

Original investigation

Influence of Cigarette Package Brand on the Emotional Impact of Tobacco-Warning Images That Cover 30% of Cigarette Packs in Smokers and Nonsmokers

Carlos Gantiva PhD¹, Lorena Guerrero BS¹, Andrea Rico BS¹,
Natalia Ramírez BS¹, Maite Díaz BS¹, Miyer González BS¹,
Tania Romo-González PhD²

¹Department of Psychology, University of San Buenaventura, Bogotá, Bogotá, Colombia; ²Veracruzana University, Veracruz, México

Corresponding Author: Carlos Gantiva, PhD, Department of Psychology, University of San Buenaventura, Bogotá, Cr 8 H # 172-20, Bogotá 110911, Colombia. Telephone: 57-1-6671090; Fax: 57-1-6671090; E-mail: cgantiva@usbog.edu.co

Abstract

Introduction: Research on the emotional impact of tobacco-warning images (TWIs) has not evaluated the role of context (ie, cigarette packs) as a modulator of the emotional response to TWIs. The objective of the present study was to identify the influence of the cigarette package brand on the emotional impact of TWIs that cover 30% of cigarette packs in smokers and nonsmokers using a specific methodology for the study of emotion.

Methods: The participants included 95 smokers and 111 nonsmokers who observed three TWIs under two conditions: TWIs that covered 30% of cigarette packs and TWIs alone, without brands. Additionally, 18 pictures from the International Affective Picture System were presented as comparison stimuli and to reduce the effect of habituation. The Self-Assessment Manikin was used to assess valence, arousal, and dominance dimensions.

Results: TWIs that covered 30% of cigarette packs were evaluated as least aversive, with lower ratings of arousal and higher ratings of dominance in both groups. Differences in the valence, arousal, and dominance dimensions were found between groups. Smokers rated TWIs that covered 30% of cigarette packs as less aversive and more arousing and gave them lower dominance scores compared with nonsmokers.

Conclusion: The results suggest that cigarette packages modulate the emotional impact of TWIs, especially in smokers, and the minimum size of TWIs (ie, 30% of the front and back of the package) is not sufficiently large to generate an emotional impact associated with avoidance behavior.

Implications: Cigarette packages modulate the emotional impact of TWIs, especially in smokers. The cigarette package itself is an appetitive context that captures the attention of the observer and decreases the aversive emotional response to the TWIs. The minimum size of TWIs (ie, 30% of the front and back of the package) is not sufficiently large to generate an emotional impact associated with avoidance behavior.

Introduction

Tobacco consumption is a major threat to public health worldwide. An estimated 6 million people die each year because of tobacco consumption.¹ This has led the World Health Organization to develop a set of six measures, referred to as MPOWER, that seek to reduce tobacco demand, with the objective of counteracting advertising, preventing the initiation of tobacco consumption, and encouraging abandonment of the habit.²

For years, the tobacco industry has used advertising and the mass media to promote the consumption of tobacco and influence people's decision to smoke.³⁻⁶ In its advertising strategies, the tobacco industry has used highly agreeable images that induce people to smoke. Since the promulgation of laws that regulate diffusion campaigns, advertising has concentrated on tobacco packaging, making it more visually attractive.⁷ The use of pictorial warning images seeks to diminish the pleasurable responses that are elicited by the package by providing information about the consequences of consumption to prevent tobacco use or strengthen the motivation to quit.⁸ This strategy has proven effective in a wide range of demographic groups,⁹⁻¹¹ particularly in people who have recently started consumption and people who seek to quit smoking, especially when warnings are highly visible and display the negative health effects of smoking.¹² A larger graphic of health warnings increases the perception of risk, promotes recall of the consequences, and communicates health risks.^{13,14}

Studies of the emotional impact of tobacco-warning images (TWIs) have generally been conducted using surveys and focus groups.¹⁴ Results from these investigations show that TWIs more effectively communicate the message of damage and danger compared with text alone.¹⁵ Smokers reported some degree of fear and disgust in response to TWIs, associated with a decrease in tobacco use.^{16,17} Images that feature harm to children are most effective.¹⁸ However, few investigations have used a methodology that is specifically designed to evaluate the emotional impact of TWIs.

One of the more solid methodologies for studying emotion is the Affective Image Visualization Paradigm.¹⁹ This methodology is based on the concept of emotion as a predisposition to action, starting with the activation of one of the two primary motivational systems: appetitive and defensive.²⁰ This model proposes that emotional experience is constructed from three general dimensions: valence (pleasant/unpleasant), arousal (low/high intensity), and dominance (low/high control).²¹ Extensive evidence shows that pleasant pictures generate high arousal and are associated with approach behaviors. Unpleasant pictures also generate high arousal but are associated with avoidance behaviors. Neutral pictures generate low arousal and no behavioral tendency.²²⁻²⁴ Similarly, unpleasant and highly arousing pictures are characterized by low levels of dominance, and pleasant pictures have higher levels of dominance.²²

Using this methodology, Nascimento et al.²⁵ evaluated pictorial images from the first and second sets of TWIs that are used in Brazil and demonstrated that they could be classified as unpleasant. Muñoz et al.²⁶ analyzed European TWIs and found that 83% of the images were rated as moderately aversive to very aversive.

