Plain Packaging- Can we do better than Grisly Images?

Effects of plain packaging and efficacy beliefs on smoking behavior and cognitions amongst individuals with high and low levels of education

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Statement of sources

I declare that this report is my own original work and that the contributions of others have been duly acknowledged.

Amelia Williams

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Abstract

This study sought to assess whether including efficacy messages alongside graphic health warning labels on cigarette packaging would reduce smoking behavior or increase the cognitive mediators of smoking (risk perceptions, self-efficacy and intentions to quit). This was based on the Extended Parallel Process Model, which states both risk perceptions and efficacy beliefs must be heightened in order to encourage behavior change (Witte, 1992). It was also assessed whether these effects would differ by level of education, as those with lower education often report lower self-efficacy in quitting (Siahpush et al., 2006). Using a randomized controlled trial with forty-six current smokers who had no initial intention to quit smoking, participants either smoked from the current packaging or the modified packaging for a period of three weeks. 2x3 ANOVAs were conducted on each of the hypotheses and found that the modified labels were capable of evoking risk perceptions but not self-efficacy. However, when education was included as a factor (in a 2x2x3 ANOVA) self-efficacy was heightened, but only for individuals with higher levels of education. This suggests that these particular labels may need further modification to be considered relevant for those with lower levels of education (Mead et al., 2016).

Smoking is one of the greatest contributors to the burden of lifestyle diseases worldwide, in particular cardiovascular disease and lung cancer (Greenhalgh, Bayley, & Winstanley, 2015). Through a range of coordinated measures, including tax increases and smoking bans, Australia has managed to effectively halve the rate of smoking over the past two decades (Australian Bureau of Statistics [ABS], 2014). Despite these efforts, smoking continues to be the leading cause of premature death and a major public health concern in Australia, as smoking cessation rates have remained stagnant in recent years. This plateau suggests that whilst new individuals may not be taking up smoking, those who are already smoking are persisting, and finding it difficult to quit. Further, this suggests that Government initiatives should be geared towards quitting interventions (Greenhalgh et al., 2015).

In addition to the stagnating rate of quitting, it appears that smoking initiation and quitting rates are not proportionate for all social groups (ABS, 2014). It has been well established that the incidence of smoking is highest in those with lower levels of education (Greenhalgh et al., 2015). Currently, in Australia, the rate of smoking- for individuals who have completed less than a year eleven education- is over double the rate of those who have completed at least some university education. Those with lower levels of education are also far less likely to cease smoking, for example, the rate of smoking cessation in those who have received year nine education or less has not declined significantly from 1998, but has halved in that same period for those with at least some university education (Greenhalgh et al., 2015). These findings suggest that not only are current health promotion initiatives failing to encourage quitting, but they appear to be least effective in the groups who smoke the most.

Plain Packaging and Cigarette Warning Labels

Warning labels on cigarette packs are one way in which to overcome the stagnant and disproportionate quitting rate. Cigarette packaging has the potential to make large contributions to quitting behaviour, as it is one of the only interventions that will be experienced by all smokers, each time they consume a cigarette. It is also one of the only interventions that can be experienced by all smokers, irrespective of their social status or education level (Hammond, Fong, McDonald, Cameron, & Brown, 2003). The Australian Government sought to utilise the benefits of cigarette packaging in 2011 by releasing the *Tobacco Plain Packaging Act*. The legislation involved banning the use of promotional brand logos as well as standardising the text and appearance of all cigarette packs. Along with this, the act also required that manufacturers include large pictorial health warning labels, which cover a substantial amount of the packaging. These health warnings depicted the consequences of smoking in a graphic way, for instance by including images of deteriorating arteries around the heart. These images were also accompanied by small text slogans such as "smoking causes heart disease" (The Department of Health, 2016, for an example of these labels see appendix C2).

The rationale behind this initiative was to decrease the appeal of cigarettes and increase knowledge of the risks associated with smoking (The Department of Health, 2016). The standardisation of all packaging into an unattractive olive-green colour reduced the ability of cigarette companies to create an appeal for their brand (Hammond, 2010). This allowed for other aspects of the packaging, such as the health warnings to become more salient. The increased salience of the warnings has not only meant that the health messages on plain packs are better attended to than on branded packs, but they are also recalled more often than on branded packs (Al-Hamdani, 2013).

It is assumed that the underlying mechanism by which these health warnings operate is fear (Schneider, Gadinger, & Fischer, 2012). Fear appeals are highly persuasive messages that attempt to highlight the negative consequences of a particular behaviour in order to elicit fear in an individual sufficient to encourage some form of behaviour change (Witte, 1992). For instance, individuals who have been shown the health warning labels should be fearful that they could be affected by the harms depicted, and thus, motivated to reduce this risk by quitting smoking. Fear appeals are widely used and highly intuitive, where it is often thought that if an individual is made aware of the threat posed to them by their behaviour, they should be motivated to reduce that threat (Peters, Ruiter, & Kok, 2013). However, fear appeals are not always shown to produce the desired behaviour change.

One recent study shed doubt on the effectiveness of health warning labels, and indeed fear appeals generally, to generate behaviour change by comparing smoking cessation rates between sighted and blind smokers (Ferguson & Breslin, 2017). If the fear appeals were to be effective, then one would expect a significant decrease in the smoking rate from sighted smokers but not blind smokers after the initiative started. This is because sighted smokers would be able to not only see the graphic images, but to process the consequences depicted by the image and accompanying text. As such, they should be more motivated to reduce their risk by quitting. However, the findings from this study did not support this notion, and found only marginal differences in cessation between the groups after the health warning labels began (Ferguson & Breslin, 2017). This suggests that the current health warning labels are not sufficient alone to encourage behaviour change.

In evaluating the effectiveness of the use of fear appeals, it is not only necessary to examine whether the current health warning labels are capable of encouraging behavioural change, but also whether they can influence an individual's intentions to quit smoking (Conner & Sparks, 2005). Where research conducted in the roll out of the plain packaging initiative suggested that the current warning labels are not significantly increasing people's intentions to quit more than they were from branded packs (Wakefield, Hayes, Durkin, &Borland, 2013). These findings are problematic for the argument of using fear appeals, because an individual's intentions, whilst not always highly predictive of behaviour, are a cognitive marker of an individual's readiness and motivations to alter their behaviour. As such, intentions reflect how receptive an individual will be of information that aids them in making decisions, and plans, to quit smoking. Thus, if the current health warning labels are unable to generate intentions, then they are even more unlikely to evoke behavioural changes (Conner & Sparks, 2005).

The extended parallel process model (or EPPM) provides some explanation for the potential shortcomings of fear appeals in initiating behaviour change (Witte, 1992). The EPPM proposes that when individuals encounter fear appeals, like the images used on plain packaging, two simultaneous reactions occur. One of which, deemed the danger control reaction, is a cognitive process that involves careful thought about the threat being presented. With this reaction, an individual carefully evaluates options available to them and then generate plans for behaviour change in order to reduce their own risk of being affected by the harms being presented to them (Popova, 2012). For instance, after being presented with an image of a deteriorating lung on a cigarette packet, an individual

may consider the benefits of quitting smoking and decide to purchase nicotine patches, thereby reducing their risk of lung cancer.

The other reaction, deemed the fear control reaction, is emotionally focussed and involves attempts to control emotions generated by the threat presented (Witte, 1992). In order to achieve this, an individual may either deny that there is a threat, or that they are susceptible to suffering the consequences of their behaviour, or, they may avoid the message being presented to them as not to elicit any negative feelings. For example, after being presented with one of the health warning labels, an individual may cover their cigarette packet or use patterned tins to avoid looking at the images. In some extreme cases individuals may even become reactive and engage in counterproductive behaviours, for instance by smoking more cigarettes (Popova, 2012). In terms of behavioural outcomes, the danger control response is considered more desirable, as it involves goal setting and planning to improve one's health status. The fear control response conversely does not often lead to these positive behavioural changes, since the individual may be denying that there is any harm done by their behaviour (Witte, 1992).

It has been suggested that the current health warning labels used on plain packaging are more likely to elicit a fear control reaction rather than a danger control reaction (Peters et al., 2013). Although the two reactions, danger control and fear control, occur simultaneously, only one will be the prevailing reaction. Whether it is danger control or fear control that occurs will be dependent on the individual's evaluation of their level of perceived risk and their efficacy beliefs. An individual's perception of their risk is contingent on the ability of the fear appeal to evoke notions about the person's susceptibility of being affected by the harms depicted. In addition to this, an individual must evaluate how severe these outcomes would be if they were

indeed affected by them. For instance, upon viewing one of the health warning labels depicting lung cancer, an individual must accept that they too could suffer from this disease and that the consequences could be fatal for them (Popova, 2012).

After an individual has evaluated their level of risk, they will then evaluate their efficacy beliefs (Peters et al., 2013). Efficacy beliefs are contingent upon whether the fear appeal promotes an appropriate course of action that the individual feels could reduce the risk of being affected by the threat depicted, this is known as the response efficacy of the message. Additionally, an individual must feel confident in their ability to undertake the response being depicted, thereby lowering their level of risk, this is known as an individual's self-efficacy capability (Bandura, 2004). For instance, these warning labels may provide text that tells individuals to quit smoking to reduce their risk of lung cancer, but those individuals need to feel confident in their ability to be able to quit.

The EPPM suggests that the combination of risk perception and efficacy beliefs determines whether danger control of fear control reactions are more likely to occur (Peters et al., 2013). An individual must have high perceptions of their risk in order to see a need to change their behaviour. If there are not sufficient perceptions of risk, a null reaction will occur, this simply means that the individual will not make any change in their behaviour because there is seen to be no need to. In addition, if an individual's efficacy beliefs are high, they are more likely to feel in control of their own health status, and more motivated to make behavioural changes to maintain good health (Bandura, 2004). Thus, when an individual is able to identify that there is a threat to their health and feel confident in their ability to be able to undertake behaviours that will reduce this risk, then the danger control reaction is more likely to occur. Conversely, if risk perceptions are high and self-efficacy beliefs low, then an individual may feel

helpless to change their risk status and consequently, a fear control reaction occurs (Peters et al., 2013).

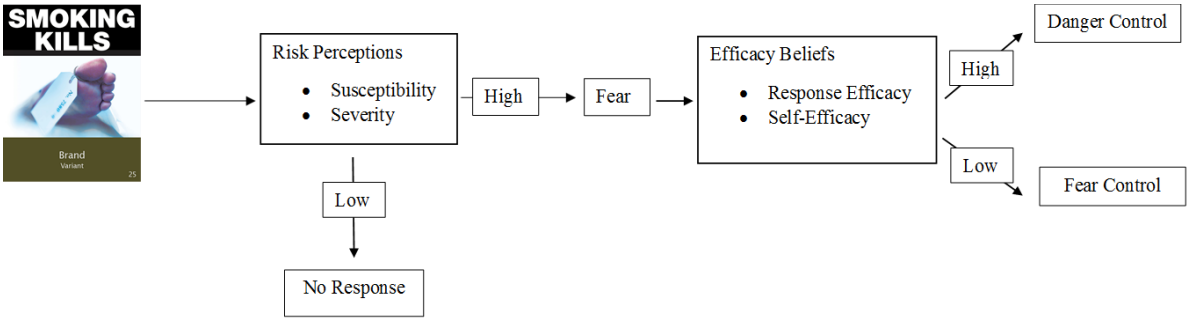

Figure 1.A visual representation of The Extended Parallel Process Model

The images on the health warning labels appear to be capable of evoking an individual's perceptions of their risk, thereby satisfying one component of the EPPM (Peters et al., 2013). An Australian survey found that individuals were 43% more likely to think frequently about the harms associated with smoking when they were smoking from packets that included the health warning labels than they were from branded packs (Wakefield et al., 2013). Additionally, experimental studies have found that individuals smoking from the warning label packets were more likely to perceive their smoking as a health risk than those smoking from branded packs (Schneider et al., 2012).

However, these health warning labels become problematic in addressing efficacy beliefs. These labels provide factual information about the risks associated with smoking, for example by including text stating "smoking kills", however, they do not provide individuals with any alternatives for their behaviour. For example, there is no mention of the availability of quitting medication to aid quit attempts. As such, the response efficacy components of the current health warning labels are weak at best. In

addition to this, the current labels do not address an individual's capabilities for quitting, where previous qualitative studies have demonstrated that smokers do not believe the labels do enough to address quitting options or make participants feel that quitting would be an achievable outcome for them (Schneider et al, 2012). Some have argued that providing the quit line number should be sufficient to address efficacy beliefs, but, this merely provides information, it is not directly encouraging individuals to undertake the response or address their capability for being able to call the quit line (Hardcastle et al., 2015). Since the current health warning labels have been shown to be effective at eliciting risk perceptions, but not efficacy beliefs, the EPPM would predict that individuals are more likely to engage in a fear control, rather than a danger control response (Witte, 1992).

Effects of Health Warning Labels on Subpopulations

It may also be suggested that the current labels may affect subpopulations of smokers differentially, specifically, they may be less effective for individuals with lower education (Siahpush, McNeill, Hammond, & Fong, 2006). It has been established that smokers with lower levels of education tend to also have lower awareness of the risks associated with smoking than those with higher education (Siahpush et al., 2006). This suggests that when these individuals are presented with the health warning labels, they may be more likely to discredit the risks being presented to them or to minimize their personal susceptibility of being affected by these risks, simply because they may not believe that these effects may arise from cigarette smoking. This may be particularly true for labels that convey complex medical terminology, for example 'smoking causes peripheral vascular disease'. This discounting of risks has been demonstrated in focus groups of smokers with lower levels of education who discussed the health warning

labels, with one participant in particular stating “There’s a picture on one of them … the foot. And its gangrene, it’s not because of smoking. It’s just gangrene,” (Guillaumier, Bonevski, & Paul, 2015).

