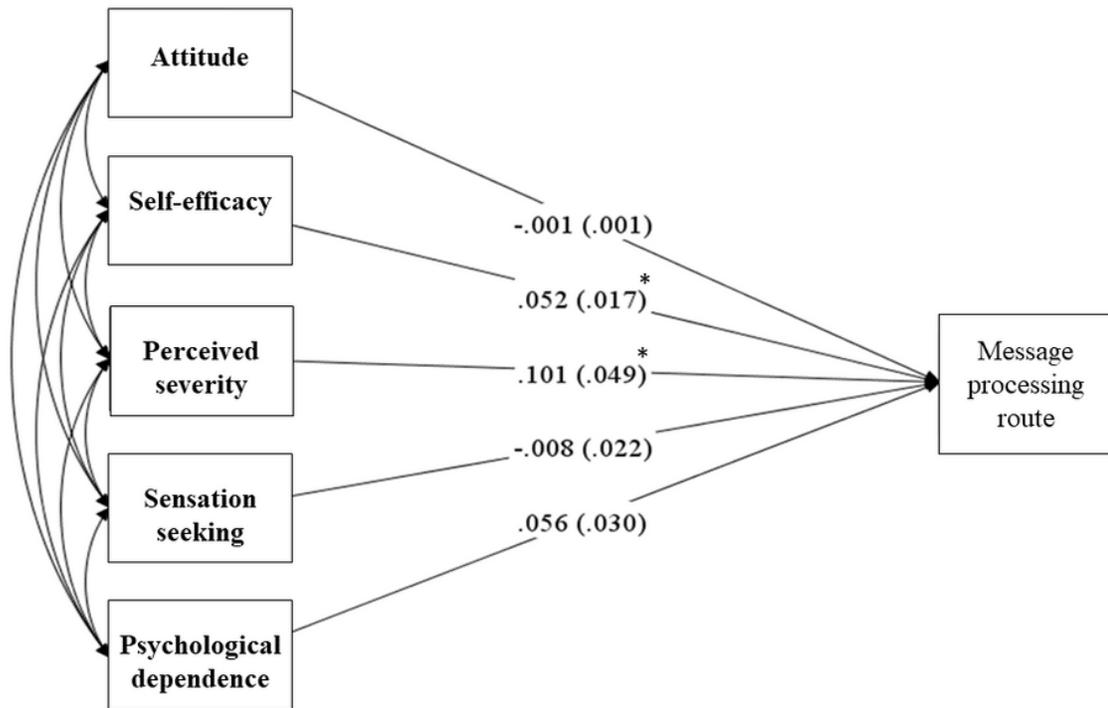


Figure 3

Structural Equation Model B for the female sub-samples: CFI=1.00, RMSEA= 0 (90% confidence interval: 0.00, 0.05). Parameter values are expressed a maximum likelihood estimates (standardized solution). Numbers in parentheses indicate values for parameter estimates. Message processing route coded as 0 = peripheral route, 1 = central route