

# Do graphic health warning labels on cigarette packages deter purchases at point-of-sale? An experiment with adult smokers

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## Abstract

This experiment tested whether the presence of graphic health warning labels on cigarette packages deterred adult smokers from purchasing cigarettes at retail point-of-sale (POS), and whether individual difference variables moderated this relationship. The study was conducted in the RAND StoreLab (RSL), a life-sized replica of a convenience store that was developed to evaluate how changing POS tobacco advertising influences tobacco use outcomes during simulated shopping experiences. Adult smokers ( $n = 294$ ; 65% female; 59% African-American; 35% White) were assigned randomly to shop in the RSL under one of two experimental conditions: graphic health warning labels present on cigarette packages versus absent on cigarette packages. Cigarette packages in both conditions were displayed on a tobacco power wall, which was located behind the RSL cashier counter. Results revealed that the presence of graphic health warning labels did not influence participants' purchase of cigarettes as a main effect. However, nicotine dependence acted as a significant moderator of experimental condition. Graphic health warning labels reduced the chances of cigarette purchases for smokers lower in nicotine dependence but had no effect on smokers higher in dependence.

## Introduction

Graphic health warning labels on cigarette packages display gruesome images (e.g. autopsy photos, disfiguring body scars) that, in combination with text warnings, are designed to invoke fear, educate about the health risks of smoking, and motivate smoking cessation [1]. Article 11 of the World Health Organization's Framework Convention on Tobacco Control proposed a set of guidelines for implementing graphic health warning labels, and as of this date more than 100 countries have passed regulations mandating that some type of graphic health warning label appears on cigarette packages. Graphic health warning labels on cigarette packages were scheduled to be introduced in the United States in 2012, but legal action by several tobacco companies (*Discount Tobacco City & Lottery, Inc. v. United States [Discount Tobacco]; R.J. Reynolds Tobacco Co. v. U.S. Food and Drug Administration [R.J. Reynolds]*) put this regulatory option on an indefinite hold. Since this time, the Food and Drug Administration (FDA) has been undertaking and funding research on the impact of graphic health warning labels. Publication of the final rule on this regulatory policy is, as of this writing, expected to occur sometime in 2020. Narrative reviews and meta-analyses of many qualitative, correlational, observational and experimental studies from around the globe have indicated that compared

with text-only labels, graphic health warning labels are recalled more readily and generate more attention compared with text-only warnings; are associated with more negative cognitions about smoking; and are perceived as having greater effectiveness for preventing smoking and helping smokers quit [1–4]. Results from a large randomized clinical trial from the US demonstrated that adult smokers who carried cigarette packs with graphic health warning labels had more quit attempts and were more likely to quit during a 1-month follow-up period than those who carried typical (for the United States: text-only warning) packages [5].

One question that has yet to be answered is whether the presence of graphic health warning labels on cigarette packages has any effect on cigarette product purchases at point-of-sale (POS) retail locations. Adult smokers visit POS, particularly convenience stores, on a near daily basis and purchase cigarettes on most of those visits [6–8]. Tobacco power walls [9], the large expansive display of cigarettes and other tobacco products located behind POS cashiers, influence tobacco use and purchasing behavior in adults. For example, power walls serve as potent cues to smoke [10], prompt impulse tobacco purchases [11, 12], deter quitting [13, 14] and prompt lapsing among recently quit smokers [15]. To the extent that graphic health warning labels are associated with negative cognitions about smoking and that these negative cognitions are associated with lower rates of smoking, greater interest in quitting and quit attempts [16, 17], adding graphic health warning labels to cigarette packages displayed on the tobacco power wall could cause smokers to avoid cigarette purchases at POS. Fewer purchases may lead to less cigarette consumption, which could in turn have a positive public health impact [18, 19]. Even if graphic health warning labels do not deter cigarette purchasing, they could influence smoking behavior if smokers that consistently carry cigarette packages with graphic health warning labels on them are more likely to quit over time [5]. In any case, obtaining a detailed understanding of how graphic health warning labels influence cigarette purchases at

POS is important for understanding their potential to have an impact on the public health.