To our knowledge, no study has used the affective image visualization paradigm with images that depict TWIs together with the cigarette brand, which is a visually attractive and appetitive context⁷ and can result in a decrease in the TWIs' ability to create an emotional impact that is characterized by aversive valence, high arousal, and low dominance, especially for warnings that occupy only 30% of the visible area of the package, which is the minimum requirement

of the Framework Convention on Tobacco Control.⁸ Currently, 57 countries use TWIs that occupy 30% of the package.²⁷ The objective of the present study was to identify the influence of the cigarette package brand on the emotional impact of TWIs that covered 30% of cigarette packs in smokers and nonsmokers using a specific methodology for the study of emotion.

Method

Participants

Two hundred six individuals (98 males and 108 females) were divided into two groups: smokers ($n = 95$, 18–25 years, $M = 21.56$ years, $SD = 2.38$ years) and nonsmokers ($n = 111$, 18–24 years, $M = 21.07$ years, $SD = 2.19$ years; $t_{174} = 1.39$, $P = .16$). The smoker group reported more than 1 year of tobacco use and smoking an average of 9.4 ($SD = 1.87$) cigarettes per day. No significant differences were found between groups in the percentage of men and women ($\chi^2 = .74$, $P = .39$). Participants were recruited from three universities in Bogota, Colombia. The exclusion criteria were current medical or psychological treatment, visual/auditory problems without correction, and being an ex-smoker. All of the participants provided written informed consent. The study was approved by the University of San Buenaventura Review Board.

Stimuli

Three TWIs without text warnings (ie, mouth cancer, aging, and erectile dysfunction) were used that are part of tobacco control campaigns that have been adopted in several countries (eg, Colombia, Bolivia, Ecuador, Brazil, Australia, Canada, and European Union countries). The TWIs that were used were from the 2009 Colombian set. Each of the TWIs was presented under two conditions: (1) on the bottom front panel of a cigarette package, covering 30% of the package (warning texts were masked, and the remaining 70% of the cigarette package showed the cigarette brand) and (2) TWIs alone, without the cigarette brands, enlarged to the same size as TWIs with the brand. Both TWI conditions consisted of photographs of real cigarette packages that were presented in the same relative size (800 × 400 pixels). Additionally, we select 18 pictures (six pleasant, six neutral, and six unpleasant) from the International Affective Picture System (IAPS; picture codes 2095, 2274, 2347, 3059, 3212, 3310, 4668, 7013, 7026, 7033, 7077, 7405, 8026, 9163, 9412, 9445, 9904, and 9927),²⁸ according to the Colombian normative ratings.²⁹ Selection implied similar arousal ratings for pleasant and unpleasant pictures ($P = .34$). These 18 pictures were used as comparison stimuli and to reduce the effect of habituation to the TWIs. IAPS pictures were presented in their original format, without the cigarette package. All of the pictures were presented in color.

Self-Report Measures

The Self-Assessment Manikin (SAM)³⁰ was used for the affective evaluation of TWIs and IAPS pictures. The SAM is a pictorial non-verbal measure of emotion that consists of three affective 9-point scales: valence, arousal, and dominance. For the valence scale, the SAM ranges from a smiling, happy figure to a frowning, unhappy figure. Scores range from 1 (extremely unpleasant) to 9 (extremely pleasant), with 5 being neutral. For the arousal scale, the SAM ranges from a relaxed, sleepy figure with eyes close to an excited, wide-eyed figure. Scores range from 1 (low arousal) to 9 (high arousal). For the dominance scale, the SAM ranges from a very small figure that represents a feeling of being controlled to a very large figure that

represents being in control. Scores range from 1 (low dominance) to 9 (high dominance). The SAM has been used successfully to evaluate the emotional impact of TWIs.^{25,26}

Procedure

The experiment was conducted in a dimly lit laboratory (6.0×6.0 m) with comfortable desks that were placed in rows in front of a slide projection screen. The maximum size of the projected image was 1.50×1.50 m. Each row of desks, from front to back, was located 10 cm higher than the row in front to ensure that the screen was fully visible to every participant. The distance from the first row to the screen was 2.0 m, and the distance from the last row to the screen was 6.0 m. The room had four rows of desks, and each row had five desks. Each desk was 60 cm long. No more than 20 subjects performed the test simultaneously. The male/female ratio was not greater than 1:2 (or 2:1) for any single group session. Two different pseudo-randomized picture presentation orders were prepared. Each image was presented once. Each order included the same set of 24 pictures (three TWIs that covered 30% of the cigarette packs, three TWIs alone, without brands, and 18 IAPS pictures). Each order had the constraint of not presenting the same picture category consecutively, and the male/female ratio was not more than 1:2 (or 2:1) for any order.