In addition to this, those with lower levels of education also report having lower levels of self-efficacy in their ability to quit smoking than those with higher education (Siahpush et al., 2006). Thus, even if individuals are aware of, and accept the risks being presented on the health warning labels, they may not firstly know what action to take, or feel motivated to undertake it. Again, in the focus groups, all participants reported that there was insufficient information on the current packaging about quitting options, demonstrating a lack of response efficacy. Further, the options that were available on the pack (i.e. providing the quit line number), most individuals in the study did not feel confident to utilise, stating that they did not believe that using the quit line would help them to effectively beat their addiction to nicotine (Guillaumier et al., 2015). These findings demonstrate a tactic commonly employed by those with lower self-efficacy, where many will attempt to explain their hopelessness in being able to change their health status by placing more emphasis on their physiological addiction to nicotine and less emphasis on their ability to change their health status (Hardcastle et al., 2015).

These differences in risk perceptions and efficacy beliefs for those with lower levels of education may be in part, explained by health literacy (Speros, 2005). Health literacy can be defined as one’s ability to seek out and process health related information in order to make informed decisions about one’s health behaviours. As such, health literacy involves a cognitive manipulation of information in order to generate plans to achieve health goals (Speros, 2005). In terms of the current health warning labels, this may mean that those with lower education are unable to effectively utilise the

information being provided to them. Thus, these individuals, who may not fully understand their level of relative risk or know of all the quitting options available to them, may continue to engage in health defeating behaviours, such as continuing smoking (Stewart et al., 2013).

Although there is evidence to suggest that individuals with lower levels of education have differential baseline rates of risk perceptions and self-efficacy, whether this translates into a reduced likelihood of experiencing a danger control reaction has not been explicitly examined. There are few studies that have examined the differential effects of the current health warning labels based on education. Those that have examined this have been largely qualitative and exploratory, and do not include a group of higher education smokers to make comparisons to (Mead, Cohen, Kennedy, Gallo, & Latkin, 2016; Guillaumier et al., 2015). Thus, it is still unclear whether the current health warning labels are able to evoke behavioural or cognitive changes in those with lower levels of education at comparable rates to the general population.

Aims

These findings suggest that if health warning labels are to be effective generally, they need to be modified. Specifically, they need to provide individuals with a clear response that they can take in order to reduce their perceived level of risk. Additionally, they need to address the individual's capabilities to undertake such behaviours (Peters et al., 2013). To date, no studies have attempted to examine the effects of making these changes. The literature is also unclear as to how this will affect different subpopulations of smokers, specifically whether those with lower levels of education will benefit equally as well from modifying the labels as those with higher education.

The present study seeks to investigate whether modifying the current Australian health warning labels on plain packaging to include efficacy messages will lead to changes in smoking behaviour or changes in the cognitive mediators of smoking, being risk perceptions, self-efficacy and intentions to quit, and whether these effects differ by educational status.

Hypotheses

Hypothesis 1:

a) Participants in the experimental group will show greater declines in cigarette consumption from baseline to follow-up compared to the control group.

b) Participants in the experimental group will show greater declines in CO readings between baseline and follow-up compared to the control group.

Hypothesis 2:

a) Participants in the experimental group will show greater increases in risk perception from baseline to follow-up compared to the control group.

b) Participants in the experimental group will demonstrate greater increases in self-efficacy from baseline to follow-up compared to the control group.

c) Participants in the experimental group will show greater increases in intentions to quit from baseline to follow up compared to the control group.

A separate research question will examine whether the effects tested in hypotheses 1a-2c differ according to educational attainment.

Method

Design

The study used a randomized controlled trial design. Participants in the control group smoked from packages with current government health warnings for the entire

trial. The experimental group conversely smoked from packages with current government health warnings for the first week, then in the second and third week smoked from packages that included efficacy messages with the government health warning images.

Outcomes

The primary outcome variables were related to smoking behaviours, namely participants self-reported cigarette consumption over the past two weeks, as measured by a timeline follow back, and carbon monoxide (CO) readings.

The secondary outcome variables were related to the cognitive mediators of smoking, risk perception, self-efficacy and intentions to quit. These were assessed by questionnaire responses at each visit.

Participants

Inclusion and exclusion criteria. In order to be considered for the study, participants needed to be current smokers, smoking at least ten cigarettes a day for the past three years, with no interest in quitting for the next month. Due to the nature of the study and the legality of cigarette purchases, all participants were over eighteen years old. Additionally, participants had an adequate comprehension of English to satisfy ethical obligations. Participants who were pregnant were excluded from the study. Participants were screened for eligibility through a phone call, screening criteria was additionally confirmed at their first appointment.

Sample size and justification. Effect size estimates for a power analysis were based on previous meta-analysis (Peters et al., 2013), which found an effect size of *d*= .71 when self-efficacy was included in fear appeals, and, Sheeran, Harris & Epton's meta-analysis- (2014) which found effect sizes of *d*= .98 on intentions to quit and *d*= .45

on behavior when self-efficacy was combined with fear appeals. Combining these effects reveals an expected effect size of d= .76. For this magnitude of effect to be found (where power is .80 and p= .05) at least 58 participants (29 per group) need to be included in the analysis.

Recruitment. Participants consisted of a community sample from the Hobart region. Participants were recruited through flyers posted around the University campus as well as an array of public outlets, including bus shelters and shopping centers (an example of the flier content can be seen in appendix B1). On these posters, a link was provided to a dedicated study website, where participants could leave their contact details in order to be contacted by the researcher to determine eligibility.

Participants were also recruited through advertisements on social media sites, such as Facebook (an example of the content used for these ads can be viewed in appendix B2). Participants were again provided with a link that would take them to the dedicated study website, participants provided their details through this site and researchers made contact to determine eligibility (the text used on the study website can be seen in appendix B3).

Participants were given a total of ninety dollars worth of gift vouchers as reimbursement for their participation.

Procedure

At the enrolment visit, eligible participants were provided with a verbal overview of the study, as well as a written information sheet, then provided informed consent. The baseline questionnaire was administered to gain demographic information and as a baseline assessment of the cognitive mediators of smoking (this questionnaire is available to view in appendix E1). After this, participants received training on how to

use an EMA device to log their cigarette consumption and respond to random questionnaires (not used for this study). Participants were instructed to smoke as usual and were randomized into either the experimental or control group at this visit. Two CO readings were also obtained at this visit (and at all subsequent visits). Participants were reimbursed with a twenty dollar gift card at this visit.

At the second visit, (baseline + 7 days) participants completed the follow up questionnaire (seen in appendix E2). All participants were then provided with their two week supply of adhesive labels and shown how to attach them to their own cigarette packages/tobacco pouches. The experimental group received labels with efficacy messages, whilst the control group received labels with the current government mandated warnings (see appendix C1 and C2 respectively). Participants were additionally given written instructions for their use for the warning labels (viewable in appendix D). Participants were also shown how to use the EMA device to photograph the labels on their cigarette packages, this was used as a compliance measure. Again, two CO readings were obtained and participants were reimbursed with a thirty dollar gift card.

At the follow up visit, (baseline + 21 days) participants completed the same follow up survey as visit two and were debriefed. Participants again provided two CO readings and were reimbursed with a forty dollar voucher.

All questionnaires were delivered electronically. As part of a larger scale study, participants were also provided with smartphone devices that were used to obtain ecological momentary assessment (or EMA) data. However, this was not examined in the current study.

Materials

Intervention. Participants in both the experimental condition and control condition were provided with adhesive labels to place over the front of their cigarette packets at their second visit in order to control for the novelty of placing a sticker on the packets. All of these adhesive labels contained the government mandated images depicting the harms of smoking. The stickers used by the control group also contained the current government mandated warning text. In the experimental group, the stickers contained efficacy messages as well as the government mandated information (see appendix C2). These efficacy messages were derived from the Smoking Abstinence Self-Efficacy Questionnaire (SASEQ, Spek et al., 2013), which contains six situations that have been validated as challenging for smokers to abstain smoking from. An example of the current government mandated warning labels used by the control group is "Don't let others breathe your smoke", whereas this same image is accompanied with the text "You can prevent children from breathing in smoke: Nicotine gum will help you not to smoke when you feel you need to" for the experimental labels.

Measures

Primary Outcomes. ***Cigarette consumption*** was measured by a Timeline Follow Back (or TLFB) task (Robinson, Sobell, Sobell, & Leo, 2014) at baseline and both follow-up assessments. The TLFB is a self-reported retrospective assessment of cigarette consumption over the past two weeks, in which participants provide an estimate of each day's cigarette consumption.

Carbon monoxide *(CO) readings* were also obtained by using a smokerlyzer (MICRO+ Smokerlyzer) as objective verification of smoking status.

Secondary Outcomes. Assessments of all secondary outcomes in the baseline and follow up questionnaires were based on Orbell et al (2009).

Risk Perceptions were assessed with 3 items about whether the participants believed they would be susceptible to suffering harm from smoking (e.g. The chances of me dying young because of smoking are high). Additionally, 3 items assessed how severe participants believed suffering a smoking related disease would be (e.g. Developing a smoking related disease would stop me living my life the way I intend to in the future).

Self-efficacy was measured with 4 items related to an individual's capability to quit smoking (e.g. I am confident that I will not smoke if I don't want to).

Intentions to quit were assessed with 3 items asking questions regarding future quitting plans (e.g. I plan not to smoke in the future).

All of these questions were measured on a 6 point Likert scale ranging from 1= strongly disagree to 6= strongly agree.

Data analysis

Each hypothesis (1a-2c) was tested using a 2x3 (time: baseline, visit two and follow up, and group: experimental or control) repeated measures mixed ANOVA to determine if the intervention (modified warning labels) had effects on smoking behaviour (TLFB and CO readings), and the cognitive mediators risk perceptions, self-efficacy and intention to quit.

The additional research questions were examined using a 2x2x3 repeated measures mixed ANOVA for each of the hypothesis from 1a-2c, with time as a within-subjects factor and intervention and education level as between-subjects factors. Education level will be assessed as being low if the individual has only completed year ten or less, and assessed as high if they have completed anything higher than year ten education.

Baseline levels of smoking were included as a covariate in each of the analyses. Where significant interactions were found, pairwise comparisons were completed to examine scores for people smoking 10, 16 and 22 cigarettes, as these numbers were approximately one standard deviation below the mean, the mean cigarette consumption and one standard deviation above the mean respectively.

Analyses were conducted with TLFB responses set at 7 days (rather than 14 days) for visit two. This was done to ensure that there was no overlap in the responses from baseline and visit two.

Greenhouse-Geisser corrections were used in the reporting of all results where Mauchly's test of sphericity revealed a significance level of less than $p = 0.05$.

All descriptive statistics for all analyses are available to view in appendix F1-G5.

Results

Demographics

Two participants were excluded from the final sample, as their baseline levels of smoking were over two standard deviations of the mean, as such they were not truly representative of the sample.

The final sample consisted of 46 participants, 24 being male. For a breakdown of these participant numbers respective to condition, see figure 2. The average age was 29.61 years ($SD = 9.22$), and the majority (approximately 94%) of participants were Caucasian. Participants were smoking an average of 16.02 cigarettes per day ($SD = 5.74$), and had been smoking for an average of 10.39 years ($SD = 8.73$). The majority of participants had low levels of education.

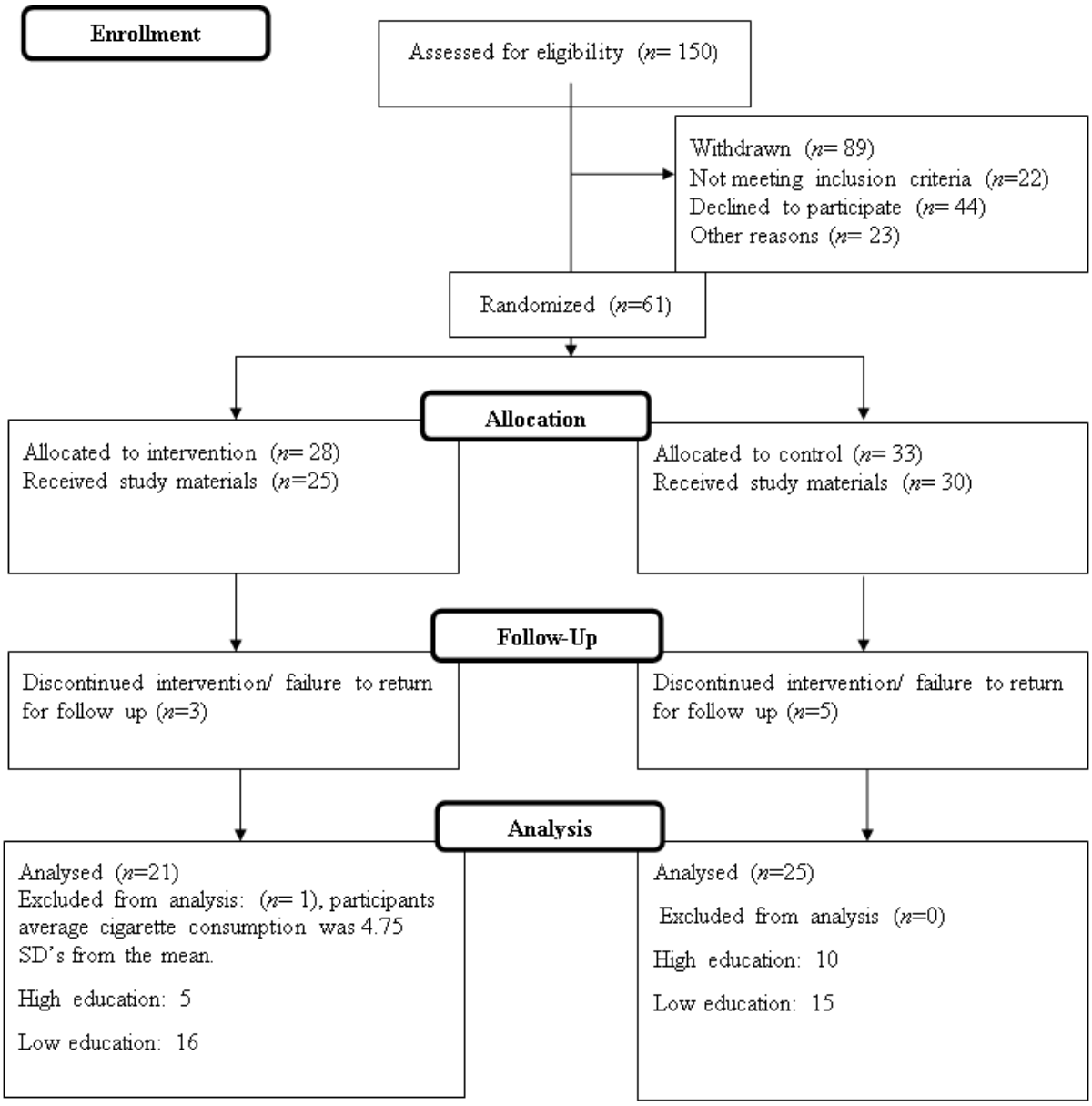

Figure 2. Participant allocation and flow of subjects throughout the study.