The purpose of this study was to experimentally evaluate whether the presence of graphic health warning labels on cigarette packages influences adult smokers' cigarette purchases at POS. We conducted this study in the RAND StoreLab (RSL), a life-sized replica of a convenience store that was designed to experimentally evaluate how to best regulate tobacco product advertising at POS during simulated shopping experiences [20–23]. In this study, we utilized a 2-arm, randomized, between-subjects design, contrasting two tobacco power wall arrangements: one in which cigarette packages were displayed in their typical, current form in the United States with only standard FDA-approved text warnings affixed (*Status Quo condition*), and one in which cigarette packages had graphic health warning labels affixed to them (*GWL condition*). The dependent measure was whether participants purchased a package of cigarettes during their shopping experience in the RSL. Evaluation of the effect of graphic health warning labels on an observed behavioral outcome such as cigarette purchase, addresses the need for behavioral experimental research in this area [3]. We also explored whether demographic variables (age, gender, ethnicity, education), nicotine dependence and quitting motivation acted as moderators because past research has suggested that these variables may have an association with the effectiveness of graphic health warning labels [4, 5, 24–32].

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## Methods

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### Study participants

The study took place from July 2016 to November 2017. Adult smokers were recruited using newspaper, Internet and radio advertising. To minimize recruitment and sample biases, the advertising materials indicated that the study was focused on adults' shopping habits at convenience stores and contained no information about smoking or tobacco. Interested participants completed a brief eligibility screening over the phone. The screening questionnaire

included filler items that had the purpose of disguising the true purpose of the study (i.e. the screening items' content was related to consumption of sweets, salty snacks and energy drinks). To be included in the study, individuals needed to be over 18 years old (and thus, be eligible to purchase cigarettes at POS in Pittsburgh, PA, the location of the study), have no physical or psychiatric problem that would interfere with completing the study, and not have a child who participated in one of our previous RSL studies [22]. To be eligible, individuals also needed to have smoked at least five cigarettes per day in the last month and smoked on at least 20 days in the last month. Individuals needed to provide written informed consent to participate.

A total of 1229 individuals were screened, of whom 374 (30.4%) were eligible to participate. Most of those who were ineligible were not smokers (67.9% or 581 individuals) or smoked too few cigarettes per day and/or on too few days in the last month (21.1% or 180 individuals). Of those eligible, 294 (77%) attended the laboratory shopping session, were randomized to experimental condition, and completed the study. Participant characteristics are shown in Table I.

### Experimental setting: the RSL

The RSL occupies 1500 square feet inside of an office building and is only open to people who have been recruited specifically for research projects. The RSL was designed to look exactly like a convenience store. It stocks over 650 unique products, including dairy, bakery, snack foods, beverages, tobacco, grocery, health and beauty aids, confectionery and magazines/newspapers. Prices are consistent with those charged throughout the city of Pittsburgh where the store is located. Posters for various products are displayed on the walls, shelves and windows of the store. A large tobacco power wall is located behind the checkout cashier counter. About 80% of the RSL power wall is dedicated to cigarettes; 15% to smokeless products and cigars and 5% to electronic cigarettes. The power wall also includes (city and state-consistent) prices for the displayed tobacco products and posters

for some of the available brands of cigarettes and other tobacco products. A more detailed description of the RSL (including photographs) can be found elsewhere [22].

### Experimental conditions

Figure 1 provides photographs of the Status Quo and Graphic Health Warning Label (GWL) conditions. The graphic health warning labels used in this study were selected from the nine graphic health warning labels that the US FDA had intended to implement on cigarette packages in 2012. We chose the five labels that had been rated as most effective by adult smokers in a previous study [33]. In the GWL condition, every package of cigarettes displayed on the power wall contained a graphic health warning label. Graphic health warning labels (e.g. 'Cigarettes cause strokes and heart disease' with an image of a person using a non-re-breather mask) varied from product-to-product (e.g. Newport Menthol Gold or Marlboro Black) but did not vary within product (e.g. all Newport Menthol Gold packages had the same warning). The packages with graphic health warning labels differed from packages without graphic health warning labels only in the presence of the label (for examples of packages used in the GWL condition, see Fig. 2). The power wall was the same size and in the same position in the two conditions. The presence of price signs and posters also remained consistent across conditions, as did the presence and proportion of other tobacco products (e.g. smokeless, cigarillos, electronic cigarettes). Particular brands of cigarettes appeared in the same positions on the power wall between conditions. The only difference between conditions was that there were no graphic health warning labels present on the cigarette packages in the Status Quo condition whereas graphic health warning labels were present on cigarette packages in the GWL condition.