A computer projection system controlled the timing of the stimulus presentation. The Spanish instructions were presented in a digital audio format that was previously recorded by a psychologist with knowledge of the investigation to minimize differences between sessions. Each trial consisted of three parts: 6 seconds of picture presentation, 15 seconds to rate the picture using the SAM scale (valence, arousal, and dominance), and a 5-second intertrial interval. The participants assessed all of the pictures during the experimental session. Five pictures from the IAPS were used as examples to ensure that the participants did not have any doubt when using the SAM scales.

Statistical Analysis

Initially, the distribution of the 24 pictures was analyzed in the emotional dimensions using a scatterplot with two axes (valence vs. arousal). Pearson's linear correlation was used to analyze correlations between appetitive valence and arousal and between aversive valence and arousal. To evaluate the influence of the cigarette package on the emotional impact of the TWIs in smokers and nonsmokers, we ran separate mixed $2 \times 2 \times 5$ analyses of variance (ANOVAs) for each affective scale (valence, arousal, and dominance), with Group (smoker/nonsmoker) and Stimulus Order as the between-subjects factors and Picture (TWIs that covered 30% of cigarette packs, TWIs alone, without brands, and pleasant, neutral, and unpleasant pictures) as the within-subjects factors. When the assumption of sphericity was not met, Greenhouse-Geisser correction was applied to the degrees of freedom in all cases. Post hoc analyses of the mean values were performed using paired multiple comparisons, adjusted with Bonferroni correction. The level of significance was set at $P < .05$ for all of the analyses, and the effect size (η_p^2) is reported. All of the statistical analyses were performed using Statistical Package for Social Sciences (SPSS) 20.0 software.

Results

Figure 1 shows the distribution of all of the pictures in two-dimensional space, composed of valence (y-axis) and arousal (x-axis) ratings. The distribution showed a typical boomerang form, in which the pictures on the upper arm (positive pole) indicate activation of the appetitive motivational system (which is associated with approach behaviors), whereas pictures on the lower arm (negative pole) indicate activation of the defensive motivational system (associated with avoidance behaviors). Both types of pictures were associated with a significant level of arousal. As expected, lower arousal scores were observed for pictures with a neutral valence. The correlation between valence and arousal at both poles was significant:

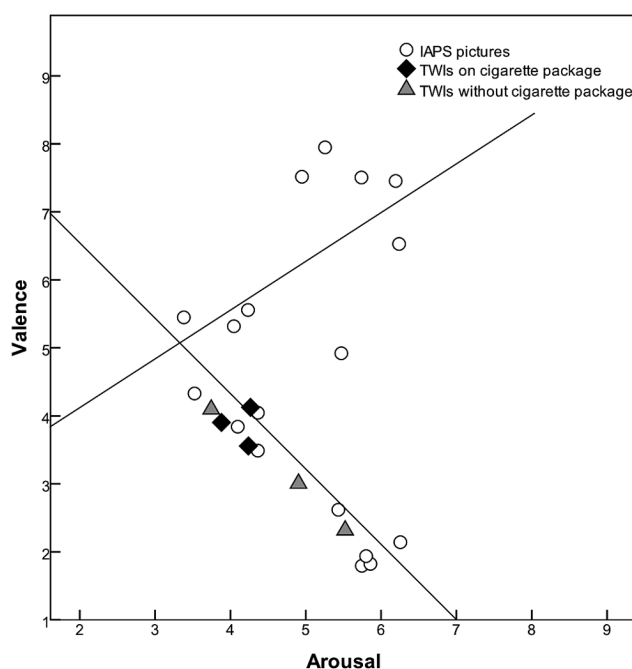


Figure 1. Distribution of tobacco-warning images (TWIs) and International Affective Picture System (IAPS) pictures in the two-dimensional affective space (valence and arousal dimensions).

positive pole ($r = 0.72$; $P = .04$, $R^2 = 0.51$), negative pole ($r = -0.94$, $P = .004$, $R^2 = 0.88$).

The IAPS pictures were located at both poles and in the zone of origin, whereas the TWIs were located exclusively at the negative pole. However, the three TWIs that covered 30% of the cigarette packs and single TWI that depicted erectile dysfunction were located in an area that was closer to neutral.