2x3 hypotheses

In testing ***hypothesis 1a***, a 2x3 repeated measures mixed ANOVA revealed that there were no significant differences between those in the experimental group (modified warning labels) and those in the control group (current government mandated labels) with regards to smoking behaviour a measured by the TLFB: $F(1, 43)=.17$, $p=.683$, $\eta^2=$

.004. The ANOVA also showed no main effect of time: $F(1.5, 63.5)=.29$, $p=.680$, $\eta^2=.007$, and no interaction was found $F(1.5, 63.5)=.33$, $p=.653$, $\eta^2= .008$, suggesting that there were no changes to smoking behaviour throughout the study regardless of whether participants were smoking from modified label packaging or the current government mandated packaging.

However, the covariate, cigarettes smoked at baseline, was significant, $F(1,43)=129.73$, $p<.001$, $\eta^2= .751$. The interaction between baseline cigarettes and time approached significance, $F(1.5, 63.5)=3.40$, $p=.053$, $\eta^2=.073$. A simple slopes analysis estimating marginal means for cigarette consumption 1 SD above and below the mean at baseline (10, 16 and 22 cigarettes a day respectively) suggested that those with higher baseline consumption reduced their smoking more throughout the study than those with lower baseline consumption over time.

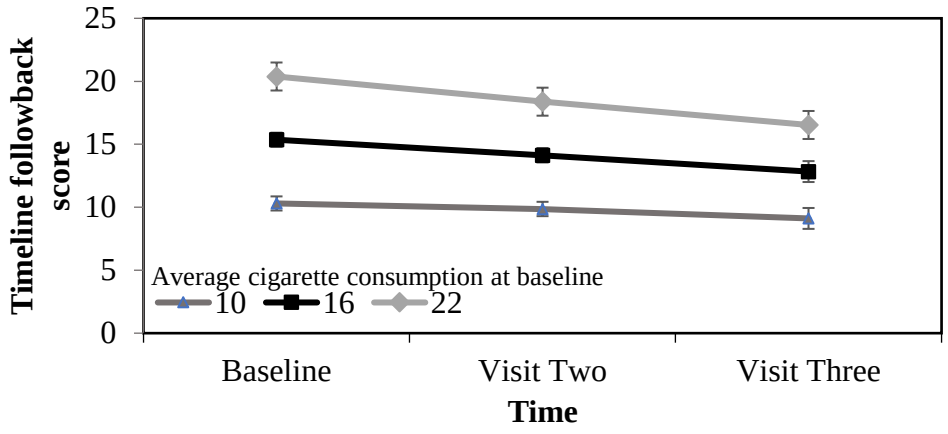

Figure 3. Interaction effects between cigarette consumption at baseline and time of assessment on timeline followback scores.

For ***hypothesis 1b,*** a 2x3 repeated measures mixed ANOVA showed no main effect of group on CO readings, $F(1,43)=.06$, $p=.810$, $\eta^2=.001$. Similarly, the main effect of time was also not significant $F(1.9, 83.3)=.14$, $p=.861$, $\eta^2=.003$, and so too, was the

interaction between group and time, $F(1.9, 83.3)=1.56$, $p=.217$, $\eta^2=.035$. This suggests that those in the control group had similar CO readings to those in the modified warning label group consistently throughout the study.

Similar to the results found from testing hypothesis 1a, the main effect of baseline cigarettes was significant $F(1, 43)= 7.37$, $p=.010$, $\eta^2=.148$. Baseline cigarettes did not however, interact with time, $F(1.9, 83.3)=.86$, $p=.423$, $\eta^2=.020$. Simple slopes analysis showed that those who smoked more at baseline (22 cigarettes) had higher CO readings than those who reported smoking less (10 cigarettes) at baseline.

In testing ***hypothesis 2a***, the ANOVA revealed no main effect of group $F(1, 43)=.032$, $p=.86$, $\eta^2=.001$, however, the main effect of time approached significance $F(1.6, 68.9)=3.26$, $p=.055$, $\eta^2=.071$, pairwise comparisons revealed that risk perceptions increased from visit two to follow up. The interaction between time and group on risk perceptions was not found to be significant $F(1.6, 68.9)=.65$, $p=.401$, $\eta^2=.015$.

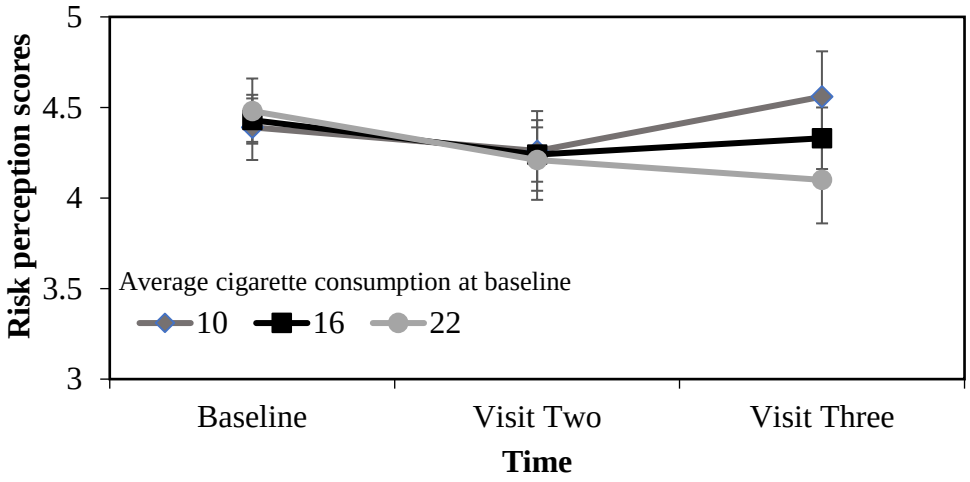

Figure 4. Interaction effects between cigarette consumption at baseline and time of assessment on risk perception scores.

The main effect for baseline cigarettes was found to be non-significant $F(1, 43)=.23$, $p=.633$, $\eta^2=.005$, but there was a significant interaction with time $F(1.6, 68.9)=3.97$, $p=.032$, $\eta^2=.084$. Pairwise comparisons of simple slopes at -1SD, mean and +1SD of baseline smoking suggested that those who smoked less at baseline (10 cigarettes), showed a significant increase in risk perceptions from visit two to follow up.

For ***hypothesis 2b,*** the ANOVA revealed no significant main effect of group $F(1, 43)=.09$, $p=.770$, $\eta^2=.002$, or time, $F(1.7, 71.5)=.57$, $p=.537$, $\eta^2=.013$, or interaction between group and time on self-efficacy, $F(1.7, 71.5)= 2.56$, $p=.094$, $\eta^2=.056$.

The main effect of baseline cigarettes was found to be non-significant $F(1, 43)=.01$, $p=.937$, $\eta^2<.001$, and so was the interaction with time $F(1.7, 71.5)=1.58$, $p=.216$, $\eta^2=.035$.

For ***hypothesis 2c***, the ANOVA showed no significant main effect of group $F(1,43)=.22$, $p=.641$, $\eta^2=.005$, or time $F(1.3, 57.7)=.24$, $p=.699$, $\eta^2=.005$, or interaction between group and time on intentions to quit $F(1.3, 57.7)=.31$, $p=.650$, $\eta^2=.007$.

The main effect of baseline cigarettes was also not significant, $F(1, 43)= .06$, $p=.814$, $\eta^2=.001$, nor was the interaction with time $F(1.3, 57.7)=.75$, $p=.428$, $\eta^2=.017$.

2x2x3 hypotheses

In order to test the additional research question on education, a dichotomous indicator of education (below/above year 10) was included in the mixed ANOVAs from hypothesis 1a-2c.

When education was included as a factor in testing ***hypothesis 1a***, a 2x2x3 repeated measures mixed ANOVA revealed no significant main effect of group, $F(1,$

41)=.05, p=.826, η^2=.001 or time, F(1.5, 60.1)=.18, p=.769, η^2=.004 on cigarette consumption as measured by TLFB scores. There was also no significant main effect of education F(1, 41)=2.96, p=.093, η^2=.067, which suggests that there those with low education and high education were smoking similar amounts of cigarettes throughout the study.

Further, the interaction between group and time was not significant F(1.5, 60.1)=.10, p=.846, η^2=.002, nor was the interaction between group and education, F(1, 41)=.13, p=.720, η^2=.003, or time and education F(1.5, 60.1)=.10, p=.842, η^2=.002. The three way interaction between group, time and education was also not significant F(1.5, 60.1)=.37, p=.628, η^2=.009. These findings suggest that those with higher levels of education showed no greater declines in smoking behaviour over time in either the experimental or control group.

The covariate, baseline cigarettes, showed a significant main effect F(1, 41)=102.21, p<.001, η^2=.714, but not a significant interaction with time F(1.5, 60.1)=2.66, p=.094, η^2=.061. This suggests that those smoking more at baseline (22 cigarettes) continued to smoke more than those who reported smoking less (10 cigarettes) throughout the study.

With education included in ***hypothesis 1b***, there was no main effect of group, F(1, 41)=.02, p=.897, η^2<.001, time F(1.9, 79.6)=.19, p=.883, η^2=.003 or education F(1,41)=.07, p=.792, η^2=.002 on CO readings.

There was also no significant interaction between group and time, F(1.9, 79.6)=.96, p=.385, η^2=.023, group and education F(1, 41)=.12, p=.726, η^2=.003, or time and education F(1.9, 79.6)=.86, p=.423, η^2=.021. There was also no significant three way interaction between them, F(1.9, 79.6)=1.44, p=.244, η^2=.034.

There was a significant main effect for baseline cigarettes $F(1, 41)= 6.72$, $p=.013$, $\eta^2=.141$, however, this did not interact with time, $F(1.9, 79.6)=.69$, $p=.503$, $\eta^2=.016$. This suggests that those who smoked more (22 cigarettes per day) had higher CO readings throughout the study than those smoking less (10 cigarettes a day).

With education included in ***hypothesis 2a***, a significant main effect of group was found, $F(1,41)=4.10$, $p=.050$, $\eta^2=.091$, suggesting that those in the control group had higher scores on risk perception measures than the experimental group. A main effect of education was also found $F(1, 41)=6.70$, $p=.013$, $\eta^2=.140$, suggesting that those with higher education levels had higher scores on risk perception measures than those with lower levels of education. There was however, no main effect of time $F(1.6, 66.5)=2.44$, $p=.105$, $\eta^2=.056$.

There was additionally a significant interaction between group and education $F(1, 41)=14.98$, $p<.001$, $\eta^2=.268$. The results suggested that those with lower education in the experimental group had lower scores on risk perception measures than all other groups. However, there was no significant interaction between time and group $F(1.6, 66.5)=.22$, $p=.761$, $\eta^2=.005$, or time and education $F(1.6, 66.5)=.94$, $p=.380$, $\eta^2=.022$ or between time, group and education $F(1.6, 66.5)=2.51$, $p=.099$, $\eta^2=.058$.

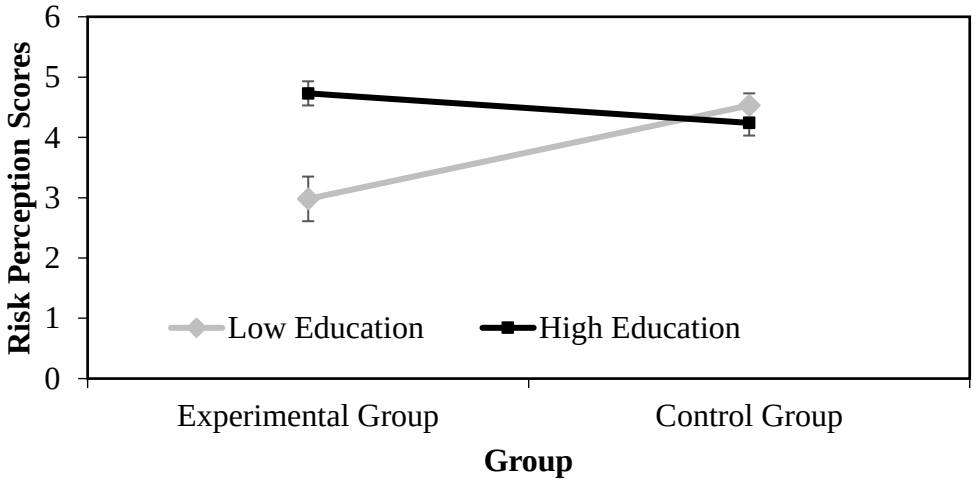

Figure 5. Interaction effects between level of education and group to which participant was assigned on risk perception scores

There was no significant main effect found for baseline cigarettes $F(1, 41)=.05$, $p=.823$, $\eta^2=.001$, or interaction between baseline cigarettes and time $F(1.6, 66.5)=3.18$, $p=.058$, $\eta^2=.072$. Suggesting that the changes in risk perceptions were not affected by how many cigarettes participants consumed.

