Which type of anti-smoking advertisement is perceived as more effective? An experimental study with a sample of Australian socially disadvantaged welfare recipients

OUTLINE

WORD COUNT

Abstract: 219

Text: 3403

ABSTRACT

Purpose: Evaluate the perceived effectiveness of key anti-smoking messages among highly disadvantaged smokers, and assess impact of nicotine dependence and cessation cognitions on message processing.

Design: Experimental cross-over trial randomly exposing participants to two of three anti-smoking advertisements delivered via touchscreen computer undertaken between March–December 2012.

Setting: Welfare recipients were recruited from a Community Service Organisation in NSW, Australia.

Subjects: N=354 smokers (79% response rate). Participants resided in government rental housing (52%), earned <AUD$400/week (72%), and received their primary income from government welfare (95%).

Intervention: Three 30-second anti-smoking television advertisements representing common campaign themes: why-to-quit (graphic imagery), why-to-quit (personal testimonial) or how-to-quit.

Measures: An 11-item scale assessed perceived effectiveness and message acceptance. An 8-item Cessation Cognitions Index assessed motivations and readiness-to-quit, and the Heaviness of Smoking Index was used to classify nicotine dependence.

Analysis: Descriptive statistics, generalized linear mixed models and multiple linear regression analyses are reported.

Results: Why-to-quit advertisements were perceived as significantly more effective than the how-to-quit advertisement (all *p*'s<0.0001). Smokers with positive cessation cognitions were more likely to accept anti-smoking messages (p=0.0003) and perceive them as effective (p<0.0001). Nicotine dependence level did not influence message acceptance (p=7322) or effectiveness (p=8872).

Conclusion: Highly emotive advertisements providing good reasons to quit may be the most effective in promoting the anti-smoking message among groups with high smoking rates.

Key words: Tobacco; Health Promotion; Socioeconomic Factors; Mass Media

Indexing key words: (Manuscript format: research; Research purpose: descriptive; Study design: quasi-experimental; Outcome measure: cognitive; Setting: clinical/health care; Health focus: smoking control; Strategy: behaviour change; Target population change: adults; Target population: education/income level.

PURPOSE

Tobacco use is the leading cause of preventable mortality and morbidity worldwide.[1] Within Western countries socially disadvantaged groups, especially those experiencing multiple adversities, demonstrate very high smoking rates. For example: Indigenous populations (32% - 50%),[2, 3] the unemployed (28% - 39%),[4, 5] individuals with serious mental health issues (35% – 90%),[6-8] homeless individuals (69% – 73%),[9, 10] and individuals accessing welfare and crisis aid (59%).[11]

In Australia mass media campaigns have been one of the most widely used strategies for tobacco control.[12, 13] Although anti-smoking campaigns require substantial financial outlay,[14] their wide reach and repetition means a low cost per person. US[15], UK[16] and Australian[17] simulation studies support the cost-effectiveness of such campaigns. Anti-smoking mass media campaigns have been effective at reducing population smoking prevalence rates in Australia and other Western countries.[18, 19] Most evaluations of mass media campaigns are population-wide observational studies aimed at capturing a broad sample, with few including an examination of differences across area-level measures of socioeconomic status (SES). Furthermore, vulnerable groups who experience multiple types of disadvantage and have the highest smoking prevalence rates are often difficult to recruit into health research,[20] and as such most of the studies with population-based samples fail to include them.[21] For example in Australia, the Australian Bureau of Statistics (ABS) acknowledges in data explanatory notes that their population-based studies do not always capture people with a mental illness, who are homeless or in rural Aboriginal communities.[22, 23] As a result the impact of campaigns among socially disadvantaged smokers is less clear. One review concluded, media campaigns to promote smoking cessation are rarely as effective or more effective amongst disadvantaged groups relative to more advantaged populations.[24]

