Do more graphic and aversive cigarette health warning labels affect Brazilian smokers' likelihood of quitting?

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HIGHLIGHTS

• The stronger warnings appear to have done a better job of reminding smokers to quit.
• Stronger warnings were associated with greater defensive-avoidance of their contents.
• Aversive warnings may act synergistically with other interventions to help cessation.

ABSTRACT

Between 2008 and 2013, Brazil experienced a large decline in smoking prevalence, with an innovative round of aversive pictorial health warnings implemented on cigarette packs and at points of sale in 2009. The objective of this study was to examine changes over time in the distribution of quitting attempts and self-reported thoughts about quitting due to health warnings among current smokers. We conducted a pre-post study to evaluate data from two nationally-representative surveys conducted in 2008 and 2013. Responses to questions on smokers’ quitting attempts in the last year (yes vs. no) and whether health warnings led them to think about quitting in the last month (yes vs. no) were combined into four categories, for which the distribution of the Brazilian smoking population by year was estimated. A multinomial model was used to obtain proportions for each category, adjusted by socio-demographic variables and nicotine dependence. The proportion of smokers who reported making a quitting attempt in the last year and stated that health warnings led them to think about smoking statistically increased over time (from 30.0% to 33.1%; p-value = 0.010). The percentage of those who answered “no” to these two questions also increased over time (from 23.5% to 32.9%; p-value ≤ 0.001). These findings suggest that innovative warnings introduced in Brazil likely served as a “reminder” for continuing to think about cessation among those who attempted to quit in the last year. These warnings may have also triggered more avoidance of thinking about their contents than the previous warnings, which some studies have found to promote subsequent quitting activity.

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1. Introduction

Between 2008 and 2013, Brazil made significant advances in reducing smoking at the population level, with those who continued to smoke seeming to make more quit attempts (Szklo, Souza, Szklo, et al., 2015). Over this five year period, three tobacco control policies were implemented: 100% smoke-free policy, substantial tax increases, and the launching of the third set of pictorial health warnings (INCA, 2008; Brazilian Ministry of Finance, 2011; ACT-BR, 2011; Brazilian Presidency
of the Republic, 2014). The latter were explicitly designed to promote a strong reaction of avoidance against cigarettes through the inclusion of aversive images selected through applying the principles of experimental psychology and neuroscience (e.g., the use of more arousing pictures, where the presence of vivid tobacco physical harms are easy to understand, and exclusion of smoking cues, such as cigarettes, which stimulate smoking urges for smokers) (INCA, 2008; Volchan, David, Tavares, et al., 2013).

Previous studies have found that smokers’ cognitive reactions to health warnings (e.g., thinking about health risks and/or about quitting because of them) predict interest in quitting and making quit attempts in the future (Hammond, Wakefield, Durkin, et al., 2013). Moreover, and counter intuitively, reported levels of avoiding warnings have been positively associated with subsequent quitting activity (Fatherrahman, Li, Borland, et al., 2013; Thrasher, Swayampakala, Borland, et al., 2015). Consistent with theories of attitude change (Witte & Allen, 2000; De Hoog, Stroebe, & de Wit, 2005), individuals who are beginning to feel the health effects of their behaviours, but who avoid the recommended protective action (i.e., “fear control”/“defensive avoidance”), may, nevertheless, be deeply processing risk messages (De Hoog et al., 2005).

Brazil’s introduction of new, more aversive, warning images in 2009 makes it possible to examine changes over time in the distribution of quitting attempts and self-reported thoughts about quitting due to the health warnings among those who continue to smoke. This is the first nationwide evaluation of the innovative stronger health warnings introduced in Brazil.

1.1. Hypothesis

Consistent with the stage model of processing of fear-arousing communications (Witte & Allen, 2000; De Hoog et al., 2005), we hypothesized that more threatening health warnings would be associated with greater defensive avoidance of warning messages (stage 1) among smokers who have not yet followed the “recommended action” to avoid the smoking-related risks that warnings describe (i.e., they have not yet attempted to quit). On the other hand, among current smokers who have already engaged in the recommended action (i.e., have made a prior attempt to quit), the more threatening warnings should be more effective in encouraging cessation than less threatening messages (stage 2).