Emotional Dimensions

Valence

The ANOVA of the valence dimension revealed a significant main effect of Picture ($F_{4,696} = 503.89$, $P < .0001$, $\eta_p^2 = 0.74$). As expected, significant differences were found between pleasant, neutral, and unpleasant pictures (all $P < .0001$). The TWIs that covered 30% of cigarette packs were perceived as less aversive than TWIs alone, without brands ($P < .0001$; Figure 2), less aversive than unpleasant pictures ($P < .0001$), and more aversive than neutral and pleasant pictures (both $P < .0001$). No differences were found between TWIs alone, without brands, and unpleasant pictures ($P = .43$). A significant Group \times Picture interaction was found ($F_{4,696} = 5.60$, $P = .001$, $\eta_p^2 = .03$). When TWIs were presented that covered 30% of the cigarette packs, smokers evaluated them as less aversive compared with nonsmokers ($P = .002$; Figure 3). Moreover, when TWIs were presented that covered 30% of the cigarette packs, smokers evaluated them as less aversive compared with TWIs alone, without brands ($P < .0001$). No differences were found in nonsmokers ($P = .34$). No other significant main effects or interactions were found.

Arousal

The ANOVA of the arousal dimension revealed a significant main effect of Picture ($F_{4,696} = 48.51$, $P < .0001$, $\eta_p^2 = .21$). As expected, pleasant and unpleasant pictures were perceived as more arousing than neutral pictures (both $P < .0001$). No differences were found

between pleasant and unpleasant pictures ($P = .44$). The TWIs that covered 30% of the cigarette packs were perceived as less arousing than TWIs alone, without brands ($P < .0001$; Figure 2), and less arousing than pleasant and unpleasant pictures (both $P < .0001$). The TWIs alone, without brands, were perceived as more arousing than neutral pictures ($P < .0001$) and less arousing than pleasant and unpleasant pictures (both $P < .0001$). A significant Group \times Picture interaction was found ($F_{4,696} = 3.23$, $P = .02$, $\eta_p^2 = .01$). When TWIs were presented that covered 30% of the cigarette packs, smokers evaluated them as more arousing compared with nonsmokers ($P = .03$; Figure 3). No other significant main effects or interactions were found.

Dominance

The ANOVA revealed a significant main effect of Picture ($F_{4,696} = 77.58$, $P < .0001$, $\eta_p^2 = .30$). Unpleasant pictures had the lowest dominance ratings compared with pleasant and neutral pictures (both $P < .0001$). The TWIs that covered 30% of the cigarette packs and TWIs that were presented alone, without brands, had lower dominance ratings than pleasant and neutral pictures (all $P < .002$) but higher dominance ratings compared with unpleasant pictures (both $P < .0001$). The TWIs that covered 30% of the cigarette packs had higher dominance ratings compared with TWIs alone, without brands ($P < .0001$; Figure 2). A significant main effect of Group was found ($F_{1,174} = 7.25$, $P = .008$, $\eta_p^2 = .04$), in which smokers gave lower dominance scores ($P = .008$). A significant Group \times Picture interaction was found ($F_{4,696} = 3.53$, $P = .01$, $\eta_p^2 = .02$). Smokers gave lower dominance scores to TWIs that covered 30% of the cigarette packs, TWIs alone, without brands (Figure 3), and pleasant and unpleasant pictures compared with nonsmokers (all $P < .04$). No other significant main effects or interactions were found.

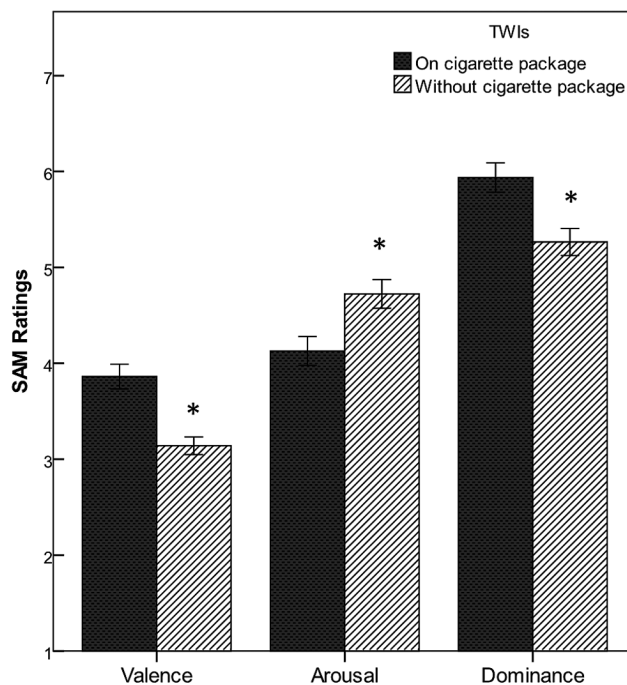


Figure 2. Emotional reactions to tobacco-warning images (TWIs) presented on cigarette package and without cigarette package. Bars indicate the standard error of the mean. * $P < .05$.