Anti-smoking mass media advertisements have generally used four broad message themes: 1) a rationale for why to quit using serious health effects; 2) practical information on how to quit; 3) countering tobacco industry behaviour and 4) the detrimental effects of second-hand smoke.[25] Among general population adult smokers more support has been found for the impact of 'why' advertisements, using visceral negative imagery or personal stories to arouse strong negative emotion, compared to how-to-quit and anti-industry messages.[18, 26] Among socially disadvantaged groups, responses to different advertisement message types are poorly understood.[21, 24, 26] One US study found a campaign focussed on learning *how* to avoid triggers to smoke was successful in promoting cessation-related thoughts and behaviours in disadvantaged groups.[27] Evidence from other studies suggest that emotionally evocative advertisements and testimonials are more effective among lower than higher SES groups[28] and with Australian Indigenous people compared to the general population.[29] There is a paucity of research regarding which anti-smoking message types are perceived as most effective and most likely to impact cessation-related behaviour among highly disadvantaged groups.

Research used to develop tobacco media campaigns typically examines respondent attitudes, perceived effectiveness and other non-behavioural outcomes[12] as perceived effectiveness can predict reduced smoking behaviour.[30] The effectiveness of media campaigns is partly determined by the receptivity of the target audience.[31] Socially disadvantaged smokers are more likely to hold self-exempting beliefs compared to the general population,[32] and view visceral graphic images as cues to smoke.[33] Smokers interested in quitting, or who smoke fewer cigarettes, may be more likely to accept the anti-smoking message. Smokers who are not interested in quitting may be less motivated to process messages.[31, 34] Assessing cognitive

responses to anti-tobacco ads is useful given the education literature indicating positive cognitions directed toward a particular behaviour are closely related to learning with respect to that behaviour.[35-37] If processing of the advertisements differs according to smokers' cessation cognitions, addiction level and quitting history, improved knowledge of how different types of smokers respond to varying cessation messages can inform the development of anti-smoking campaigns.

Given the limited evidence of how highly socially disadvantaged smokers perceive anti-tobacco mass media advertisements, the study aims were to:

a) Compare three types of televised anti-smoking media advertisements on perceived effectiveness ratings among socially disadvantaged smokers. The message types compared were 1) why - graphic imagery of serious health effects; 2) why - personal emotional testimonial and 3) how to quit message.
b) Assess whether nicotine dependence and cessation cognitions are associated with perceived effectiveness ratings of advertisements among socially disadvantaged smokers, adjusting for potential confounders.

METHODS

Design

An experimental cross-over trial (incomplete block design) randomly exposing participants to two of three advertisements delivered on a touchscreen computer was undertaken. Data were collected between March and December 2012. The study was approved by University of Newcastle's Human Research Ethics Committee.

Setting and Sample

The study was conducted at a single site of a nationwide non-government social and community service organisation (SCSO) in NSW Australia. The SCSO provides counselling and financial assistance to those experiencing financial, social or other forms of hardship. The SCSO setting represents a unique opportunity to access otherwise hard-to-reach groups.[38] Compared to their representation in the general population, the client profile of SCSOs in Australia includes higher representation of groups experiencing multiple forms of disadvantage such as the long-term unemployed, individuals experiencing homelessness, single-parent families, those suffering from addition or mental illness, and Aboriginal and Torres Strait Islanders.[39] Eligible participants for this study were clients attending the SCSO for a pre-scheduled Emergency Relief interview for financial and material aid, aged 18 years or more, who could comprehend English and were well enough to participate.

Recruitment

Following their appointment, service staff informed eligible clients about an independent survey taking place. Interested clients were introduced to a research assistant who explained the survey was about smoking and provided technical assistance. The survey was voluntary, anonymous, self-administered via a touchscreen laptop computer, and participants were reimbursed for their time with a $20 grocery voucher.

Once smoking status was assessed (see details below), non-smokers exited from the survey. All analyses presented in this paper include smokers only.

Presentation of experimental conditions and randomisation

The study used three 30-second television advertisements from the government-sponsored NSW-based campaigns (http://www.cancerinstitute.org.au/prevention-and-early-

detection/public-education-campaigns/tobacco-control). Advertisements were chosen to represent the three main types of campaign messages commonly used in the state and national tobacco control strategies.[12, 40] The message types and advertisements were: Ad1) why message - graphic imagery of serious health effects ('Bronchoscopy'); Ad2) why message - personal testimonial ('Anthony'), and; Ad3) how to quit message ('Get Off Cigarettes').