With education included in ***hypothesis 2b***, no significant main effects of group $F(1,41)=.66$, $p=.423$ $\eta^2=.016$, time $F(1.8, 72)=1.43$, $p=.247$, $\eta^2=.034$, or education $F(1, 41)=.37$, $p=.547$, $\eta^2=.009$ were found on self-efficacy.

The interaction between group and time was not significant $F(1.8, 72)=.32$, $p=.702$, $\eta^2=.008$, nor was the interaction between group and education $F(1, 41)=1.51$, $p=.227$, $\eta^2=.035$, or education and time $F(1.8, 72)=2.38$, $p=.106$, $\eta^2=.055$. However, the three way interaction between group, education and time was significant $F(1.8, 72)=4.72$, $p=.015$, $\eta^2=.103$. Further examination of this interaction suggested that self-efficacy remained the same for the control group, regardless of education. However, in the experimental group, self-efficacy decreases in those with lower education and increases in those with higher education over the three time points.

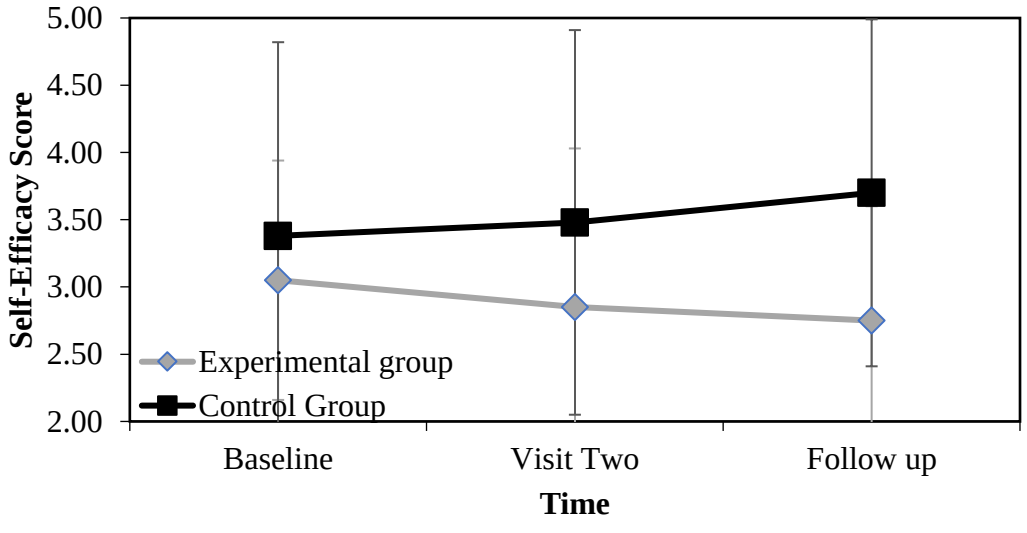

*Figure 6.*Interaction effects between group to which participant was assigned, time of assessment and low levels of education on self-efficacy scores.

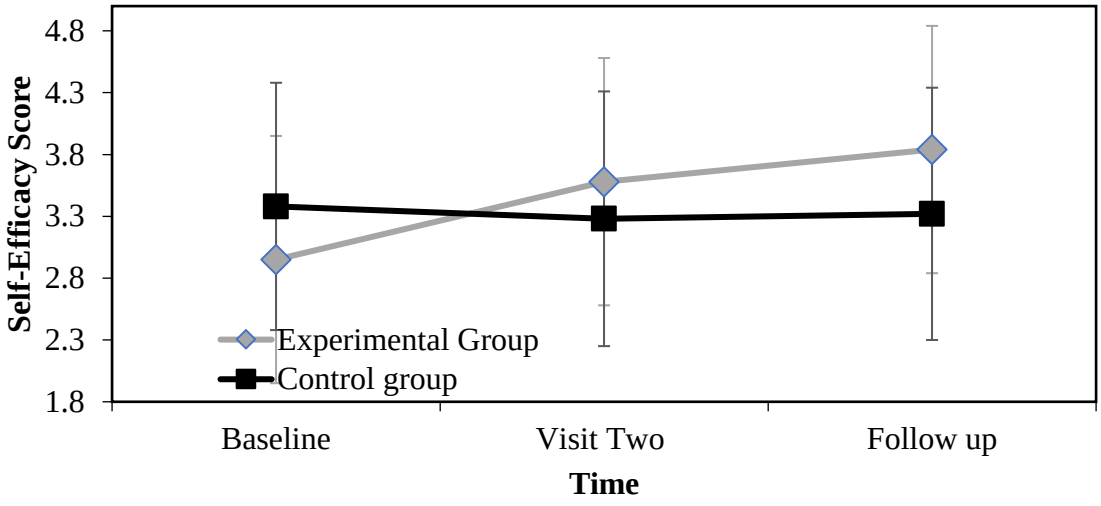

Figure 7. Interaction effects between group to which participant was assigned, time of assessment and high levels of education on self-efficacy scores

The main effect of baseline cigarettes was not found to be significant $F(1, 41)=.01$, $p=.934$, $\eta^2<.001$, nor was the interaction with time $F(1.8, 72)=2.6$, $p=.086$, $\eta^2=.060$.

With education included in ***hypothesis 2c***, there were no significant main effects of group $F(1, 41)=2.86$, $p=.099$, $\eta^2=.065$, time $F(1.4, 56.4)=.78$, $p=.421$, $\eta^2=.019$ or education $F(1, 41)=1.18$, $p=.283$, $\eta^2=.028$ on intentions to quit.

There was a significant interaction between group and education $F(1, 41)=8.43$, $p=.006$, $\eta^2= .170$, suggesting those with lower education in the experimental group had lower intentions to quit than all other groups. However the interaction between group and time $F(1.4, 56.4)=.96$, $p=.359$, $\eta^2=.075$ and between time and education $F(1.4,$

56.4)=3.30, p=.061, η^2=.075, was not significant. The three way interaction between group, education and time was also not found to be significant F(1.4, 56.4)=2.19, p=.136, η^2=.051.

There was no significant main effect found for baseline cigarettes F(1, 41) <.001, p=.996, η^2<.001, or interaction between baseline cigarettes and time F(1.4, 56.4)=1.80, p=.183, η^2=.042.

Discussion

This study sought to examine whether including efficacy messages on graphic health warning labels would reduce smoking behavior or increase the cognitive mediators of smoking (that is, risk perceptions, self-efficacy and intentions to quit). Overall, the results did not suggest any immediate benefit from using the modified labels over the current government mandated warning labels in reducing cigarette consumption. However, using the modified labels may be more effective for individuals with higher levels of education at increasing the cognitive mediators, specifically risk perception and self-efficacy.

The Extended Parallel Process Model (EPPM) suggests that in order for behavior change to occur, such as quitting smoking, a danger control reaction must take place (Witte, 1992). Danger control reactions involve planning and executing behaviours that can reduce an individual's level of risk of suffering harm from their health defeating behaviours. For instance, purchasing nicotine patches in order to quit smoking and avoid lung disease. For any reaction to take place under the EPPM, an individual must first appraise their level of risk, then their efficacy beliefs. Both of these components must be high in order to elicit a danger control reaction (Witte, 1992). Since the current government mandated warning labels do not address efficacy beliefs, it was not expected

that they would elicit a danger control reaction. However, by including efficacy messages, both components necessary for danger control should be satisfied, and thus, there would be a higher likelihood of a danger control reaction occurring (Witte, 1992).

This study found that the modified labels are indeed capable of satisfying all components necessary for a danger control reaction to occur (Witte, 1992). However, these effects were only observed in individuals with higher education. Additionally, although the requirements were met for a danger control reaction to take place in this group, this did not translate into an increase in intentions to quit or a decrease in reported cigarette consumption.

Reiterating findings from previous studies, this study found that using the current government mandated labels was sufficient to increase an individual's perception of their level of risk (Schneider et al., 2012). Whilst the modified labels with efficacy messages were found to be capable of eliciting risk perceptions, they were not found to be as effective as the current government mandated labels. One possible explanation for this comes from previous research undertaken by Bolton, Cohen and Bloom (2006). This study found that when interventions, such as the modified warning labels, provide advice on products or solutions that can reduce an individual's risk posed by their behaviours, such as suffering a smoking related disease, the urgency in utilizing these solutions declines. This may be because individuals reduce their perception of risk by taking into account these protective solutions before they have even utilized them (Van der Pligt, 1996). As such, the risks become far less fear inducing. It then becomes an issue of whether individuals have a desire (or motivation) to quit smoking, as they believe the options can be utilized at any time they feel they are ready to change their behavior (Bolton, Cohen and Bloom, 2006).

However, the modified labels appeared to be more effective at increasing risk perceptions in lighter smokers, and those with higher education. In terms of the modified labels increasing risk perceptions in lighter smokers, the reasons may be twofold, firstly, the labels may not increase risk perceptions in heavier smokers because they already have a realistic notion about their level of risk for suffering a smoking related disease (Dijkstra &Bos, 2015). As such, the labels may be seeking to remind heavier smokers of their risk, but cannot continue to increase these perceptions. Secondly, whilst lighter smokers have a tendency to perceive their smoking as less risky than heavier smokers, due to a lower exposure to tobacco, the labels may have been able to overcome these perceptions through consistent repeated exposure to the warning labels (Dijkstra & Bos, 2015).

Finding that the modified labels are more effective at eliciting risk perceptions in those with higher education supports previous research suggesting that individuals with lower education often undermine the level of risk presented by their smoking behavior (Siahpush et al., 2006). One suggested reason for this is that smokers with lower education are more likely to dismiss future orientated risks, and instead focus on the immediate gains from cigarette smoking (for instance stress relief) (Guillaumier et al., 2015). Since the labels used in the current study predominantly focused on long term consequences such as heart or lung disease, these possibilities may not be tangible enough to elicit immediate fear in this population.

Risk perceptions need to be high in order to highlight to individuals need to change behavior under the EPPM (Witte, 1992). Thus, finding that the modified labels are less effective at eliciting risk perceptions for individuals with lower education, would suggest these individuals do not see it as necessary to change their behavior, as such, a

danger control reaction cannot take place, and the individual will continue to smoke as normal. Conversely, for individuals with higher education, the first appraisal process has been satisfied, and a need to change behavior identified. However, these individuals still then need to evaluate their efficacy beliefs for a danger control reaction to be possible (Witte, 1992).

In terms of self-efficacy, the results indicated that the labels were only capable of altering these beliefs when education was included as a factor in the analysis. They showed that for individuals with higher levels of education, the modified labels were effective at increasing self-efficacy. However, for individuals with lower levels of education, using the modified labels resulted in a decrease in self-efficacy. These findings are promising for individuals with higher levels of education, as both risk perceptions and efficacy beliefs have been successfully manipulated. This means that under the EPPM, individuals with higher levels of education are more likely to engage in a danger control reaction, and thus, quit smoking (Witte, 1992). However, this also means that these particular modified labels may not be appropriate as a population level intervention, since majority of smokers have lower levels of education (Greenhalgh et al, 2015).

One possible explanation for the decrease in self-efficacy for smokers with lower education is that this group faces additional barriers to quitting than smokers with higher education, and that the modified labels may draw attention to these existing inequalities. Many of the modified labels used in the current study focused on solutions that required individuals to make purchases, such as using quitting medications, nicotine patches or nicotine gum. These solutions are costly, often in Australia using these remedies are greater than or equal to the cost of purchasing cigarettes (Bryant, Bonevski, Paul,

O'Brien & Oakes, 2011). This is problematic, since individuals with lower levels of education are also often on lower incomes (Cutler and Lleras-Muney, 2006), and may not see these treatments as a worthwhile investment (Bryant et al., 2011).

If this is the case, then it means the modified labels could again be altered to include scenarios with greater relevance and sense of achievability for individuals with lower levels of education. Previous research undertaken with smokers from low socioeconomic backgrounds suggests that these individuals are more likely to be receptive to warning labels when they provide representational role models (Mead, Cohen, Kennedy, Gallo & Latkin, 2016). When relatable role models convey their quitting journey on the packages, these vicarious experiences have been shown to increase self-efficacy to quit smoking (Mead et al., 2016). Conversely, the images used in the current study are mostly depersonalized (using images of hearts or other organs for example), and thus easier to dissociate from, which may be why they are unable to increase self-efficacy in smokers of lower education.

However, it may also be argued that the modified labels are unable to evoke efficacy beliefs in smokers with lower education to the same extent as they are able to in smokers with higher education due to differences in health literacy. Health literacy is one's ability to effectively process and use health related information (Speros, 2005). Health literacy levels are often lower amongst individuals who have lower levels of education, thus, evaluating the information on the modified warning labels may not be as simple as it is for someone with higher levels of education (Gottfredson & Deary, 2004). The efficacy messages used in the current study were solely text based, where the images used with the modified labels are identical to the ones used in the current government mandated warning labels, as these were used to elicit risk perceptions, not

efficacy beliefs. Previous research indicates that when health related content is delivered in a text form, rather than as an image, those with lower levels of health literacy tend to ignore the information, or even if they do engage with the content, may not understand it as well as someone with higher health literacy. As such, the modified labels used in the current study may be able to be more effective by using simple text, and trying to incorporate some of the efficacy message into the accompanying image on the packaging (Thrasher et al., 2012).

As was expected following the assumptions of the EPPM, no changes in smoking behavior were observed for individuals with lower education. This is again because using the labels did not lead to both increased risk perceptions and efficacy beliefs, thus, a danger control reaction is highly unlikely to occur (Witte, 1992). However, in individuals with higher levels of education, although both components necessary for a danger control reaction to occur, this did not translate into an increase in intentions to quit or a decrease in cigarette consumption within this group.