### Study procedures

This study was approved by the Human Subjects Protection Committee at the RAND Corporation. To balance the ethical integrity and internal validity

**Table I.** Baseline descriptive statistics for each experimental condition

	Status Quo ( <i>n</i> = 152)	GWL <sup>a</sup> ( <i>n</i> = 142)	<i>P</i>
Demographics			
<i>M</i> age (SD)	48.73 (12.70)	46.24 (10.75)	0.07
% Female	66.89	63.38	0.53
Ethnicity			
% White	34.87	36.17	0.72
% African-American	57.90	58.87	
% Other reported	7.24	4.97	
% > High school education	60.53	57.75	0.63
Smoking and quitting behavior			
<i>M</i> age at first cigarette (SD)	15.04 (3.84)	15.28 (4.39)	0.62
<i>M</i> cigarettes smoked/day past month (SD)	16.93 (13.78)	15.92 (11.53)	0.50
<i>M</i> days smoked/past month (SD)	27.88 (5.09)	27.09 (6.82)	0.27
% That smoke within 30 min of waking	70.75	73.57	0.59
% Using other tobacco products/past month	30.5	35.9	0.34
<i>M</i> number of past year quit attempts (SD)	6.24 (14.35)	4.81 (11.16)	0.34
<i>M</i> readiness to Quit Ladder score (SD)	5.47 (1.62)	5.47 (1.70)	0.98
Convenience store habits			
% That typically shop >3 to 4 times/week	74.32	71.13	0.54
% That typically spend <\$15	80.00	73.57	0.19
% That typically purchase tobacco	98.00	96.48	0.43
RSL variables			
Time since last cigarette before RSL <sup>b</sup>			0.43
Shopping			
% <15 min	23.33	25.36	
% 16–30 min	38.67	42.03	
% 31–60 min	22.00	23.19	
% >61 min	16.00	9.42	
<i>M</i> minutes shopping in RSL <sup>b</sup> (SD)	3.94 (1.89)	3.67 (1.88)	0.23
Cashier assigned			
% Cashier #1	42.1	56.0	0.03
% Cashier #2	37.5	24.1	
% Cashier #3	20.4	19.9	

<sup>a</sup>GWL is the Graphic Health Warning Label condition.

<sup>b</sup>RSL is the RAND StoreLab.

of the research, this study used an authorized deception. During recruitment and informed consent, participants were told about the broad parameters of the study (e.g. that the study was concerned with adults' shopping patterns and involved minimal risk), and that there were aspects of the study that they could not be told about up front because telling them at that point could affect the study results. They were told that they would be provided with all information about the study at the end of their participation. Their consent indicated agreement to participate in

the study without full knowledge of the study details.

Participants completed the study protocol one at a time. First, participants completed a shopping questionnaire online prior to arriving at the RSL. This pre-RSL questionnaire contained items measuring their smoking and tobacco use, their convenience store shopping experiences, and demographics (see description below). These items were administered for descriptive purposes and to evaluate the adequacy of randomization. The pre-RSL shopping



Fig. 1. Photographs of each experimental condition, Status Quo and GWL (graphic health warning labels on cigarette packages).



Fig. 2. Examples of cigarette packages with graphic health warning labels affixed to them.

questionnaire also contained filler items (to disguise the true purpose of the study) that were like the tobacco measures in structure but focused on behaviors unrelated to smoking and tobacco use (e.g. consumption of soft drinks, 'junk' food and fruits and vegetables).

After completing the pre-RSL shopping questionnaire, participants were randomized (using a random

number generator) to one of the two experimental conditions (see Fig. 1) and scheduled for an in-person session at the RSL. The RSL was configured for participants' assigned condition before their arrival at the session. Participants were provided with \$15 in cash from a study research assistant and instructed to shop in the RSL for whatever items they wanted for as long as they wanted. They were



instructed to spend at least \$5 and to check-out and pay for the items as they would in any convenience store. A research assistant who was not involved in the consent or survey administration process served as the cashier. This assistant scanned the selected items for a total price, collected money, provided change and bagged the purchased items. Research assistants rotated roles regularly to maximize balance across the experimental conditions. Research assistants were trained using a standard written protocol, role plays with WGS and regular monitoring to minimize protocol drift.

After the RSL shopping task, items that participants ‘purchased,’ including cigarettes, were returned along with any change provided by the cashier (participants had no idea before engaging in the experiment that they would be asked to return the items). Participants were called 3 days later to assess their smoking behavior (these data are not presented here). At the end of this third follow-up day, participants were: (i) fully debriefed on the purpose of the study; (ii) asked to guess the purpose of the study; (iii) received a \$75 gift card for completing the study and were reimbursed for transportation and parking and (iv) were provided with smoking cessation referrals and printed quitting self-help materials.