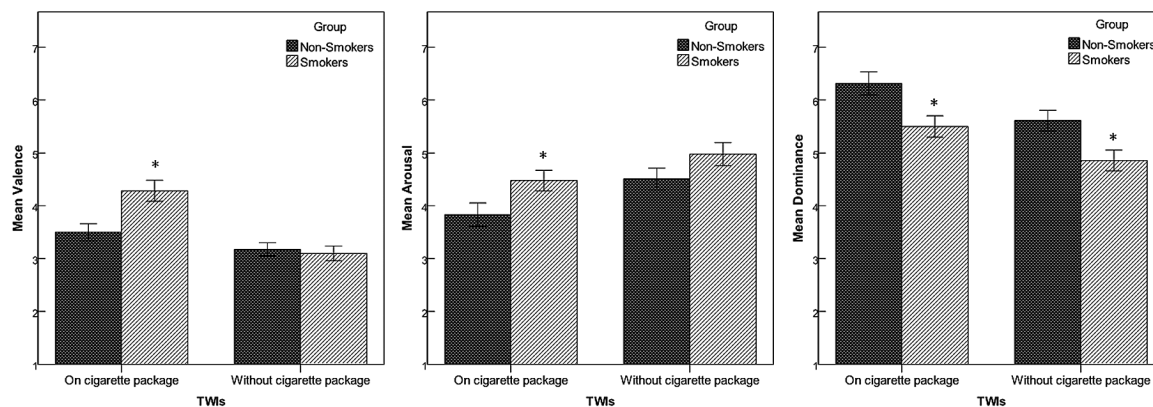


Figure 3. Differences in the valence, arousal, and dominance dimensions between tobacco-warning images (TWIs) that were presented on the cigarette package and without the cigarette package in smokers and nonsmokers. Bars indicate the standard error of the mean. * $P < .05$.

Discussion

The objective of the present study was to identify the influence of the cigarette package brand on the emotional impact of TWIs that covered 30% of cigarette packs in smokers and nonsmokers using a specific methodology for the study of emotion. The results showed that the cigarette package presentation decreased the levels of aversion and arousal that were produced by the TWIs and enhanced the perception of emotional control. These changes were more pronounced in smokers. These results suggest that the cigarette package modulates the emotional impact of TWIs, decreasing their effectiveness in generating intense negative emotions.

Previous studies have shown that stimuli that have an emotional impact that is characterized by significant aversive valence also typically generate high levels of arousal and low levels of dominance,^{23,31} which in turn are associated with avoidance behaviors. However, when the valence is less aversive, arousal decreases and dominance increases, leading to a low probability of avoidance behavior.^{21,22} These changes in valence, arousal, and dominance were observed when TWIs were presented that covered 30% of cigarette packs, indicating a decrease in the TWIs' ability to generate an avoidance response. These results suggest that the minimum size that is stipulated for TWIs⁸ is insufficient to generate a negative and effective emotional impact.

Similar results have been reported by studies that used other types of methodologies, demonstrating that the salience of the TWI depends on the size, type, and location of the image.¹⁴ In young adults, large warning images are most remembered and have a greater impact.^{32,33} Recent studies found that the size of TWIs is essential to avoid habituation to the warning images and associated with cognitive reactions that can result in forgoing cigarettes and possibly abandoning tobacco consumption.³⁴

Our results suggest that the minimum size of TWIs (ie, 30% of the principal display area of the package) is insufficient to achieve the goal of motivating avoidance behavior because the warning image must compete with the visual properties of the other 70% of the package, which is designed to capture attention and visually appealing.⁷ This suggests that the cigarette package itself is a context that captures the attention of the observer and decreases the aversive emotional response to TWIs. The decrease in the emotional response may occur for several reasons: (1) an appetitive context modulates an aversive stimulus, such as a TWI, (2) the context distracts attention away from the TWI, and (3) the TWI becomes more familiar and is therefore less threatening. For example, nonsmokers

may realize that the stimulus is irrelevant to him or her, and smokers may learn to ignore the threatening message to reduce conflict while they maintain their habit.