The only significant declines in smoking behavior observed throughout the study was from those who were the heaviest smokers. It may simply be the case that since these individuals smoke more, thus, they had more opportunity to vary their smoking habits. However, it may be that this group of smokers are exposed to the warning labels more frequently than lighter smokers are, since presumably, they see the warning each time they consume a cigarette (Dijkstra & Bos, 2015). This higher exposure serves to constantly remind an individual of their level of risk, however, this group of smokers have a higher nicotine dependence than lighter smokers, meaning that quitting smoking can seem to be a more daunting task than it would be for a lighter smoker. Thus, these smokers my feel that intending to quit smoking is not an achievable goal for them.

However, they may be more confident in their ability to reduce their cigarette consumption or to forgo a single cigarette when they feel anxiety over their level of risk, rather than quitting entirely (Dijkstra &Bos, 2015).

If individuals are choosing to make these smaller scale behavioural changes, such as reducing consumption or forgoing cigarettes, then this could be an indication of the danger control reaction taking place within this group (Peters et al., 2013). The danger control reaction is focused on planning and executing behaviours that can reduce an individual's level of risk. As such, it could be argued that forgoing a cigarette or reducing consumption constitutes a short-term plan to reduce immediate risk. Further, utilizing these smaller scale changes may precede intending to quit in a larger scale plan to quit smoking altogether, since reducing cigarette consumption has been linked with a higher likelihood of quitting in the future (Hughes & Carpenter, 2006).

There are a few theoretical reasons why very little behavior change was observed throughout the study. It may be the case that the effectiveness of the labels is contingent upon an individual's motivation to quit (Wong & Cappella 2009). Motivation to quit was not explicitly tested in the current study, however, the requirements for participation included having no intention to quit at the commencement of the study, and not undergoing a quit attempt, so it may be reasonable to assume that the individuals in the study had relatively low motivation to quit. This is problematic in evaluating the effectiveness of the modified labels, as previous research suggests that fear appeals are more effective for individuals highly motivated to change their behavior. This is because individuals with a higher motivation to quit are more likely to be receptive to information that emphasizes their confidence to quit. Conversely, individuals with low motivation to quit tend to require fear appeals to provide them with both the motivation

and the confidence to quit (Wong & Cappella, 2009). Thus, individuals with a higher motivation may be more likely to attend to and engage with the efficacy messages on the modified labels used in the current study.

There are additionally some methodological considerations in examining the lack of behavioural change. A contributing factor may be because of the timeline of the study. This study only assessed the effects of the labels over two weeks, it may take longer than this for the increase in risk perceptions and self-efficacy to translate into intentions to quit and then subsequent quitting behavior (cigarette reduction). This may be because undergoing a danger control reaction and thus achieving these outcomes may be dependent on the formation of plans (Peters et al., 2013). In order to form these plans, individuals need to identify their triggers for smoking and also their barriers to quitting and then create strategies for overcoming or coping with them (Sniehotta, Scholz & Schwarzer, 2005). This process is substantial, and thus, may require longer than the duration of the study.

Additionally, cigarette consumption was measured by a self-reported retrospective assessment. It is known that when assessing variables through self-report, individuals may not always respond accurately (Dolcini, Adler, Lee & Bauman, 2003). In the current study, individuals had to recall their cigarette consumption over seven days. Anecdotal observations throughout the study indicated that participants found this to be a difficult task, and that when participants were unsure about their consumption, there was a tendency to report the same number of cigarettes for all days of the week, even if this may not have been accurate. Because this study was also run in conjunction with an EMA study, whereby participants would log each cigarette they consumed, as they consumed it, it would be reasonable to suggest that participants may have not been

as motivated to try and recall their consumption accurately, since they may feel they have provided that information already through the EMA data. As such, this study may not have captured the true extent of participants smoking behavior.

There is one major confound in the current study related to the methodology used. Specifically, this study required participants to apply their warning label to their cigarette pack daily, irrespective of condition. By doing so, individuals may be more engaged with the warning labels than they would be in daily life. The novelty of attending to the labels may have been a more powerful effect than the differences that may have been observed between groups. Future research could seek to clarify whether pre-printed labels produce greater differences between the modified labels and the current government mandated labels.

Another limitation worth noting is that the current study had a relatively small sample size. The power analysis undertaken prior to the commencement of the study indicated that fifty-eight participants would be necessary to achieve meaningful effects. However, the current study only analyzed data from forty-six participants, since fourteen dropped out at various stages throughout the study. Often these participants were not able to be contacted to determine why they decided to discontinue the study, as such analysis of these effects could not be undertaken. However, anecdotal evidence from the study suggests that the burden of participation may have been too intensive for some participants, since this study was undertaken in conjunction with a larger scale ecological momentary assessment (EMA) study, that required continuous logging of each cigarette and questionnaires at random time points for three weeks.

In similar vein, the participants were not evenly distributed amongst education level. Majority of participants were classified as having lower levels of education. In

fact, only five participants with higher education received the modified labels. As such, these numbers may be too low to obtain any larger differences between the groups. It should also be considered that when participants were classified as having either high or low education, this decision was based solely on whether individuals completed higher than year ten, or did not. The completion of trade certificates was not classified as a higher level of education if the individual had not completed year 10. This may have been one of the factors affecting the number of participants being characterized as having low education.

Further, a limitation of the current study is that the underlying mechanisms of the results found cannot be concluded. That is, although this study did not find danger control reactions occurred for all groups, it is not clear from these results whether this means that the labels are instead causing fear control reactions or simply null reactions (Witte, 1992). Fear control reactions involve heightened risk perceptions, but not efficacy beliefs, meaning that individuals will the seek to deny their level of threat or avoid the warning labels. Conversely, null reactions involve no increases in either risk perceptions or efficacy beliefs. This is an important distinction to make, as it will determine the effectiveness of using warning labels as a quitting intervention. If the labels are causing null reactions, it would mean that individuals are not engaging with the labels at all, and thus, modifying the label would have no effect in changing cognitions or behaviours (Popova, 2012). However, if the labels are leading to fear control reactions, there is some hope for future modifications of the labels to produce behavior change, as individuals are engaging with the label, yet feel unable to change their current state (Witte, 1992). If this is the case, then the efficacy messages used in the current study were unable to enhance an individual's efficacy beliefs. However, this

does not mean that other variations of efficacy messages would not be more successful in eliciting these beliefs (Peters et al., 2013). In order for this to be tested, measures of fear and anxiety should be included in future replications of this study. If the labels are capable of evoking fear, but not behavior change, then it is likely that fear control reactions are taking place.

Another consideration worth noting is that this study evaluated the use of modified labels alone as a sole intervention, which is indeed necessary to evaluate their effectiveness. However, in the real world, warning labels are rarely introduced alone. For instance, when the plain packaging initiative rolled out in Australia, the introduction of the health warning labels was also accompanied by media campaigns and anti-smoking advertisements (The Department of Health, 2016). It may be the case that by having both of these interventions occurring simultaneously, the interaction between them enhances the effectiveness of the warning labels (Pierce, White & Sherry, 2012). This may be particularly true for the use of warning labels with efficacy messages, as increasing one's confidence in their ability to quit smoking may be more easily portrayed in television advertisements. In this case, the warning labels would then act as a supplementary intervention, and may even be more effective than demonstrated in the current study (Pierce et al., 2012).

In summary, the EPPM posits that if behavior change is to occur, risk perceptions and efficacy beliefs need to be heightened to elicit a danger control reaction (Witte, 1992). The current study found that using labels with efficacy messages was able to satisfy the conditions necessary for a danger control reaction to occur, but only in individuals with higher levels of education. This may be because individuals with lower education tend to discount the future risks of smoking and instead focus on immediate

gains (Guillaumier et al., 2015), or may be due to the relevance of the content on the modified labels for individuals with lower levels of education (Mead et al., 2016), or even due to differences in health literacy (Thrasher et al., 2012). Although the conditions for a danger control reaction were met for individuals with higher education, there was no evidence in the current study of this occurring, since there were no declines in smoking behavior or increase in intentions to quit. This may be because the effectiveness of the labels is contingent upon an individual's motivation to quit (Wong & Cappella, 2009), or simply that the duration of the study was not long enough to capture these changes. Future research should attempt to discern whether the modified labels are causing fear control reactions or simply null reactions in individuals with lower education (Witte, 1992), as this will determine the utility of again altering the labels to be more relevant for these individuals (Thrasher et al., 2012; Mead et al., 2016). Additionally, this study should be replicated with pre-printed cigarette packages and with a larger sample size to find the true scale of the effects found.

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Appendix A1: Ethical Approval Letter

Office of Research Services
University of Tasmania
Private Bag 1
Hobart Tasmania 7001
Telephone + 61 3 6226 7479
Facsimile + 61 3 6226 7148
Email Human.Ethics@utas.edu.au
www.research.utas.edu.au/human_ethics/

HUMAN RESEARCH ETHICS COMMITTEE (TASMANIA) NETWORK

UTAS

17 June 2016
Dr Natalie Schuez
C/o UTAS (Health Sciences)

Sent via email

Dear Dr Schuez,

REF NO: H0015696
TITLE: Making the most of plain packaging: using self-efficacy messages on cigarette packaging to promote smoking cessation

Document	***Date***
Application Form - NEAF	
Protocol	June 2016
Participant Information Sheet and Consent Form	June 2016
Demographic Questionnaires	June 2016
Proposed Facebook Advertisement	June 2016
Recruitment Flyer	June 2016
Smoking Abstinence Self-Efficacy Questionnaire (SASEQ)	June 2016
Wording for Webpage Link	June 2016
Appendix H: Example of modified health warning label featuring self-efficacy message	

The Tasmanian Health and Medical Human Research Ethics Committee considered and approved the above documentation on **15 June 2016** to be conducted at the following site(s):

University of Tasmania – School of Medicine

Please ensure that all investigators involved with this project have cited the approved versions of the documents listed within this letter and use only these versions in conducting this research project.

This approval constitutes ethical clearance by the Health and Medical HREC. The decision and authority to commence the associated research may be dependent on factors beyond the remit of the ethics review process. For example, your research may need ethics clearance from other organisations or review by your research governance coordinator or Head of Department. It is your responsibility to find out if the approvals of other bodies or authorities are required. It is recommended that the proposed research should not commence until you have satisfied these requirements.
All committees operating under the Human Research Ethics Committee (Tasmania) Network are registered and required to comply with the *National Statement on the Ethical Conduct in Human Research* (NHMRC 2007 updated 2014).
Therefore, the Chief Investigator's responsibility is to ensure that:
(1) The individual researcher's protocol complies with the HREC approved protocol.
(2) Modifications to the protocol do not proceed until **approval** is obtained in writing from the HREC. Please note that all requests for changes to approved documents must include a version number and date when submitted for review by the HREC.
(3) Section 5.5.3 of the National Statement states:
Researchers have a significant responsibility in monitoring approved research as they are in the best position to observe any adverse events or unexpected outcomes. They should report such events or outcomes promptly to the relevant institution/s and ethical review body/ies and take prompt steps to deal with any unexpected risks.
The appropriate forms for reporting such events in relation to clinical and non-clinical trials and innovations can be located at the website below. All adverse events must be reported regardless of whether or not the event, in your opinion, is a direct effect of the therapeutic goods being tested. http://www.utas.edu.au/research-admin/researchintegrity-and-ethics-unit-rieu/human-ethics/human-research-ethics-reviewprocess/health-and-medical-hrec/managing-your-approved-project
(4) All research participants must be provided with the current Patient Information Sheet and Consent Form, unless otherwise approved by the Committee.
(5) The Committee is notified if any investigators are added to, or cease involvement with, the project.
(6) This study has approval for four years contingent upon annual review. A *Progress Report* is to be provided on the anniversary date of your approval. Your first report is due **15 June 2017.** You will be sent a courtesy reminder closer to this due date.
(7) A *Final Report* and a copy of the published material, either in full or abstract, must be provided at the end of the project.
Should you have any queries please do not hesitate to contact me on (03) 6226 2764.

Yours sincerely

Heather Vail
Ethics Administrator
Office of Research Services
Email: Heather.vail@utas.edu.au
University of Tasmania
Private Bag 01 Hobart Tas 7001

Appendix A2: Participant Information Sheet

Medical Science 1, Level 4, 17 Liverpool Street,
Hobart, Tasmania 7000 Australia
Phone (03) 6226 1093 Fax (03) 6226 2870
Email smokingutas@gmail.com
FACULTY OF HEALTH SCIENCE

UNIVERSITY OF TASMANIA

PARTICIPANT INFORMATION SHEET

HEALTH AND MEDICAL RESEARCH

STUDY: Making the best of plain packaging: using self-efficacy messages on cigarette packages to promote smoking cessation.

You are invited to participate in a research study to investigate the way that anti-smoking warnings influence smoking behaviour and the onset of smoking. The study is conducted by Dr. Natalie Schüz, Dr Benjamin Schüz, Dr. Stuart Ferguson, Lillian Brinken and Amelia Williams.

1. What is the purpose of this study?

The purpose is to investigate the way that anti-smoking warnings on cigarette packages influence smoking behaviour.

2. Why have I been invited to participate in this study?

You are eligible to participate in this study because

- you are an adult (18+) cigarette smoker
- you have smoked 10 cigarettes per day for, the past 3 years
- you are NOT currently interested in quitting smoking within the next month
- you are NOT pregnant
- you have adequate comprehension of English.

3. What does this study involve?

If you choose to participate in this study, you will be required to take part in three (3) study visits at the University of Tasmania campus, answer prompted questions and monitor the cigarettes you smoke for a total of 3 weeks (explained below).

You will monitor the cigarettes you smoke using a simple to use hand-held computer—similar to a mobile telephone. You indicate every time you smoke a cigarette by pressing a button on the device. You will also be asked to complete 2 minute assessments at 4-5 random times throughout your day as well as brief reports when you turn the device on in the morning and before you turn it off in the evening. **You will need to return this**

Medical Science 1, Level 4, 17 Liverpool Street,
Hobart, Tasmania 7000 Australia
Phone (03) 6226 1093 Fax (03) 6226 2870
Email smokingutas@gmail.com

FACULTY OF HEALTH SCIENCE

device at the end of the study.You will be asked to carry this device with youat all times until the end of the study. During this and all subsequent visits, we will obtain two measures of expired air carbon monoxide levels as a measure of cigarette smoke exposure.