## Pre-RSL shopping questionnaire

### *Demographics*

*Age, gender, race and education* were self-reported by participants.

### **Smoking and quitting behavior**

*Age at first cigarette, number of cigarettes smoked per day, number of days smoked in the past month, and number of 24-hour quit attempts in the past year* were assessed. *Nicotine dependence* was assessed by asking participants ‘How soon after waking do you smoke your first cigarette?’ [34, 35]; responses were coded dichotomously as smoking within 30 min of waking (high dependence) or smoking after 30 min (low dependence). *Use of other tobacco products (smokeless tobacco, cigars or cigarillos, electronic cigarettes) in the past month* was assessed

(no, yes). *Quitting motivation* was measured using the 10-item Readiness to Quit Ladder [36], where response options ranged from 1 (‘I have decided not to quit smoking for my lifetime. I have no interest in quitting.’) to 10 (‘I have quit smoking’). Participants in this study had quitting motivation scores  $\leq 8$  because none had yet quit smoking. Participants also provided information on the *time since they smoked their last cigarette* prior to the RSL shopping task.

### **Convenience store behavior**

Participants’ typical convenience store shopping behavior was assessed with three items, adapted from the Convenience Consumer Insights Panel [6]: *How frequently do you shop at convenience stores? How much money do you typically spend at convenience stores?* and *Do you typically purchase tobacco at convenience stores?*

### **Dependent measure (post RSL-shopping)**

The dependent measure was whether a participant purchased cigarettes in the RSL. This information was recorded by the study research assistant at the end of the participant’s shopping experience.

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## Results

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Descriptive information by condition is shown in Table I. Overall, the sample was 65% female, and a majority was either White or African-American. Approximately 60% had greater than a high school education. Participants started smoking, on average, at age 15, and were currently smoking a little less than a pack of cigarettes per day on most days of the month. Most of the sample was highly nicotine dependent, based on the criterion that they smoked within 30 min of waking. One-third of the sample had used some other tobacco product (cigars, smokeless tobacco and/or electronic cigarettes) in the past month. Participants reported, on average, nearly half a dozen 24-h quit attempts during the past year and a willingness to quit smoking within the next 6 months. A majority (72.8%) of the sample reported visiting convenience stores 3–4 times per

week and spending less than \$15 on each shopping trip. Almost all participants reported purchasing their cigarettes at convenience stores. Finally, most participants reported smoking within 60 min of the experimental session and they spent nearly 4 min, on average, shopping in the RSL.

Although randomization was mostly successful in ensuring parity of participant characteristics between experimental conditions, there were some differences between conditions on pre-RSL shopping questionnaire items. There was a trend for participants assigned to the Status Quo condition to be older compared with participants assigned to the GWL condition (48.73 versus 46.24 years old;  $P = 0.07$ ). Age was also significantly and negatively associated with the dependent variable (i.e. cigarette pack purchases), in univariable analyses ( $P < 0.01$ ); older participants were significantly less likely to purchase cigarettes compared with younger participants. As such, age was included as a covariate in the multivariable logistic regression models reported below.

In addition, there were significant differences by condition in which of the research assistants was assigned to act as the RSL cashier ( $P = 0.03$ ). As this variable was also related to cigarette pack purchases in univariable analyses, we included cashier as a covariate in the multivariable logistic regression models reported below.

Although no participants guessed the specific purpose of the study, 87% suspected that the study had something to do with smoking. There were no

differences between conditions in whether a participant expressed such a suspicion ( $P = 0.38$ ), and expression of such a suspicion was unrelated to cigarette pack purchases ( $P = 0.94$ ). The results of the multivariable models presented below were the same whether an indicator guessing that the study had something to do with smoking was included in the model or not. As such, analyses presented below do not include an indicator for guessing that the study had something to do with smoking.

Table II presents the results of a logistic regression analysis predicting likelihood of purchasing a pack of cigarettes (no = 0; yes = 1) as a function of experimental condition (Status Quo condition = 0; GWL condition = 1). There were no significant differences between conditions ( $P = 0.81$ ). Participants were equally likely to purchase cigarettes when the packs were covered with graphic health warning labels (estimated probability of purchase = 0.72) as when the packs appeared in their typical form (estimated probability of purchase = 0.71).