A Dell Latitude XT3 (2.50 GHz processor) touchscreen computer installed with Digivey version 4 software[41] was used to deliver the advertisements and collect data. Each participant viewed and immediately rated two randomly selected and randomly ordered advertisements. Six allocation sequences were generated within the Digivey software to allow for all possible pairs of advertisement number and order. One of the six combinations was randomly allocated to each participant. The sequences were: 1) Ad1/Ad2; 2) Ad2/Ad1; 3) Ad1/Ad3; 4) Ad3/Ad1; 5) Ad2/Ad3; 6) Ad3/Ad2. When choosing a random path out of the six options, Digivey used a pseudo random number generator provided by the underlying programming language (http://msdn.microsoft.com/en-us/library/system.random(v=vs.90).aspx).

Measures

Smoking status

Participants were asked "Do you currently smoke tobacco products?" and responded "Yes, daily", "Yes, at least once a week", "Yes, but less often than once a week", or "No, not at all." Participants were then asked "Have you smoked at least 100 cigarettes or a similar amount of tobacco in your life?" and responded "Yes", "No", or "Not sure." Participants who smoked daily, or who reported smoking occasionally AND at least 100 cigarettes met the definition of current smoker. The touchscreen version of this item has been validated against

a biochemical measure in a sample of SCSO clients and found to have high sensitivity (94%) and specificity (92%) when compared to expired CO.[11]

Smoking behaviours and quitting history

Participants were asked about the number of cigarettes they smoked per day, the age they started smoking daily, whether they had ever made a quit attempt, and the number of quit attempts made in the previous 12 months.

Perceived effectiveness measures

Perceived effectiveness and message acceptance was assessed following presentation of each advertisement using 11 items rated on a Likert scale of 1 (strongly disagree) to 5 (strongly agree).[29] Participants rated the extent to which they felt the advertisement was "easy to understand", "believable" and "relevant to me", whether the advertisement made them "stop and think", "feel concerned about my smoking", "more likely to try to quit", "feel uncomfortable", "likely to talk to someone else about this ad", and whether it "provided good reasons to quit smoking", "taught me something new" and "was an effective anti-smoking ad."

An exploratory factor analysis was conducted on the 11-item advertisement rating questionnaire, including data from all advertisement viewings, and Cronbach's alpha was used to assess internal consistency of the scales. Two composite scales were revealed; 'perceived message effectiveness' scale comprised nine items: taught me something new; stop and think; uncomfortable; relevant; reason to quit; effective; talk about it; concerned, and; try to quit (α=0.90). The 'message acceptance' scale comprised: easy to understand and

believable (α=0.59). Ratings on both scales ranged from 1 to 5, with higher ratings indicating stronger perceptions of advertisement effectiveness and message acceptance.

Explanatory variables

The following items were assessed prior to viewing the advertisements.

Cessation cognitions: The 8-item Cessation Cognitions Index[27, 42] was used to assess motivations and readiness to quit. The Index score (Cronbachs α=0.79) ranges from -24 to 40 with a higher score on the index representing more favourable thoughts about quitting smoking.[42]

Nicotine dependence: was assessed using the two-item Heaviness of Smoking Index which measures cigarettes/day and time to first cigarette after waking.[43] The index has good reliability (Cronbach's α=0.72) and predictive validity.[44]

Demographic factors: included age, gender, marital status, housing type, highest level of education, personal weekly income, and Indigenous status.

Statistical Methods

All statistical analyses were performed using SAS v9.3. Descriptive characteristics of the sample are presented as numbers and percentages for categorical variables, and means and standard deviations for continuous variables.

For aim a) the mean perceived message effectiveness and mean message acceptance scores are reported for each advertisement. Differences in effectiveness across advertisements were examined using generalized linear mixed models, fitted with advertisement type and viewing order as fixed effects and participant as a random effect to adjust for multiple observations per individual. The likelihood ratio test was used as a global test of significance for between

advertisement differences, and if significant then pairwise comparison were undertaken, with a conservative Bonferonni adjusted significance level of 0.017 used (two-sided, 0.05 divided by three). The difference between means with 98.3% confidence intervals (to be consistent with significance levels) for each pairwise comparison of advertisements is reported.