Visit one (1) - will take approximately 30-45 minutes to complete, during which you complete a questionnaire and will be given training in the study procedures.

Visit two (2) – one week (7 days) after the first visit. It will take approximately 15-20 minutes. The data from your device will be downloaded; and you will provide a sample of your breath, a simple and non-invasive procedure where you exhale into a special device. You will be required to bring along any cigarette packets you have. A research assistant will apply labels to all provided packs/tobacco pouches and distribute additional stickers to last until the next visit.

Visit three (3) – This final visit will be scheduled two weeks (14 days) after visit two (2). You are asked to return the study device. You will be debriefed and provided with the opportunity to tell us about your experiences in the study.

4. Will I be reimbursed for my time?

Participants who complete the entire study will be reimbursed $65for their time and out of pocket expenses. First year psychology students will receive three hours of course credit. **Your involvement in the study is not linked to your individual answers or your interest in quitting or starting smoking. If you complete the study you will be reimbursed for your time.**

5. What will happen to my personal details?

It is important that you understand your involvement in this study is voluntary. While we would be pleased to have you participate, we respect your right to decline. There will be no consequences to you if you decide not to participate. If you decide to discontinue participation at any time, you may do so without providing an explanation. **All information will be treated in a confidential manner, and your name will not be used in any publication arising out of the research.** All of the research data will be kept on a password-protected computer. Hard copy data will be kept for at least five (5) years from the date of the first publication of the study results. Electronic data will be securely stored until it is no longer necessary.

6. Are there any possible benefits from participation in this study?

No. However, the information we gather may help preventing the onset of smoking in adolescents and motivating smokers to quit smoking in the future.

7. Are there any possible risks from participation in this study?
There are no specific risks anticipated with participation in this study aside from those associated with continued smoking if you are a current smoker. If, over the course of the study, you do decide that you would like to quit smoking, we would be happy to provide you with quitting materials and to refer you to the local quit line.

8. What if I have questions about this research?
If you would like to discuss any aspect of this study please feel free to contact Dr. Natalie Schüz on (03) 6226 1093. Dr. Schüz would be happy to discuss any aspect of the research with you. When the study has been finalised the main outcomes will be published on the University of Tasmania's website.

This study has been approved by the Tasmanian Health and Medical Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study should contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 7479 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. You will need to quote **[H0015696].**

Thank you for taking the time to consider this study.

If you wish to take part in it, please sign the attached consent form.

This information sheet is for you to keep.

Appendix A3: Participant Consent Form

UNIVERSITY of TASMANIA | FACULTY OF HEALTH

CONSENT FORM

Title of Project: Making the best of plain packaging: using self-efficacy messages on cigarette packages to promote smoking cessation.

1. I have read and understood the 'Information Sheet' for this project.

2. The nature and possible effects of the study have been explained to me.

3. I understand that the study involves 21 days of monitoring (explained below). While in the study, I will be asked to monitor my smoking using a smartphone. I understand I will be asked to carry this device with me at all times during the study.

I understand that I will also be required to visit the University of Tasmania three (3) times for study visits: once to enrol (this current visit), and two (2) further times over the course of the study. Aside from this enrolment visit (which will take up to 45 minutes), each future study visit will take approximately 15-20 minutes to complete. During each study visit I will also be required to provide a sample of my breath by exhaling into a special device.

Finally, I understand that if I complete all three study visits, I will receive shopping vouchers worth $90 as compensation for my time. Moreover, I will receive an additional shopping voucher of $50 at the final visit if I answer at least 75% of all the random prompts issued by the study device and report at least 75% of the cigarettes I smoke.

4. As a smoker, I understand that participation involves the risk(s) associated with continued smoking.

5. I understand that all research data will be securely stored on the University of Tasmania premises for at least five years, and will then be destroyed when no longer required.

6. Any questions that I have asked have been answered to my satisfaction.

7. I agree that research data gathered from me for the study may be published provided that I cannot be identified as a participant.

8. I understand that the researchers will keep my identity confidential and that any information I supply to the researcher(s) will be used only for the purposes of the research.

9. I agree to participate in this investigation and understand that I may withdraw at any time without any consequence, and if I so wish, may request that any data I have supplied to date be withdrawn from the study.

10. I understand that this research has been approved by the Tasmanian Health and Medical Human Research Ethics Committee **[**project number: H0015696**].**

Name of Participant:

Signature: Date:

Appendix B1: Example Text for Recruitment Flier

Recruitment flier

SUPPORT RESEARCH ON TOBACCO WARNING LABELS

In a study conducted at the University of Tasmania, we are interested in current smokers' views and experiences with tobacco warning labels they encounter in every-day life as well as responses to alternative warning labels.

All participants will be compensated with shopping vouchers worth $90 for their time.

Call the University of Tasmania on (03) (03) 6226 1093 or email smokingutas@gmail.com for further details and to determine whether you are eligible to participate.

Recruitment flier alternative heading

$90 SHOPPING VOUCHERS FOR YOUR OPINION ON CIGARETTE WARNING LABELS. SCARED OR BORED?

Appendix B2: Text for Recruitment Ad on Facebook

Proposed *Facebook* advertisement

LOGOS: Faculty of Health Science, UTAS Red Lion,

Facebook advertisements will be refreshed on a regular basis to keep potential participants interested. The heading of the advertisement will mostly include the words “tobacco warnings” and/ or “research”, the body will inform that the advertisement is for a research project for which compensation will be provided and that smokers will not be asked to quit. The character limit is 25 characters for the title and 90 for the body. Below are example headings.

Example headings:

Study on tobacco warning labels.
Support research.
Smokers wanted.
Study on no-smoking messages.
Tobacco warnings research.
Anti-smoking encounters.
Scared or bored?

Appendix B3: Text on the Recruitment Webpage

Making the Most of Plain Packaging.

We are recruiting current smokers aged 18 or older.
You should NOT be interested in quitting, and should have smoked for a minimum of three years, with a minimum of 10 cigarettes per day.

Study participants will be compensated with shopping vouchers worth $90 for their time.

Importantly, ***you will not be asked to quit smoking as part of the study***—we are interested in the effects of graphic warning labels on smokers' everyday experiences of smoking. The aim of our study is to investigate whether warning messages on tobacco packaging influence thoughts and/or smoking behaviour. The outcomes of this study will be used to improve our understanding of health warning messages and factors that influence smoking.

Please click on the information sheetfor more information.

Research Participation Submission Form
The faculty of Health Science welcomes your participation. Please complete and submit the form below. The output of this form goes to the experiment coordinator.

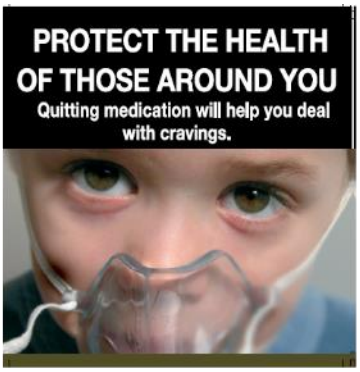
Name:

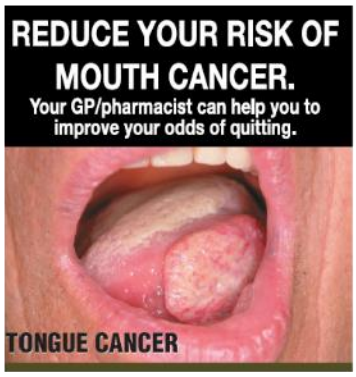
Phone number:

Email address:

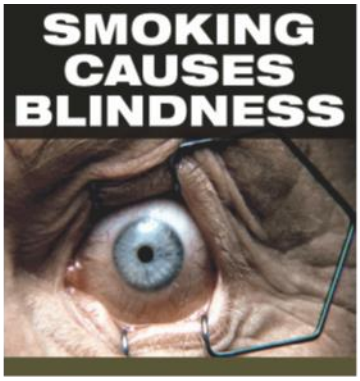
Additional comments:

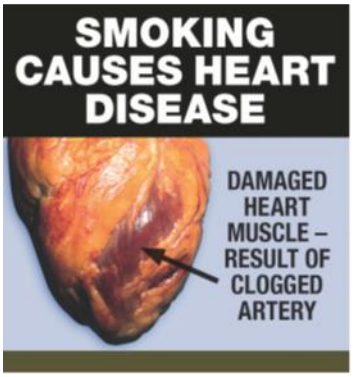
Appendix C1: The Modified Warning Labels with Self-Efficacy Messages used in the Study

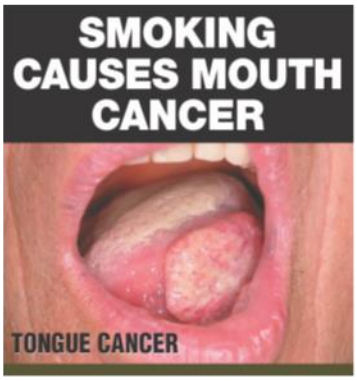


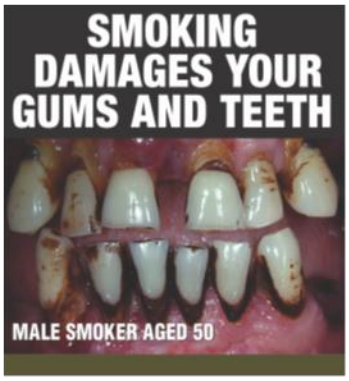


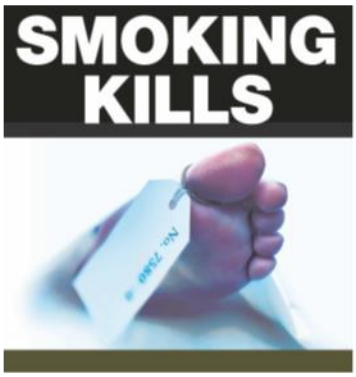
Appendix C2: The Current Government Mandated Warning Labels











Appendix D: Instructions for Participants use of Warning Labels

QUICK GUIDE TO WARNING LABELS

- You have been given **labels for the front** (black warning label, perforation beneath heading) and **labels for the back** (red warning label, unperforated) to stick on your cigarettes.
- **Please use the labels in pairs**. E.g. if you put a label with a picture of teeth on the front of your cigarettes, please ensure that you select the corresponding label with a picture of teeth to go on the back.
- It is important that you put a label on your cigarettes immediately after you buy them (ideally *before* you start smoking them).
- If you are smoking cigarettes from **25-40 packs**, please use the larger labels. If you are smoking **20 packs**, please use the smaller labels.
- Labels for the front of the pack are perforated beneath the warning text. Please place the label on to your pack so the top of the sticker lines up with the top of the box and the perforation is in line with the point at which the box opens.
- If you are smoking **rolling tobacco**, please place two identical labels designed for the front of the 25-40 sized packs side by side on the flap of the pouch, and two of the corresponding labels (those with a red heading) side by side over the warning on the back of the pack.
- If you are smoking rolling tobacco, please stick new warning labels to your pouch every day.

Appendix E1: Baseline Questionnaire

BASELINE SURVEY TEXT

1. What is your current age (in years)?

   _____

2. Gender: please choose one of the following:

   ☐FEMALE ☐MALE

3. What is the highest level of education that you have completed? Please choose one of the following:

   ☐YEAR 10 OR LESS ☐YEAR 12 ☐SOME UNIVERSITY

   ☐GRADUATED UNIVERSITY ☐GRADUATE DEGREE

4. What is your ethnicity? Please choose all that apply:

   ☐CAUCASIAN/EUROPEAN ☐ABORIGINAL ☐TORRES STRAIT ISLANDER

   ☐ASIAN ☐OTHER: (PLEASE SPECIFY)

5. What is your current marital status? Please choose only one of the following:

   ☐MARRIED ☐WIDOWED ☐DIVORCED ☐SEPARATED

   ☐NEVER MARRIED ☐LIVING WITH PARTNER

6. Partner's smoking behaviour: please choose only one of the following:

☐NO PARTNER ☐PARTNER HAS NEVER SMOKED ☐PARTNER IS A SMOKER

☐PARTNER IS A QUITTING SMOKER ☐PARTNER IS AN EX-SMOKER

7. How old were you when you smoked your first ever cigarette? Please write your answer in years

_____

8. Do you currently smoke cigarettes (please choose only one of the following):

☐EVERYDAY ☐SOMEDAYS

9. On the days that you smoke, on average, how many cigarettes do you smoker per day? (please use whole numbers – not a range)

_____

10. On the days that you smoke, on average, how many cigarettes do you smoker per day? (please use whole numbers – not a range.)

_____

11. On averages, how many DAYS per month do you smoke? (a month has 30 days)

_____

12. For about how long have you smoked this amount?

___ YEARS, AND ____MONTHS

13. How soon after waking up do you smoke your first cigarette? Please choose only one of the following

☐WITHIN 5 MINUTES ☐FROM 6-15 MINUTES ☐FROM 16-30 MINUTES

☐FROM 31 MINUTES TO 1 HOUR ☐MORE THAN 1 HOUR

14. Do you find it difficult to refrain from smoking in the places where it is forbidden e.g., in church, at the library, in cinemas etc.?

☐YES ☐NO

15. Which cigarette would you hate most to give up? Please choose only one of the following:

☐THE FIRST CIGARETTE IN THE MORNING ☐ANY OTHER

16. Do you smoke more frequently during the first hours after waking than during the rest of the day? Please choose only one of the following:

☐YES ☐NO

17. Do you smoke if you are so ill that you are in bed most of the day? Please choose only one:

☐YES ☐NO

18. In your best guess, about how many times in your lifetime have you made a serious attempt to stop smoking? By serious attempt we mean that you decided that you would try to make sure that you never smoked another cigarette.