We explored whether demographic variables (i.e. age, gender, race, education), nicotine dependence (i.e. time to smoking in the morning) and/or quitting motivation (i.e. Contemplation Ladder) acted as moderators. The only variable that moderated the association between study condition and cigarette purchasing was nicotine dependence (significant interaction  $P = 0.03$ ; see Table III). Figure 3 illustrates the interaction between study condition and nicotine dependence by plotting the estimated probability of purchasing cigarettes by experimental

**Table II.** Results of logistic regression model predicting likelihood of purchasing a package of cigarettes from experimental condition and covariates

Predictor	<i>b</i>	SE	Odds ratio [95% CI]	Wald $\chi^2$	<i>P</i>
Age	-0.03	0.01	0.97 [0.95, 0.99]	6.93	0.01
Cashier assigned <sup>a</sup>					
Cashier #3	-0.44	0.36	0.64 [0.32, 1.29]	1.55	0.21
Cashier #2	-0.55	0.31	0.57 [0.31, 1.06]	3.12	0.08
GWL condition <sup>b,c</sup>	0.07	0.27	1.07 [0.63, 1.82]	0.06	0.81

<sup>a</sup>Cashier #1 is the comparison condition.

<sup>b</sup>GWL is the Graphic Health Warning Label Condition.

<sup>c</sup>Status Quo is the comparison condition.

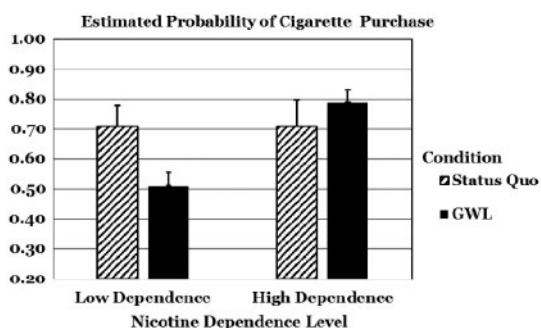
**Table III.** Results of logistic regression model predicting likelihood of purchasing a package of cigarettes from experimental condition, nicotine dependence, the interaction of experimental condition and nicotine dependence, and covariates

Predictor	<i>b</i>	<i>SE</i>	Wald $\chi^2$	<i>P</i>
Age	-0.03	0.01	7.33	0.01
Cashier assigned <sup>a</sup>				
Cashier #3	-0.58	0.38	2.49	0.12
Cashier #2	-0.61	0.32	3.80	0.05
High nicotine dependence <sup>b</sup>	0.00	0.40	0.00	0.99
GWL condition <sup>c</sup>	-0.85	0.49	2.96	0.09
Experimental condition × nicotine dependence	1.31	0.60	4.80	0.03

<sup>a</sup>Cashier #1 is the comparison condition.

<sup>b</sup>Low nicotine dependence is the comparison condition.

<sup>c</sup>GWL is the Graphic Health Warning Label Condition and Status Quo is the comparison condition.



**Fig. 3.** Plot of the interaction between experimental condition and nicotine dependence levels, predicting probability of purchasing a package of cigarettes while shopping in the RSL.

condition at each level of nicotine dependence. As the figure shows, whereas smokers with lower levels of dependence were much less likely to purchase cigarettes in the GWL condition compared with the Status Quo condition (estimated probabilities of 0.71 versus 0.51;  $P = 0.08$ , marginally significant from direct comparison via contrasts; this was equivalent to a small to medium effect size of approximately  $-0.28$ ), smokers with higher levels of dependence were slightly more likely to purchase cigarettes in the GWL condition compared with the Status Quo condition (estimated probabilities of 0.71 versus 0.79;  $P = 0.17$ , nonsignificant from direct comparison via contrasts; this was equivalent to a very small effect size of approximately 0.13).

## Discussion

The results of our experiment show that the effects of graphic health warning labels on adult smokers' purchase of cigarettes depend on their level of nicotine dependence. Smokers lower in nicotine dependence were less likely to purchase cigarettes when graphic health warning labels were present (estimated probability of 0.51) compared with the when they were absent (estimated probability of 0.71). Less dependent smokers, who tend to be light and/or intermittent smokers, represent a substantial and growing proportion of current smokers (e.g. approximately one quarter of smokers consume less than 10 cigarettes per day; and approximately one quarter of smokers are non-daily or intermittent smokers [37] and tend to be younger, more racially/ethnically diverse, and to have smoked for less time (i.e. later age of initiation) compared with heavier, more dependent smokers [38]). By reducing the likelihood of cigarette purchases at POS in this segment of the smoking population, graphic health warning labels could contribute to a range of short term (i.e. even less cigarette consumption) and more distal public health benefits (e.g. by disrupting progression toward higher dependence in younger smokers; by reducing consumption among racial/ethnic minorities and thereby buffering tobacco-related health disparities). However, these downstream effects, linking purchases to consumption to health



outcomes, would need to be investigated in future research studies.