Recent studies have reported that a specific context can modulate physiological and psychological responses to an emotional stimulus.^{35,36} Previous studies have suggested that health warning messages must comprise at least 90% of the package to decrease its attractiveness.³⁷ For example, the third set of Brazilian TWIs was printed on real three-dimensional cigarette packages, covering 100% of one of the faces of the cigarette package (as stipulated by the Brazilian government), and presented to participants. These TWIs were rated as very aversive, were effective against smoking, and behaviorally curbed the appetitive drive toward the packs.³⁸ These previous findings corroborate the present results, in which TWIs should cover as much of the packs as possible to avoid appetitive competition by the brand. Additionally, when TWIs are placed on plain packages, their impact increases, the ability to remember them increases,³⁹ demand for the product decreases (in experimental contexts),⁴⁰ the social appeal of smoking behavior decreases, and the perception of damage caused by smoking increases.^{41,42} Altogether, these results suggest that the currently stipulated minimum size of TWIs can be effective when they are presented on plain packages, but their effectiveness decreases when traditional packaging is used.

Our results also indicate that smokers evaluated the TWIs as less aversive and more arousing and gave them lower dominance scores when they covered 30% of the cigarette packs compared with nonsmokers. These results are consistent with previous studies that found that stimuli that are associated with tobacco (eg, the cigarette package) activate the appetitive motivational system in smokers,^{43–46} which competes with activation of the defensive motivational system that is activated by the TWI. This suggests that the emotional impact of TWIs that cover 30% of cigarette packs may be greater in nonsmokers than in smokers, which can lead to a decrease in the motivation to start smoking.

With regard to the content of the TWIs, the results suggested that symbolic warning pictures that use tobacco-related images (eg, erectile dysfunction) are less effective in generating an aversive emotional response. In contrast, pictures that show explicit damage or bodily deterioration are more effective. Such findings have been reported by other studies.^{25,26} These results can be explained by activation of the defensive motivational system in both men and women by stimuli that involve explicit threats, such as animal and human attacks, illness, and contamination.^{21,22}

Finally, we found no difference in the valence dimension between unpleasant pictures and TWIs alone, without brands. However, when TWIs were presented that covered 30% of the cigarette packs, they were evaluated as less aversive than unpleasant pictures. Differences were also found between unpleasant pictures and TWIs (both TWIs that covered 30% of cigarette packs and TWIs that were presented alone, without brands) in the arousal and dominance dimensions. These results suggest that modulation by the cigarette package is particularly relevant to the valence dimension.

The present study has several limitations. First, the sample consisted exclusively of young people. Similar studies should be developed with adolescents and adults to compare the results. Second, the duration of abstinence since the last cigarette in smokers should be controlled because evidence indicates that the duration of abstinence affects emotional responses.^{47,48} Third, the TWIs that covered 30% of cigarette packs were smaller than TWIs that were presented without brands. Such a difference in size may explain the reduction of their emotional impact,⁴⁹ but the effect of the cigarette pack was higher in smokers than in nonsmokers, favoring the interpretation that appetitive competition by the brand was also present. Fourth, future research should use physiological measures to assess the emotional impact of TWIs to increase the objectivity of the data.

Funding

Funding for this study was provided by the University of San Buenaventura (Ref. PSI 010-004). University of San Buenaventura, had no role in the study design, collection, analysis or interpretation of the data, writing the manuscript, or the decision to submit the article for publication.

Declaration of Interests

None declared.