For aim b) first, a series of simple linear regressions were undertaken to investigate the relationship between perceived effectiveness subscales and Cessation Cognitions Index and Nicotine Dependence, and between perceived effectiveness subscales and potential confounders: ever quit, number of quit attempts in past 12 months, education, income, housing, indigenous status, gender, age and marital status. Variables with a *p*-value of ≤ 0.2 for simple regression models were then included in a multiple linear regression analysis. Since there were two observations per subject, a generalized estimating equations framework with an exchangeable covariance structure was used.

Since there could possibly be differential carry-over effects of the advertisements in the first period due to the cross-over design, sensitivity analyses (not reported here) were conducted using the data from only the first advertisement viewed.

Sample size

A sample of 300 participants (600 observations in total or approximately 200 per advertisement) would allow detection of a difference in mean outcomes between groups of approximately 0.4 of a standard deviation and detection of relationships of factors associated with perceived effectiveness of at least 0.4 standard deviations for categorical explanatory variables and correlations of 0.3 or more for continuous explanatory variables with at least 80% power, a significance level of 0.017 (to allow for multiple comparisons among type of

advertisement) and a design effect of 1.5 to adjust for correlation among repeated observations for individuals. Assuming, based on previous research,[11, 45] an approximate 70% consent rate and that 65% of SCSO clients are current (daily and occasional) smokers, it was estimated that 800 SCSO clients should be approached.

RESULTS

Sample characteristics

Over the data collection period 787 clients attended SCSO emergency relief appointments, 738 were told about the research, 608 met with the research assistant and 581 were eligible and consented to completing the survey (79% consent). Of the 581 participants completing the survey, 62% (n = 362) were identified as current smokers, 13% were ex-smokers, and 25% were non-smokers. Eight participants who reported normally using other smoked (e.g. cigars, chop chop) or smokeless (e.g. chewing tobacco, snuff) tobacco were classified as ineligible. The demographic details of the 354 smokers included in analysis are displayed in Table 1. Over half of the sample were living in government rental housing (52%) and had not completed high school education (64%). Individuals self-reporting as Aboriginal and/or Torres Strait Islander represented 18% (n=64) of the sample, compared to 2.9% of the population in NSW.[46] A majority received their primary income from a government benefit (95%), earning less than AUD$400/week (72%) which indicates these participants were living below the Australian single-person 'poverty line' of $390/week.[47]

Table 1 about here

Smoking behaviours, nicotine dependence, and cessation cognitions

Smoking and quitting behaviours of the sample are presented in Table 1. On average participants smoked 16 cigarettes/day and began smoking at age 16. The majority of the sample had tried to quit in the past (83%), making an average of three quit attempts in the preceding 12 months. The heaviness of smoking index revealed 19% of the sample was heavily nicotine dependent. Results of the cessation cognitions scale show a mean index score of 13.40 (*SD* = 9.99). Scores on the index ranged from -16 to 40, and scores were slightly skewed to the right, indicating more favourable quit cognitions. The cessation cognitions index score for participants viewing each ad in the first period were 1) Why-Graphic (*M*=13.40, *SD*=9.84); 2) Why-Testimonial (*M*=13.40, *SD*=10.37); and 3) How-to-quit (*M*=13.40, *SD*=9.85).

Ratings of perceived effectiveness

The number of participants viewing each advertisement in the first and second viewing periods respectively, were 1) Why–Graphic: 132 (37%) and 107 (30%); 2) Why–Testimonial: 117 (33%) and 138 (39%); and 3) How-to-quit: 105 (30%) and 109 (31%). Perceived effectiveness ratings and mean difference in ratings of the advertisements are presented in Table 2. The How-to-quit advertisement had a significantly lower mean rating than Why–Graphic and Why–Testimonial advertisements on both Message Acceptance and Perceived Message Effectiveness scales. The mean ratings of Why–Graphic and Why–Testimonial advertisements were not significantly different on either scale.