Indeed, consumption rates or habits could change in unexpected ways in response to graphic health warning labels. For example, repeated exposures to the same graphic health warning labels could cause them to eventually lose their effectiveness [39]. As such, repeated trips to retail stores with exposures to cigarette packages with the same labels could diminish their efficacy over time and fail to inhibit purchases in the long term. This underscores the recommendations for frequent label rotations, as outlined by the World Health Organization's Framework Convention on Tobacco Control. Alternatively, although low dependence smokers may be deterred from cigarette purchases at retail POS by graphic health warning labels, they could purchase through the Internet or vending machines (as allowed by law) where graphic health warnings are not as readily visible. This possibility suggests comprehensive approaches that combine graphic health warnings with policies that restrict alternative access points beyond retail stores (per the WHO Framework on Tobacco Control) and/or that allow full visibility of graphic health warning labels regardless of sales venue are needed.

In contrast, smokers higher in nicotine dependence were slightly (but not significantly) more likely to purchase cigarettes when graphic health warning labels were present (estimated probability of 0.79) compared with when they were absent (estimated probability of 0.71). This finding adds to a small, but growing literature, which suggests that more highly dependent smokers react to graphic health warning labels differently than less dependent smokers. Specifically, studies have shown that highly dependent smokers may not fully process graphic health warning labels [30]; warnings may not change highly dependent smokers' demand for cigarettes [28] and warnings may not strongly influence highly dependent smokers' motivation to quit [26]. The reasons for these counterintuitive findings are unclear, but some studies suggest that graphic health warning labels and anti-smoking messages may prompt defensive reactions in smokers that cause warnings and messages to have effects that

are opposite of what is intended [17, 40–46]. In our study, it is possible that the graphic health warning labels on cigarette packages in the POS prompted a defensive reaction in highly dependent smokers and these defensive reactions, in turn, blunted their impact on reducing cigarette purchases.

For more highly dependent smokers, though, it may not matter that graphic health warning labels failed to influence their cigarette purchases. Studies have found that although smokers can experience reactance to graphic health warnings, that reactance does not seem to interfere with quitting [44]. Thus, once cigarette packages with graphic health warning labels are in the hands of highly nicotine dependent smokers, they may serve as a repeated prompt to seek services that will help these smokers to quit. More research is needed to explore the issue of reactance to anti-smoking messages, like graphic health warning labels (for further discussion, see [47, 48]).

Limitations of this study should be considered in any interpretation of the results. First, we tested graphic health warning labels that were going to be implemented by the United States in 2012; there is considerable image and text warning diversity across the 100 or so countries that have implemented graphic health warning labels. Other images or warnings could yield different results. Second, although the assessment of nicotine dependence we employed is commonly accepted and by itself predicts outcome [34], there are other ways to characterize dependence that could alter our conclusions (e.g. via Nicotine Dependence Syndrome scale [49]). Finally, though closely modeled after a real convenience store, the RSL is still an artificial environment and moreover, does not allow modeling of the entire process of how the POS environment influences adult smoking. Rather, the RSL allows us to look closely at a carefully chosen 'slice' of this entire process and provides information about how altering specific features of the POS retail environment (i.e. addition of a graphic health warning labels on cigarette packages) influences near-term changes in cigarette smoking.

In conclusion, we found that smokers with lower levels of nicotine dependence were deterred from

purchasing cigarettes when graphic health warning labels were present compared with when they were absent. Strengths of this study include the experimental design and use of the RSL, which provided a near-real-life retail context for this research. These findings fill a gap in the literature by utilizing an experimental design to evaluate the effect of graphic health warning labels on an observed, objective behavioral outcome (cigarette purchase) [3]. The study provides evidence for the effectiveness of such labels among less dependent smokers, thus complementing the corpus of nonexperimental evidence [1, 2, 4] on this critically important domain of tobacco regulatory science research.

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### Conflict of interest statement

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None of the authors has any conflicts of interest.

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