_____

19. What is the MINIMUM number of cigarettes that you have smoked on any day in the last two months?

_____

20. What is the maximum number of cigarettes you have smoked on any day in the last two months?

_____

21. Please indicate how much you agree with the statements below:
Please choose the appropriate response for each item.

	1. Strongly disagree	2. Disagree	3. Somewhat disagree	4. Somewhat agree	5. Agree	6. Strongly agree
I am confident that I will not smoke if I don't want to.	☐	☐	☐	☐	☐	☐
I will try not to smoke in the future	☐	☐	☐	☐	☐	☐
Developing a smoking related disease would put my financial security at risk	☐	☐	☐	☐	☐	☐
The chances of me developing a smoking related disease because of smoking are high	☐	☐	☐	☐	☐	☐

Not smoking is under my control	☐	☐	☐	☐	☐	☐
I plan not to smoke in the future	☐	☐	☐	☐	☐	☐
Developing a smoking related disease would affect my important relationships in my life	☐	☐	☐	☐	☐	☐
The chances of me dying young because of smoking are high	☐	☐	☐	☐	☐	☐
It is difficult for me not to smoke	☒	☐	☐	☐	☐	☐
I intend to not smoke in the future	☐	☐	☐	☐	☐	☐
Developing a smoking related disease would stop me living my life the way I intend to in the future	☐	☐	☐	☐	☐	☐
The chances of me becoming disabled (unable to walk long distances) because of smoking are high	☐	☐	☐	☐	☐	☐

Not smoking is something I can do	☐	☐	☐	☒	☐	☐

7. The thought of me developing a smoking related disease makes me feel: (please select the appropriate response for each item)

	1	2	3	4	5	6	
Not at all anxious	☐	☐	☐	☐	☐	☐	Anxious
Not at all afraid	☐	☐	☐	☐	☐	☐	Afraid
Not at all scared	☐	☐	☐	☐	☐	☐	Scared
Not at all worried	☐	☐	☐	☐	☐	☐	Worried

8. What is your total income before tax?

☐Less than $20,000 ☐ $20,000 to $29,999 ☐$30,000 to $44,999

☐$45,000 to $59,999 ☐$60,000 to $74,999 ☐$75,000+ ☐Prefer not to answer

9. Thinking back over the last two (2) weeks, how many cigarettes did you smoke each day?

It is important that for each day listed, there is a number indicating the number of cigarettes you smoked that day.

On the days that you did not smoke, mark those days with a zero (0).

In filling out the calendar we would like you to be as accurate as possible. If you cannot remember, give it your best guess.

It may help to think about other things that happened on each day – sometimes this helps people to remember.

Please write your answer here:

Yesterday ____

2 days ago ____

3 days ____

4 days ____

5 days ____

6 days ____

1 WEEK ago ____

8 days ____

9 days ____

10 days ____

11 days ____

12 days ____

13 days ____

2 WEEKS _____

Using a scale from 1 (not at all) to 5 (very much), please indicate how much each of the following statements reflects how you typically are.

1. I am good at resisting temptation
2. I have a hard time breaking bad habits.
3. I am lazy.
4. I say inappropriate things.
5. I do certain things that are bad for me, if they are fun.
6. I refuse things that are bad for me.
7. I wish I had more self-discipline.
8. People would say that I have iron self-discipline.
9. Pleasure and fun sometimes keep me from getting work done.
10. I have trouble concentrating.
11. I am able to work effectively towards long-term goals.
12. Sometimes I can't stop myself from doing something even if I know it is wrong.

I often act without thinking though all the alternatives

The next four questions relate to costs and benefits related to smoking and quitting smoking.

If you were to experience COSTS from your smoking, WHEN do you think you would notice them?

1. When I am thinking about smoking or not
2. When I make the decision to smoke
3. While I am getting ready to smoke
4. While I am smoking
5. Immediately after smoking
6. After smoking for about a week
7. After smoking for about a month
8. After smoking for about a year
9. After smoking for several years
10. After smoking for several decades

If you were to experience BENEFITS from your smoking, WHEN do you think you would notice them?

1. When I am thinking about smoking or not
2. When I make the decision to smoke
3. While I am getting ready to smoke
4. While I am smoking
5. Immediately after smoking
6. After smoking for about a week
7. After smoking for about a month
8. After smoking for about a year
9. After smoking for several years
10. After smoking for several decades

If you were to experience COSTS from QUITTING SMOKING, WHEN do you think you would notice them?

1. When I am thinking about smoking or not
2. When I make the decision to quit smoking
3. While I am getting ready to quit smoking
4. While I am quitting smoking
5. Immediately after quitting smoking
6. After quitting smoking for about a week
7. After quitting smoking for about a month
8. After quitting smoking for about a year
9. After quitting smoking for several years
10. After quitting smoking for several decades

If you were to experience BENEFITS from QUITTING SMOKING, WHEN do you think you would notice them?

1. When I am thinking about smoking or not
2. When I make the decision to quit smoking
3. While I am getting ready to quit smoking
4. While I am quitting smoking
5. Immediately after quitting smoking
6. After quitting smoking for about a week
7. After quitting smoking for about a month
8. After quitting smoking for about a year

9. After quitting smoking for several years
10. After quitting smoking for several decades

Thank you for completing this survey.

Appendix E2: Follow up Questionnaires

SURVEY TEXT FOR VISITS 2 & 3

1. Please indicate how much you agree with the statements below:
(please choose the appropriate response for each item)

	2. Strongly disagree	3. Disagree	4. Somewhat disagree	5. Somewhat agree	6. Agree	7. Strongly agree
I am confident that I will not smoke if I don't want to.	☐	☐	☐	☐	☐	☐
I will try not to smoke in the future	☐	☐	☐	☐	☐	☐
Developing a smoking related disease would put my financial security at risk	☐	☐	☐	☐	☐	☐
The chances of me developing a smoking related disease because of smoking are high	☐	☐	☐	☐	☐	☐
Not smoking is under my control	☐	☐	☐	☐	☐	☐
I plan not to smoke in the future	☐	☐	☐	☐	☐	☐

Developing a smoking related disease would affect my important relationships in my life	☐	☐	☐	☐	☐	☐
The chances of me dying young because of smoking are high	☐	☐	☐	☐	☐	☐
It is difficult for me not to smoke	☒	☐	☐	☐	☐	☐
I intend to not smoke in the future	☐	☐	☐	☐	☐	☐
Developing a smoking related disease would stop me living my life the way I intend to in the future	☐	☐	☐	☐	☐	☐
The chances of me becoming disabled (unable to walk long distances) because of smoking are high	☐	☐	☐	☐	☐	☐
Not smoking is something I can do	☐	☐	☐	☐	☐	☐

---

1. The thought of me developing a smoking related disease makes me feel: (please select the appropriate response for each item)

	1	2	3	4	5	6	
Not at all anxious	☐	☐	☐	☐	☐	☐	Anxious
Not at all afraid	☐	☐	☐	☐	☐	☐	Afraid
Not at all scared	☐	☐	☐	☐	☐	☐	Scared
Not at all worried	☐	☐	☐	☐	☐	☐	Worried

2. Since you last answered these questions, did you quit smoking?

☐YES ☐NO

3. If yes, did you experience a lapse since you quit smoking?

☐YES ☐NO

4. Thinking back over the last two (2) weeks, how many cigarettes did you smoke each day?

It is important that for each day listed, there is a number indicating the number of cigarettes you smoked that day.

On the days that you did not smoke, mark those days with a zero (0).

In filling out the calendar we would like you to be as accurate as possible. If you cannot remember, give it your best guess.

It may help to think about other things that happened on each day – sometimes this helps people to remember.

Please write your answer here:

Yesterday ____

2 days ago ____

3 days ____

4 days ____

5 days ____

6 days ____

1 WEEK ago ____

8 days ____

9 days ____

10 days ____

11 days ____

12 days ____

13 days ____

2 WEEKS _____

Thank you for completing this survey.

Appendix F1: Descriptive Statistics for the 2x3 ANOVA on Hypothesis 1a (Timeline Followback Scores).

Table 1

Descriptive statistics for the main effects of time assessment took place and group to which participant was assigned on timeline followback scores

Variable		Mean	Standard Error	95% Confidence Interval
Time:	Baseline	15.36	0.38	[14.56, 16.14]
	Visit Two	14.13	0.39	[13.34,14.93]
	Follow Up	12.83	0.57	[11.68, 13.99]
Group:	Experimental	13.96	0.53	[12.89, 15.04]
	Control	14.26	0.49	[13.27, 15.24]

Table 2

Descriptive statistics for interaction effects between group to which the participant was assigned, and time of assessment on timeline followback scores

	Experimental Group			Control Group		
Time of Assessment	Mean	Standard Deviation	95% Confidence Interval	Mean	Standard Deviation	95% Confidence Interval
Baseline	15.34	5.34	[14.9, 16.58]	15.37	5.65	[14.24, 16.33]
Visit two	13.84	4.89	[12.75,15.09]	14.42	4.88	[13.28, 15.42]
Visit Three	12.46	5.24	[10.82,14.23]	13.2	5.25	[11.58, 14.70]

Appendix F2: Descriptive Statistics for the 2x3 ANOVA on Hypothesis 1b (CO Readings).

Table 3

Descriptive statistics for the main effects of time assessment took place and group to which participant was assigned on carbon monoxide readings

Variable		Mean	Standard Error	95% Confidence Interval
Time:	Baseline	26.63	1.78	[23.04, 30.22]
	Visit Two	26.80	1.83	[23.11, 30.48]
	Follow Up	29.98	1.71	[26.53, 33.43]
Group:	Experimental	27.43	2.27	[22.84, 32.01]
	Control	28.17	2.08	[23.97, 32.38]

Table 4

Descriptive statistics for interaction effects between group to which participant was assigned, and time of assessment on carbon monoxide readings

	Experimental Group			Control Group		
Time of Assessment	Mean	Standard Deviation	95% Confidence Interval	Mean	Standard Deviation	95% Confidence Interval
Baseline	24.67	11.29	[19.45, 30.22]	28.58	13.15	[23.68, 33.37]
Visit two	26.88	12.73	[21.53, 32.40]	26.70	13.09	[21.65, 31.61]
Visit Three	30.48	14.35	[25.50, 35.67]	29.46	10.96	[24.71, 34.03]

Appendix F3: Descriptive Statistics for the 2x3 ANOVA on Hypothesis 2a (Risk Perceptions).

Table 5

Descriptive statistics for the main effects of time assessment took place and group to which participant was assigned on risk perception scores

Variable		Mean	Standard Error	95% Confidence Interval
Time:	Baseline	4.43	0.12	[4.18, 4.69]
	Visit Two	4.24	0.15	[3.93, 4.55]
	Follow Up	4.33	0.17	[3.99, 4.67]
Group:	Experimental	4.31	0.21	[3.90, 4.72]
	Control	4.36	0.19	[3.98, 4.73]

Table 6

Descriptive statistics for interaction effects between group to which participant was assigned, and time of assessment on risk perception scores

	Experimental Group			Control Group		
Time of Assessment	Mean	Standard Deviation	95% Confidence Interval	Mean	Standard Deviation	95% Confidence Interval
Baseline	4.36	0.95	[3.99, 4.73]	4.51	0.72	[4.17, 4.85]
Visit two	4.20	1.31	[3.74, 4.66]	4.27	0.71	[3.85, 4.69]
Visit Three	4.37	1.48	[3.86, 4.87]	4.29	0.77	[3.84, 4.75]

Appendix F4: Descriptive Statistics for the 2x3 ANOVA on Hypothesis 2b (Self-Efficacy).

Table 7

Descriptive statistics for the main effects of time assessment took place and group to which participant was assigned on self-efficacy scores

Variable		Mean	Standard Error	95% Confidence Interval
Time:	Baseline	3.18	0.16	[2.86, 3.49]
	Visit Two	3.38	0.16	[3.06, 3.70]
	Follow Up	3.53	0.16	[3.21, 3.85]
Group:	Experimental	3.32	0.21	[2.90, 3.74]
	Control	3.40	0.19	[3.02, 3.79]

Table 8

Descriptive statistics for interaction effects between group to which participant was assigned, and time of assessment on self-efficacy scores

	Experimental Group			Control Group		
Time of Assessment	Mean	Standard Deviation	95% Confidence Interval	Mean	Standard Deviation	95% Confidence Interval
Baseline	2.98	0.87	[2.51, 3.44]	3.38	1.17	[2.96, 3.81]
Visit two	3.41	0.90	[2.93, 3.87]	3.36	1.18	[2.93, 3.79]
Visit Three	3.58	0.99	[3.11, 4.06]	3.47	1.12	[3.04, 3.90]

Appendix F5: Descriptive Statistics for the 2x3 ANOVA on Hypothesis 2c (Intentions to Quit).