Table 2 about here

Characteristics associated with ratings of perceived effectiveness

Smokers who thought more about quitting smoking were more likely to perceive anti-smoking advertisements as acceptable and effective. Table 3 shows that Cessation Cognition Index scores were significantly associated with advertisement ratings, with an increase of 0.014 units (95% CI: 0.007-0.020) in Message Acceptance ratings and 0.035 units (95% CI: 0.025-0.045) in Perceived Message Effectiveness ratings per unit increase in the Index score. Nicotine dependency was not significantly associated with either Message Acceptance (p=0.7322) or Perceived Message Effectiveness (p=0.8872) scales.

Table 3 about here

Table 4 presents the multiple linear regression models. Cessation Cognitions Index, gender, Indigenous status, income and number of quit attempts in past 12 months were included in the model examining factors associated with message acceptance scores. Cessation Cognitions Index was the only variable significant at the 5% level, indicating that smokers who had increasingly more and favourable thoughts about cessation were more likely to accept anti-smoking advertisement messages. Cessations Cognition Index, gender, Indigenous status, age, housing, ever quit and number of quit attempts in the past 12 months were included in the multiple regression model predicting perceived message effectiveness. Similarly, Cessation Cognitions Index was the only variable that was significant, indicating that smokers who had more favourable thoughts about quitting were more likely to perceive the anti-smoking advertisements as effective.

Table 4 about here

Sensitivity analyses undertaken using only data from the first advertisement demonstrated slight differences in the estimates compared to analyses involving all data, but provided the same conclusions.

DISCUSSION

This study found socioeconomically disadvantaged smokers rate anti-smoking advertisements with a why-to-quit message as more effective than a how-to-quit message, with no differences found in the delivery of the why message (i.e. negative graphic imagery or personal testimonial). The study also found that while nicotine dependence level did not impact perceived effectiveness of advertisements, smokers who thought more about cessation were more likely to accept message content and find anti-smoking advertisements effective compared to those with fewer thoughts about quitting.

The results of this study are supportive of past research suggesting that advertisements portraying the negative consequences of smoking (why-to-quit) are rated as more effective than other message types among Indigenous Australian[29] and low SES smokers.[28] These results also complement general population findings,[31, 48] and contribute to growing evidence indicating that anti-smoking advertisements designed to evoke strong emotional responses, providing good reasons to quit, may be the most effective, particularly among disadvantaged groups with high smoking rates.

Receptivity to the anti-smoking message was important among participants. Greater thoughts about cessation were associated with positive ratings of message acceptance and effectiveness. Davis *et al.*[31] also found that smokers less motivated to quit responded less favourably to a range of advertisement types, concluding that benefits of specifically

targeting campaigns to these smokers are limited. In our study level of nicotine dependence was not associated with advertisement ratings indicating all smokers, despite level of addiction, are open to the anti-smoking message. In combination these results support the suggestion that emphasis should be placed on mainstream anti-smoking advertisements reaching high-risk smoking sub-groups, rather than developing targeted messages.[26] However, there is room for improvement within current messaging strategies. It is well established that changes in a person's intentions results in behaviour change.[49] Given participants who thought more about cessation were more receptive to messages, it may prove fruitful for future messaging strategies to concentrate on building motivation to quit, or even focus on promoting greater receptivity to the message.

Limitations

Use of a single SCSO service site is the primary limitation affecting generalizability of study results. However, compared to other tobacco research in SCSO settings, the demographic characteristics are very similar[11, 45] and it is likely the findings would generalise to other SCSO clients. Socially disadvantaged smokers are a difficult-to-reach group and the SCSO presents an ideal opportunity to reach large numbers of socially disadvantaged smokers.[45, 50] The advertisements used in this study were not new to viewers, however they were not in current use and original campaign impacts are likely to have decayed by time of survey.[19] Use of only one advertisement to represent each message type limited generalizability and it is recommended that further research uses a range of advertisements. Finally, as there was no comparison group of high socioeconomic smokers used, we cannot comment on the comparative effectiveness of these advertisements across SES groups.