2. Methods

This is a pre-post study to evaluate data from the Global Adult Tobacco Survey (GATS-Brazil 2008 and GATS-Brazil 2013), which is part of the Global Tobacco Surveillance System established by the WHO to track the evolution of the tobacco epidemic (WHO, 2003).

GATS-Brazil cross-sectional surveys were nationally representative and conducted in 2008 and 2013. The surveys involved individual interviews on tobacco use perceptions, behaviours, and environment among adults 18 years and older. A complex probabilistic sample with four strata (stage 2). Overall, quitting attempts increased between 2008 and 2013 (from 41.3% to 47.2%; p-value ≤ 0.001; see Table 1). Marked absolute decreases in cigarette smoking prevalence rates were observed in Brazil between 2008 and 2013 and males with low educational level showed a greater decline in smoking prevalence than male smokers with high educational level (Szkló, Souza, et al., 2015). Thus, the estimate of 24.0 million cigarette smokers in Brazil in 2008 (quitting attempt status: yes, 9.9 million; no, 14.1 million) was reduced to 21.2 million cigarette smokers in 2013 (quitting attempt status: yes, 10.0 million; no, 11.2 million). In addition, the proportion of current smokers with less than secondary school decreased statistically significantly between 2008 and 2013, irrespective of quitting attempt status (Table 1). Males, individuals older than 24 years and those living in urban areas comprised the great majority of cigarette smokers in Brazil, irrespective of year of the survey and quitting attempt status. The percentage of males, heavy smokers and daily smokers were higher among current smokers who did not attempt to quit than among those who made a quit attempt in the last year, irrespective of the year of the survey (Table 1).

The proportion of smokers who reported making a quitting attempt in the last year and stated that health warnings led them to think about quitting smoking more recently increased over time (from 30.0% to 33.1%; p-value = 0.010) (Table 2). Although of lower magnitude, the proportion of smokers who attempted to quit smoking in the last year but gave no recent importance to health warnings for stimulating thoughts about cessation also increased between 2008 and 2013 (from 11.3% to 14.1%; p-value ≤ 0.001). The percentage of those who did not make a quit attempt in the last 12 months and reported no recent thoughts about quitting due to the health warnings strongly increased over time (from 23.5% to 32.9%; p-value ≤ 0.001). Conversely,
analyses were conducted using four separate logistic regression models, where the dependent variable was categorized as “1” for each one of the four possible combinations of responses and “0” for the sum of the other possible combination of answers. When we ran the logistic models, the main conclusions did not change (Supplemental Table 1).

4. Discussion

The pictorial health warnings introduced in 2009, which were specifically designed to promote avoidance behavior against cigarettes (INCA, 2008; Volchan et al., 2013), may have been more effective than the prior warnings in increasing the proportion of smokers who have attempted to quit in the last year and were encouraged to continue to think about cessation. Moreover, the percentage of smokers who reported no quitting attempts in the last year and no importance related to health warnings on recent thoughts about quitting also increased over time. These results are consistent with principles underlying the theories of attitude change, which posit that quit behavior reflects different stages in the processing of fear-arousing messages (Witte & Allen, 2000; De Hoog et al., 2005; Moorman & Putte, 2008; Szkló & Coutinho, 2010). Indeed, as hypothesized, the impact of emotionally powerful images on cigarette packages seems to have been modified by individuals’ quitting attempt in the last year (p-value for interaction ≤ 0.001, Supplemental Table 2). In both GATS surveys, for instance, smokers who made no quit attempts were more likely to be heavy smokers than smokers who tried to quit (Table 1). These highly-addicted smokers more easily experience threat and expectations of loss when faced with messages that aim to change their smoking behaviors and, as a consequence, may avoid warning messages by engaging in a “biased evaluation” against the recommended protective action (Witte & Allen, 2000; De Hoog et al., 2005). Similar to our results, two surveys conducted among smokers who lived in three Brazilian cities between the second group of warnings (from 2004 to 2008) and the third group (from 2009 onwards) also found that the percentage of heavy smokers who made efforts to avoid looking at or thinking about the warning labels increased over time (ITC, 2014).