Table 9

Descriptive statistics for the main effects of time assessment took place and group to which participant was assigned on intentions to quit

Variable		Mean	Standard Error	95% Confidence Interval
Time:	Baseline	3.59	0.19	[3.21, 3.98]
	Visit Two	3.88	0.22	[3.43, 4.32]
	Follow Up	4.02	0.22	[3.57, 4.47]
Group:	Experimental	3.74	0.28	[3.17, 4.31]
	Control	3.92	0.26	[3.40, 4.45]

Table 10

Descriptive statistics for interaction effects between group to which participant was assigned, and time of assessment on intentions to quit

	Experimental Group			Control Group		
Time of Assessment	Mean	Standard Deviation	95% Confidence Interval	Mean	Standard Deviation	95% Confidence Interval
Baseline	3.51	1.25	[2.94, 4.07]	3.68	1.29	[3.16, 4.20]
Visit two	3.73	1.46	[3.07, 4.38]	4.03	1.48	[3.43, 4.63]
Visit Three	3.98	1.52	[3.33, 4.64]	4.05	1.45	[3.45, 4.66]

Appendix G1: Descriptive Statistics for the 2x2x3 ANOVA on Hypothesis 1a (Timeline Followback Scores)

Table 11

Descriptive statistics for the main effects of time assessment took place, group to which participant was assigned and education level on timeline followback scores

Variable		Mean	Standard Error	95% Confidence Interval
Time:	Baseline	15.59	0.41	[14.76, 16.42]
	Visit Two	14.33	0.44	[13.44, 15.22]
	Follow Up	13.13	0.65	[11.82, 14.43]
Group:	Experimental	14.26	0.62	[13.01, 15.51]
	Control	14.44	0.49	[13.44, 15.43]
Education:	Low	15.08	0.69	[13.68, 16.47]
	High	13.62	0.44	[12.73, 14.52]

Table 12

Descriptive statistics for interaction effects between group to which participant was assigned, and time of assessment on timeline followback scores

	Experimental Group			Control Group		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	15.64	0.65	[14.34, 16.95]	15.54	0.51	[14.50, 16.57]
Visit Two	14.19	0.69	[12.80, 15.57]	14.48	0.55	[13.38, 15.58]
Follow up	12.96	1.01	[10.92,14.99]	13.30	0.80	[11.68, 14.91]

Table 13

Descriptive statistics for interaction effects between education level, and time of assessment on timeline followback scores

	Low Education			High Education		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	16.41	0.72	[14.96, 17.86]	14.77	0.46	[13.84, 15.70]
Visit Two	14.90	0.77	[13.36, 16.45]	13.76	0.49	[12.77, 14.75]
Follow up	13.91	1.12	[11.65, 16.18]	12.34	0.72	[10.89, 13.79]

Table 14

Descriptive statistics for interaction effects between group to which participant was assigned, and education level on timeline followback scores

	Experimental Group			Control Group		
Education Level	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Low	14.85	1.10	[12.62, 17.07]	15.30	0.78	[13.73, 16.88]
High	13.68	0.61	[12.45, 14.90]	13.57	0.63	[12.30, 14.84]

Table 15

Descriptive statistics for the interaction between group to which participant was assigned, time of assessment and education level on timeline followback scores

	Experimental Group					
	Low Education			High Education		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	18.87	6.55	[13.74, 18.40]	14.23	4.59	[13.96, 16.51]
Visit Two	17.11	5.62	[12.24, 17.16]	12.81	4.33	[12.31, 15.03]
Visit Three	15.83	3.91	[10.17, 17.40]	11.4	5.25	[10.14, 14.12]

	Control Group					
	Low Education			High Education		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	18.87	6.73	[15.12, 18.40]	13.03	3.32	[12.99, 15.63]
Visit Two	16.91	5.50	[13.36, 16.85]	12.75	3.72	[12.44, 15.26]
Visit Three	15.57	5.75	[11.48, 16.60]	11.62	4.40	[10.48, 14.61]

Appendix G2: Descriptive Statistics for the 2x2x3 ANOVA on Hypothesis 1b (CO Readings)

Table 16

Descriptive statistics for the main effects of time assessment took place, group to which participant was assigned and education level on carbon monoxide readings

Time of Assessment		Mean	Standard Error	95% Confidence Interval
Time:	Baseline	26.38	2.00	[22.34, 30.42]
	Visit Two	27.28	2.08	[23.08, 31.49]
	Follow Up	29.50	1.95	[25.57, 33.44]
Group:	Experimental	27.49	2.18	[23.55, 32.35]
	Control	27.95	2.17	[21.95, 33.40]
Education:	Low	27.22	3.06	[21.05, 33.40]
	High	28.22	1.90	[24.26, 32.18]

Table 17

Descriptive statistics for interaction effects between group to which participant was assigned, and time of assessment on carbon monoxide readings

	Experimental Group			Control Group		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	24.86	3.12	[18.56, 31.16]	27.89	2.47	[22.90, 32.89]
Visit Two	28.00	3.25	[21.44, 34.57]	26.56	2.58	[21.36, 31.76]
Follow up	29.62	3.04	[23.47, 35.76]	29.39	2.41	[24.52, 34.26]

Table 18

Descriptive statistics for interaction effects between education level, and time of assessment on carbon monoxide readings

	Low Education			High Education		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	24.93	3.48	17.91-31.95	27.82	2.23	23.33-32.32
Visit Two	28.10	3.62	20.80-35.41	26.47	2.32	21.79-31.15
Follow up	28.64	3.39	21.78-35.48	30.37	2.17	25.98-34.75

Table 19

Descriptive statistics for interaction effects between group to which participant was assigned, and education level on carbon monoxide readings

	Experimental Group			Control Group		
Education Level	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Low	27.61	4.88	17.76-37.46	26.84	3.46	19.85-33.82
High	27.38	2.69	21.95-32.80	29.06	2.79	21.95-34.69

Table 20

Descriptive statistics for the interaction between group to which participant was assigned, time of assessment and education level on carbon monoxide readings

	Experimental Group					
	Low Education			High Education		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	27.50	12.67	[13.89, 36.26]	23.78	11.12	[18.45, 30.81]
Visit Two	32.40	14.28	[18.36, 41.64]	25.83	12.03	[19.59, 32.43]
Visit Three	31.20	7.04	[16.85, 38.66]	30.25	16.16	[25.46, 37.48]

	Control Group					
	Low Education			High Education		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	26.60	9.59	[16.85, 32.72]	29.90	15.25	[24.60, 37.40]
Visit Two	28.00	10.43	[17.95, 34.46]	25.83	14.89	[20.26, 33.58]
Visit Three	32.10	10.46	[21.79, 37.26]	27.70	11.29	[23.02, 35.50]

Appendix G3: Descriptive Statistics for the 2x2x3 ANOVA on Hypothesis 2a (Risk Perceptions)

Table 21

Descriptive statistics for the main effects of time assessment took place, group to which participant was assigned and education level on risk perception scores

Variable		Mean	Standard Error	95% Confidence Interval
Time:	Baseline	4.27	0.13	[4.02, 4.53]
	Visit Two	3.99	0.15	[3.70, 4.29]
	Follow Up	4.09	0.16	[3.76, 4.43]
Group:	Experimental	3.85	0.21	[3.44, 4.27]
	Control	4.39	0.16	[4.05, 4.72]
Education:	Low	3.76	0.23	[3.29, 4.22]
	High	4.48	0.15	[4.19, 4.78]

Table 22

Descriptive statistics for interaction effects between group to which participant was assigned, and time of assessment on risk perception scores

	Experimental Group			Control Group		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	4.02	0.20	[3.62, 4.42]	4.53	0.16	[4.21, 4.84]
Visit Two	3.69	0.23	[3.23, 4.14]	4.30	0.18	[3.93, 4.66]
Follow up	3.85	0.257	[3.34, 4.37]	4.33	0.20	[3.92, 4.74]

Table 23

Descriptive statistics for interaction effects between education level, and time of assessment on risk perception scores

	Low Education			High Education		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	4.00	0.22	[3.55, 4.44]	4.55	0.14	[4.27, 4.84]
Visit Two	3.56	0.25	[3.05, 4.07]	4.42	0.16	[4.09, 4.75]
Follow up	3.71	0.27	[3.13, 4.28]	4.48	0.18	[4.11, 4.85]

Table 24

Descriptive statistics for interaction effects between group to which participant was assigned, and education level on risk perception scores

	Experimental Group			Control Group		
Education Level	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Low	2.98	0.37	[2.24, 3.72]	4.53	0.26	[4.00, 5.05]
High	4.73	0.20	[4.32, 4.67]	4.24	0.21	[3.82, 5.13]

Table 25

Descriptive statistics for the interaction between group to which participant was assigned, time of assessment and education level on risk perception scores

	Experimental Group					
	Low Education			High Education		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	3.45	0.86	[2.67, 4.09]	4.64	0.81	[4.28, 5.06]
Visit Two	2.75	1.24	[1.88, 3.51]	4.65	0.98	[4.23, 5.13]
Visit Three	2.80	0.99	[1.96, 3.80]	4.86	1.25	[4.33, 5.34]

	Control Group					
	Low Education			High Education		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	4.68	0.86	[4.12, 5.12]	4.40	0.61	[4.03, 4.84]
Visit Two	4.48	0.76	[3.85, 5.10]	4.13	0.67	[3.69,4.63]
Visit Three	4.48	0.64	[3.88, 5.19]	4.17	0.84	[3.61, 4.66]

Appendix G4: Descriptive Statistics for the 2x2x3 ANOVA on Hypothesis 2b (Self-Efficacy)

Table 26

Descriptive statistics for the main effects of time assessment took place, group to which participant was assigned and education level on self-efficacy scores

Variable		Mean	Standard Error	95% Confidence Interval
Time:	Baseline	3.2	0.18	[2.84, 3.56]
	Visit Two	3.3	0.18	[2.95, 3.66]
	Follow Up	3.38	0.17	[3.03, 3.72]
Group:	Experimental	3.17	0.25	[2.67, 3.66]
	Control	3.42	0.20	[2.67, 3.66]
Education:	Low	3.19	0.27	[2.64, 3.75]
	High	3.40	0.18	[3.04, 3.75]

Table 27

Descriptive statistics for interaction effects between group to which participant was assigned, and time of assessment on self-efficacy scores

	Experimental Group			Control Group		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	3.02	0.28	[2.46, 3.58]	3.39	0.22	[2.94, 3.83]
Visit Two	3.22	0.28	[2.67, 3.78]	3.38	0.22	[2.94, 3.83]
Follow up	3.26	0.27	[2.72, 3.80]	3.49	0.21	[3.07, 3.92]

Table 28

Descriptive statistics for interaction effects between education level, and time of assessment on self-efficacy scores

	Low Education			High Education		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	3.26	0.31	[2.64, 3.89]	3.15	0.20	[2.74, 3.55]
Visit Two	3.19	0.31	[2.57, 3.72]	3.42	0.20	[3.02, 3.82]
Follow up	3.13	0.30	[2.53, 3.72]	3.63	0.19	[3.24, 4.01]

Table 29

Descriptive statistics for interaction effects between group to which participant was assigned, and education levelon self-efficacy scores

	Experimental Group			Control Group		
Education Level	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Low	2.88	0.44	[2.00, 3.76]	3.51	0.31	[2.89, 4.14]
High	3.46	0.24	[2.98, 3.95]	3.33	2.50	[2.83, 3.84]

Table 30

Descriptive statistics for the interaction between group to which participant was assigned, time of assessment and education level on self-efficacy scores

Experimental Group

	Low Education			High Education		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	3.05	0.89	[2.11, 4.12]	2.95	0.89	[2.38, 3.48]
Visit Two	2.85	1.18	[1.89, 3.88]	3.58	0.76	[3.02, 4.11]
Visit Three	2.75	0.85	[1.69, 3.59]	3.84	0.91	[3.36, 4.41]

Control Group

	Low Education			High Education		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	3.38	1.44	[2.71, 4.13]	3.38	1.00	[2.76, 3.93]
Visit Two	3.48	1.43	[2.79, 4.20]	3.28	1.03	[2.70, 3.84]
Visit Three	3.70	1.29	[2.94, 4.29]	3.32	1.02	[2.82, 3.91]

Appendix G5: Descriptive Statistics for the 2x2x3 ANOVA on Hypothesis 2c (Intentions to Quit)

Table 31

Descriptive statistics for the main effects of time assessment took place, group to which participant was assigned and education level on intentions to quit

Variable		Mean	Standard Error	95% Confidence Interval
Time:	Baseline	3.54	0.21	[3.12, 3.96]
	Visit Two	3.66	0.23	[3.20, 4.11]
	Follow Up	3.77	0.23	[3.31, 4.23]
Group:	Experimental	3.32	0.31	[2.69, 3.95]
	Control	3.99	0.25	[3.49, 4.49]
Education:	Low	3.42	0.35	[2.72, 4.13]
	High	3.89	0.22	[3.44, 4.34]

Table 32

Descriptive statistics for interaction effects between group to which participant was assigned, and time of assessment on intentions to quit

	Experimental Group			Control Group		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	3.31	0.33	[2.66, 3.97]	3.76	0.26	[3.24, 4.28]
Visit Two	3.21	0.35	[2.50, 3.92]	4.10	0.28	[3.54, 4.67]
Follow up	3.43	0.36	[2.71, 4.15]	4.10	0.28	[3.53, 4.67]

Table 33

Descriptive statistics for interaction effects between education level, and time of assessment on intentions to quit

	Low Education			High Education		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	3.56	0.36	[2.83, 4.29]	3.52	0.23	[3.05, 3.99]
Visit Two	3.35	0.39	[2.55, 4.14]	3.99	0.25	[3.46, 4.47]
Follow up	3.36	0.40	[2.56, 4.16]	4.17	0.25	[3.66, 4.68]

Table 34

Descriptive statistics for interaction effects between group to which participant was assigned, and education level on intentions to quit

	Experimental Group			Control Group		
Education Level	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Low	2.51	56.00	[1.39, 3.63]	4.33	0.39	[3.54, 5.13]
High	4.13	0.31	[3.51, 4.74]	3.65	0.32	[3.00, 4.27]

Table 35

Descriptive statistics for the interaction between group to which participant was assigned, time of assessment and education level on intentions to quit

	Experimental Group					
	Low Education			High Education		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	2.87	0.73	[1.79, 4.12]	3.71	1.33	[3.04, 4.32]
Visit Two	2.20	0.84	[.95, 3.48]	4.21	1.28	[3.51, 4.90]
Visit Three	2.47	1.04	[1.09, 3.64]	4.46	1.33	[3.79, 5.20]

	Control Group					
	Low Education			High Education		
Time of Assessment	Mean	Standard Error	95% Confidence Interval	Mean	Standard Error	95% Confidence Interval
Baseline	4.10	1.51	[3.34, 4.99]	3.40	1.09	[3.04, 4.32]
Visit Two	4.47	1.84	[3.58, 5.38]	3.73	1.17	[3.51, 4.45]
VisitThree	4.43	1.64	[3.46, 5.26]	3.80	1.30	[3.79,4.57]