Implications

During times of well-funded campaigns and tobacco control efforts, smoking prevalence may reduce equally across SES groups.[13, 51] Inequalities in smoking prevalence may not be the result of differing perceptions of the anti-smoking message or interest in quitting, but perhaps differences in cessation success. The current study observed that socially disadvantaged smokers are interested in quitting, and respond positively to anti-smoking messages, but also experience poor quit success. Although quit interest was high in this sample the smoking rate outnumbered ex-smokers (13%) and non-smokers (25%). These findings add weight to the argument that this group might need better cessation assistance rather than targeted advertisements to help them quit. It may also be that a combination of more effective campaigns and better cessation support are warranted. Future research should investigate ways to improve existing campaign strategies so that they become proportionately more effective among socioeconomically disadvantaged groups. This may include combining the most potent elements of 'why-to-quit' and 'how-to-quit' messaging, or given perceived effectiveness of advertising was influence by thoughts of cessation, designing content to build a smoker's readiness-to-quit.

Conclusion

Mass media campaigns are one of the most widely implemented and evaluated tobacco control policies, however evaluations have not often included highly socioeconomically disadvantaged groups with very high smoking rates as they are a difficult population to reach. As a consequence there is little research investigating the impact of anti-tobacco mass media advertising with these smokers. This study found that why-to-quit anti-smoking messages were perceived as more effective than how-to-quit messages among highly disadvantaged smokers, and those who thought more about cessation were more likely to perceive anti-smoking advertisements as effective.

SO WHAT?

What is already known on this topic?

Anti-smoking mass media campaigns are one of the most widely used tobacco control strategies, however evaluations often miss hard-to-reach socioeconomically disadvantaged smokers. Evaluating the effectiveness of anti-smoking messages in order to maximise their use among disadvantaged social groups with the highest smoking rates is a priority.

What does this article add?

The findings indicate that socioeconomically disadvantaged smokers consider 'how-to-quit' anti-smoking messages significantly less effective and engaging compared to 'why-to-quit' messages. Motivation to quit is also associated with being receptive to the anti-smoking message among socioeconomically disadvantaged smokers.

What are the implications for health promotion practice or research?

The findings of this study support the continuation of a high rotation of 'why-to-quit' relative to 'how-to-quit' advertisements. As perceived effectiveness of advertising was influence by thoughts of cessation, future campaigns may consider content designed to increase motivation and self-efficacy to quit among socioeconomically disadvantaged smokers.

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Table 1. Demographic and smoking characteristics of the survey sample (n = 354).

Characteristic	n (%)*
Age	
18 – 29	88 (25)
30 – 39	118 (33)
40 – 49	99 (28)
50+	49 (14)
Gender	
Female	216 (61)
Indigenous Australian	
Yes	64 (18)
Marital Status	
Married / De facto / living with partner	87 (25)
Separated or divorced	103 (29)
Never married / single / widowed	164 (46)
Highest Education	
Primary school	12 (3.4)
High school years 7-10	214 (61)
High school years 11-12	51 (14)
TAFE / trade qualification	64 (18)
University degree	13 (3.7)
Personal Weekly Income	
<$200	81 (23)
$201 - $400	172 (49)
>$400	79 (22)
Prefer not to answer	22 (6.2)
Income source	
Paid work	13 (3.7)
Centrelink (Government pension)	335 (95)
Other	6 (1.7)
Housing type	
Own house	19 (5.4)
Government rental	184 (52)
Private rental	89 (25)
Homeless	48 (14)
Supported accommodation	14 (4)
Heaviness of smoking index	
Low	135 (38)
Moderate	153 (43)
Heavy	66 (19)
Ever made quit attempt (Y/N)	
Yes	295 (83)
	Mean (SD)
Cigarettes per day	16.37 (11.3)
Age started smoking	15.52 (6.4)
Quit attempts past 12 months	3.27 (7.7)
Cessation Cognitions Index	13.40 (9.99)

*Total percentages may not add to 100 due to rounding.

Table 2. Perceived effectiveness for Advertisement 1: Why-to-quit (Graphic); Advertisement 2: Why-to-quit (Testimonial) and; Advertisement 3: How-to-quit.