References

- World Health Organization. Tobacco. 2012. www.who.int/mediacentre/factsheets/fs339/en/index.html. Accessed June 11, 2015.
- Mackay J, Bettcher D, Minhas R, Schotte K. Successes and new emerging challenges in tobacco control: addressing the vector. *Tob Control*. 2012;21(2):77–79. doi:10.1136/tobaccocontrol-2012-050433.
- Anderson S, Glantz S, Ling P. Emotions for sale: cigarette advertising and women's psychosocial needs. *Tob Control*. 2005;14(2):127–135. doi:10.1136/tc.2004.009076.
- Gilpin E, White M, Messer K, Pierce J. Receptivity to tobacco advertising and promotions among young adolescents as a predictor of established smoking in young adulthood. *Am J Public Health*. 2007;97(8):1489–1495. doi:10.2105/AJPH.2005.070359.
- Moodie, C, Hasting G. Making the pack the hero, tobacco industry response to marketing restrictions in the UK: findings from a long-term audit. *Int J Ment Health Addiction*. 2011;9(1):24–38. doi:10.1007/s11469-009-9247-8.
- Wakefield M, Flay B, Nichter M, Giovino G. Role of the media in influencing trajectories of youth smoking. *Addiction*. 2003;98(suppl 1):79–103. doi:10.1046/j.1360-0443.98.s1.6.x.
- Wakefield M, Morley C, Horan J, Cummings K. The cigarette pack as image: new evidence from tobacco industry documents. *Tob Control*. 2002;11(suppl 1):73–80.
- World Health Organization. Framework Convention for Tobacco Control. 2005. <http://whqlibdoc.who.int/publications/2003/9243591010.pdf>. Accessed June 11, 2015.
- Hammond D, Thrasher J, Reid J, Driezen P, Boudreau C, Arillo-Santillán E. Perceived effectiveness of pictorial health warnings among Mexican youth and adults: a population-level intervention with potential to reduce tobacco-related inequities. *Cancer Cause Control*. 2012;23(1):57–67. doi:10.1007/s10552-012-9902-4.
- Hammond D, Reid JL, Driezen P, Boudreau C. Pictorial health warnings on cigarette packs in the United States: an experimental evaluation of the proposed FDA warnings. *Nicotine Tob Res*. 2013;15(1):93–102. doi:10.1093/ntr/nts094.
- Thrasher J, Arillo-Santillán E, Villalobos V, et al. Can pictorial warning labels on cigarette packages address smoking-related health disparities? Field experiments in Mexico to assess pictorial warning label content. *Cancer Cause Control*. 2012;23(1):69–80. doi:10.1007/s10552-012-9899-8.
- Hammond D, Fong G, McNeill A, Borland R, Cummings K. Effectiveness of cigarette warning labels in informing smokers about the risks of smoking: findings from the International Tobacco Control (ITC) Four Country Survey. *Tob Control*. 2006;15(suppl III):19–25. doi:10.1136/tc.2005.012294.
- Bansal-Travers M, Hammond D, Smith P, Cummings KM. The impact of cigarette pack design, descriptors, and warning labels on risk perception in the US. *Am J Prev Med*. 2011;40(6):674–682. doi:10.1016/j.amepre.2011.01.021.
- Hammond D. Health warning messages on tobacco products: a review. *Tob Control*. 2011;20(5):327–337. doi:10.1136/tc.2010.037630.
- Vardavas C, Connolly G, Karamanolis K, Kafatos A. Adolescents perceived effectiveness of the proposed European graphic tobacco warning labels. *Eur J Public Health*. 2009;19(2):212–217. doi:10.1093/eurpub/ckp015.
- Hammond D, Fong GT, McDonald PW, Brown KS, Cameron R. Graphic Canadian cigarette warning labels and adverse outcomes: evidence from Canadian smokers. *Am J Public Health*. 2004;94(8):1442–1445.
- Kees J, Burton S, Andrews JC, Kozup J. Understanding how graphic pictorial warnings work on cigarette packaging. *J Public Policy Mark*. 2010;29(2):265–276. doi:http://dx.doi.org/10.1509/jppm.29.2.265.
- Healey B, Hoek J. Young adult smokers' and prior-smokers' evaluations of novel tobacco warning images. *Nicotine Tob Res*. In press. doi:10.1093/ntr/ntv041.
- Lang PJ, Greenwald MK, Bradley MM, Hamm AO. Looking at pictures: affective, facial, visceral, and behavioral reactions. *Psychophysiology*. 1993;30(3):261–273.
- Lang PJ. The emotion probe. Studies of motivation and attention. *Am Psychol*. 1995;50(5):372–385.
- Bradley M, Lang PJ. Emotion and motivation. In: Cacioppo J, Tassinary L, Berntson G, eds. *The Handbook of Psychophysiology*. New York, NY: Cambridge University Press; 2007.
- Bradley M, Codispoti M, Cuthbert B, Lang PJ. Emotion and motivation I: defensive and appetitive reactions in picture processing. *Emotion*. 2001;1(3):276–298. doi:10.1037//1528-3542.1.3.276.
- Lang PJ. Emotion and motivation: toward consensus definitions and a common research purpose. *Emot Rev*. 2010;2(3):229–233. doi:10.1177/1754073910361984.
- Lang PJ, Bradley M. Emotion and the motivational brain. *Biol Psychol*. 2013;84(3):437–450. doi:10.1016/j.biopsycho.2009.10.007.
- Nascimento B, Oliveira L, Vieira A, et al. Avoidance of smoking: the impact of warning labels in Brazil. *Tob Control*. 2008;17(6):405–409. doi:10.1136/tc.2008.025643.
- Muñoz M, Viedma-del-Jesús M, Rosselló F, Sánchez-Nácher N, Montoya P, Vila J. The emotional impact of European tobacco-warning images. *Tob Control*. 2013;22(2):123–129. doi:10.1136/tobaccocontrol-2011-050070.
- World Health Organization. WHO Report on the Global Tobacco Epidemic 2013. 2013. www.who.int/tobacco/global_report/2013/en/. Accessed June 11, 2015.
- Lang PJ, Bradley M, Cuthbert B. *International Affective Picture System (IAPS): Affective Ratings of Pictures and Instruction Manual. Technical Report A-8*. Gainesville, FL: University of Florida; 2008.
- Gantiva C, Guerra P, Vila J. Validación colombiana del sistema internacional de imágenes afectivas: evidencias del origen transcultural de la emoción. *Acta Colomb Psicol*. 2011;14(2):103–111.