Controlled experiments have assessed automatic motivational predispositions (i.e., hedonic valence, emotional arousal and automatic motor preparation) elicited by a range of different images, including the health warnings from 2009 and the prior round. Findings indicated that the graphic images selected for the new round of warnings were more aversive than other imagery (INCA, 2008; Volchan et al., 2013). The fact that implicit responses operate unconsciously may also help explain the low motivational importance given to health warnings among those who made no quitting attempt in the last year (De Hoog et al., 2005). Indeed, self-reported avoidance of warnings has been associated with greater likelihood of subsequent quitting attempts/cessation in recent longitudinal research among Australian and Canadian smokers (Thrasher et al., 2015). These counterintuitive results are also consistent with the findings from many experimental and observational studies on “ironic processes” across a range of contexts that found that attempts to suppress thoughts and information often lead to the opposite effect, i.e., suppression attempts make the thought or idea more likely to arise in the mind of the person attempting to suppress them (Wegner, 1994). Research to further assess the predictive validity of questions about warning avoidance, particularly in contexts where smokers have been exposed to strong tobacco control policies for a long time (Levy, de Almeida, & Szkló, 2012), will enhance their utility for cross-sectional surveys, such as GATS.

4.1. Limitations

This “pre-post study” was unable to assess the independent effects of the three policies implemented between 2008 and 2013 (INCA, 2008; Brazilian Ministry of Finance, 2011; ACT-BR, 2011), which include the policy focused in this manuscript, which may have contributed to
accelerate the decline in smoking prevalence rate in recent years. In fact, when considering the average annual relative decline of approximately 3% per year observed between 1989 and 2008 (Szkoł, de Almeida, 2012; INCA, 2010), one would have expected the cigarette prevalence rate in 2013 to be 15.9%, which is higher than the 14.5% obtained in the 2013 National Health Survey (IBGE, 2014). Nevertheless, the results suggest that warning labels may stimulate further thoughts about quitting smoking that will likely result in further quit attempts in smokers who have been trying to quit (Hammond et al., 2013), even if their initial quit attempts were influenced by other policies. This role for warnings is important given that smoking is a chronic, relapsing disorder that requires multiple cessation attempts before smokers can successfully quit (Fiore, Jaén, Baker, et al., 2008; Levy, Graham, Mabry, et al., 2010).

Moreover, although the amount of time the warnings were on packs before each wave of GATS was the same (i.e., four years each), the lack of data closer to the initial introduction of the new set of health warnings may have missed important warning responses, since warning effects “wear-out” (White, Bariola, Faulkner, et al., 2015). For instance, smokers who attempted to quit smoking in the last year but gave no recent importance to health warnings for stimulating thoughts about cessation may have been motivated by the new stronger health warnings in their previous quit attempts.

Finally, although both surveys were nationally representative, these data are also subject to “survival bias”, since cessation rates significantly increased between 2008 and 2013 in Brazil (Szkoł, Souza, et al., 2015). Because of this, smokers most influenced by health warnings may have already quit, thus underestimating the overall population effects of health warnings.

4.2. Conclusion

Notwithstanding the study’s limitations, our findings suggest that more averse health warnings may act synergistically with other interventions that promote cessation behavior by helping to strengthen the willingness of Brazilian smokers to stop smoking (Levy, de Almeida, et al., 2012; Szkoł, Souza, et al., 2015). Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.addbeh.2016.04.021.

Competing interests statement

The authors declare that there are no conflicts of interest.

Role of funding sources

Not applicable.

Contributors

A.S., participated in the data processing, data analysis and as lead author in the elaboration/preparation of the article; J.T. and M.S. participated in the consultancy for data analysis and elaboration/preparation of the article as co-authors. E.V., C.P., and L.M.A. participated in the elaboration/preparation of the article as co-authors.

Conflict of interest

The authors declare that there are no conflicts of interest.

Acknowledgments

The GATS-Brazil was carried out with the cooperation of the Brazilian Ministry of Health, the Brazilian Geographic and Statistics Institute (IBGE), and the Bloomberg Foundation.

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