	Message Acceptance		Perceived Message Effectiveness	
	Mean (95%CI)	**p-value***	**Mean (95%CI)**	**p-value***
Advertisement				
1 (Why – Graphic)	4.70 (4.62, 4.79)	.	3.96 (3.85, 4.08)	.
2 (Why – Testimonial)	4.78 (4.69, 4.86)	.	3.97 (3.86, 4.08)	.
3 (How-to-quit)	4.25 (4.15, 4.34)	.	3.22 (3.10, 3.34)	.
Advertisement Difference				
1 – 2	-0.08 (-0.18, 0.03)	0.1744	0 (-0.12, 0.11)	0.9555
1 – 3	0.46 (0.34, 0.57)	<0.0001	0.74 (0.62, 0.87)	<0.0001
2 – 3	0.53 (0.42, 0.65)	<0.0001	0.75 (0.62, 0.87)	<0.0001

*P-value for Wald test from generalised linear mixed models assessing differences in perceived effectiveness between advertisements.

Table 3. Results from simple linear regression examining relationship between perceived effectiveness sub-scale score and smoking characteristics.

Domain	Smoking characteristic	Class	Coefficient estimate (95% CI)	Overall p-value*
Message Acceptance	Cognition Index		0.014 (0.007,0.020)	<0.0001
	Nicotine Dependence	Low	-0.040 (-0.210,0.130)	0.7322
		Moderate	-0.009 (-0.158,0.176)	
		High	ref	
Perceived Message Effectiveness	Cognition Index		0.035 (0.025,0.045)	<0.0001
	Nicotine Dependence	Low	0.047 (-0.234,0.329)	0.8872
		Moderate	0.067 (-0.204,0.338)	
		High	ref	

*P-value for Wald test.

Table 4. Multiple linear regression results showing the relationship between perceived effectiveness sub-scale score and explanatory variables.

Sub-scale	Explanatory Variable	Category	Change in domain score (adjusting for all predictors)(95% CI)	p-value* for comparison	Overall p-value[#]
Message Acceptance	Cessation Cognitions Index	.	0.012 (0.006, 0.019)	0.0003	0.0003
	Gender	Male	-0.091 (-0.207,0.024)	0.1221	0.1221
		Female	ref	.	
	Indigenous	Indigenous	0.083 (-0.036,0.203)	0.1729	0.1729
		Non-Indigneous	ref	.	
	Income	Less than $200	0.142 (-0.135,0.419)	0.3153	0.2096
		$201 - $400	0.154 (-0.111,0.42)	0.2545	
		More than $400	0.238 (-0.025,0.5)	0.0762	
		Prefer not to disclose	ref	.	
	Quit attempts	Zero	-0.162 (-0.321,-0.003)	0.0457	0.1229
		1	-0.248 (-0.442,-0.053)	0.0125	
		2	-0.099 (-0.265,0.067)	0.2429	
		3 – 5	-0.125 (-0.295,0.044)	0.1477	
		>5	ref	.	
Perceived Message Effectiveness	Cessation Cognitions Index	.	0.032 (0.022,0.042)	<0.0001	<0.0001
	Gender	Male	-0.085 (-0.255,0.084)	0.3222	0.3222
		Female	ref	.	
	Indigenous	Indigenous	0.14 (-0.065,0.346)	0.1806	0.1806
		Non-Indigneous	ref	.	

Sub-scale	Explanatory Variable	Category	Change in domain score (adjusting for all predictors)(95% CI)	p-value* for comparison	Overall p-value[#]
	Quit attempts	Zero	-0.193 (-0.555,0.17)	0.2982	0.0846
		1	-0.023 (-0.407,0.361)	0.9052	
		2	0.163 (-0.18,0.507)	0.3506	
		3 – 5	-0.112 (-0.464,0.24)	0.5330	
		>5	ref	.	
	Age	18-29yrs	0.155 (-0.167,0.477)	0.3449	0.3478
		30-39yrs	0.249 (-0.069,0.567)	0.1243	
		40-49yrs	0.252 (-0.065,0.57)	0.1195	
		50+yrs	ref	.	
	Housing	Own house	-0.394 (-0.819,0.032)	0.0697	0.0979
		Private Rental	-0.244 (-0.537,0.05)	0.1041	
		Government Rental or Supported	-0.061 (-0.318,0.195)	0.6389	
		Homeless	ref	.	
	Ever quit?	No	0.142 (-0.123,0.408)	0.2930	0.2930
		Yes	ref	.	

*p-value for Wald test.

[#] p-value for Likelihood Ratio test.