30. Bradley M, Lang PJ. Measuring emotion: the self-assessment manikin and the semantic differential. *J Behav Ther Exp Psy*. 1994;25(1):49–59.
31. Bradley M. Natural selective attention: orienting and emotion. *Psychophysiology*. 2009;46(1):1–11. doi:10.1111/j.1469-8986.2008.00702.x.
32. Borland R, Wilson N, Fong GT, et al. Impact of graphic and text warnings on cigarette packs: findings from four countries over five years. *Tob Control*. 2009;18(5):358–364. doi:10.1136/tc.2008.028043.
33. Environics Research Group. Canadian Adult and Youth Opinions on the Sizing of Health Warning Messages. 1999. <http://dsppsd.pwgsc.gc.ca/Collection/H49-134-1999E.pdf>. Accessed May 15, 2015.
34. Li L, Borland R, Yong H, et al. Longer term impact of cigarette package warnings in Australia compared with the United Kingdom and Canada. *Health Educ Res*. 2015;30(1): 67–80. doi:10.1093/her/cyu074.
35. Fujimura T, Kentaro K, Kazuo O. Contextual modulation of physiological and psychological responses triggered by emotional stimuli. *Front Psychol*. 2013;4:1–7. doi:10.3389/fpsyg.2013.00212.
36. Mocaiber I, Sanchez T, Pereira M, et al. Antecedent descriptions change brain reactivity to emotional stimuli: a functional magnetic resonance imaging study of an extrinsic and incidental reappraisal strategy. *Neuroscience*. 2011;193:241–248. doi:10.1016/j.neuroscience.2011.07.003.
37. Les Études De Marché Créatec. Quantitative Study of Canadian Adult Smokers: Effects of Modified Packaging Through Increasing the Size of Warnings on Cigarette Packages Health Canada. 2008. www.tobaccobels.ca/health/canada/w7. Accessed May 15, 2015.
38. Volchan E, David IA, Tavares G, et al. Implicit motivational impact of pictorial health warning on cigarette packs. *PLoS ONE*. 2013;8(8):e72117. doi:10.1371/journal.pone.0072117.
39. Beede P, Lawson R. The effect of plain packages on the perception of cigarette health warnings. *Public Health*. 1992;106(4):315–322.
40. Thrasher JF, Rousu MC, Hammond D, Navarro A, Corrigan JR. Estimating the impact of pictorial health warnings and “plain” cigarette packaging: evidence from experimental auctions among adult smokers in the United States. *Health Policy*. 2011;102(1):41–48. doi:10.1016/j.healthpol.2011.06.003.
41. Hardcastle SJ, Chan DC, Caudwell KM, et al. Larger and more prominent graphic health warnings on plain-packaged tobacco products and avoidant responses in current smokers: a qualitative study. *Int J Behav Med*. In Press. doi:10.1007/s12529-015-9487-x.
42. McCool J, Webb L, Cameron LD, Hoek J. Graphic warning labels on plain cigarette packs: Will they make a difference to adolescents?. *Soc Sci Med*. 2012;74(8):1269–1273. doi:10.1016/j.socscimed.2011.12.043.
43. Dempsey JP, Cohen LM, Hobson VL, Randall PK. Appetitive nature of drug cues re-confirmed with physiological measures and the potential role of stage of change. *Psychopharmacology (Berl)*. 2007;194(2):253–260.
44. Gantiva C, Ballén Y, Casas M, Camacho K, Guerra P, Vila J. Influence of motivation to quit smoking on the startle reflex: differences between smokers in different stages of change. *Motiv Emotion*. 2015;39(2):293–298. doi:10.1007/s11031-014-9449-7.
45. Muñoz M, Idrissi S, Sánchez-Barrera M, Fernández M, Vila J. Motivation to quit smoking and startle modulation in female smokers: context specificity of smoking cue reactivity. *Psychopharmacology*. 2011;218(3):525–532. doi:10.1007/s00213-011-2334-0.
46. Muñoz M, Idrissi S, Sánchez-Barrera M, Fernández-Santaella M, Vila J. Tobacco craving and eyeblink startle modulation using 3D immersive environments: a pilot study. *Psychol Addict Behav*. 2013;27(1):243–248. doi:10.1037/a0028745.
47. Cinciripini PM, Robinson JD, Carter BL, et al. The effects of smoking deprivation and nicotine administration on emotional reactivity. *Nicotine Tob Res*. 2006;8(3):379–392.
48. Rehme AK, Frommann I, Peters S, et al. Startle cue-reactivity differentiates between light and heavy smokers. *Addiction*. 2009;104(10):1757–1764.
49. Codispoti M, De Cesarei A. Arousal and attention: picture size and emotional reactions. *Psychophysiology*. 2007;44(5):680–686. doi:10.1111/j.1469-8986.2007.00545.x.