Psychosocial Determinants of Quit Motivation in Older Smokers from Deprived Backgrounds: A Cross-Sectional Survey

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Objectives

To identify psychosocial determinants of quit motivation in older deprived smokers. The evidence may be used to optimise smoking cessation interventions for the target population.

Design

Cross-sectional survey using online recruitment methods including Facebook-targeted advertising.

Setting

United Kingdom, 2019.

Participants

Current smokers aged 50 years or older and from a socioeconomically deprived background.

Main outcome measures

Measures included motivation to stop smoking, smoking history, perceived social support, self-efficacy for quitting, self-exempting beliefs and lung cancer risk perception. Multivariable regression was used to analyse factors associated with quit motivation.

Results

Of a total 578 individuals who consented to take part, 278 (48.1%) did not meet the inclusion criteria. Of the 300 eligible participants most were recruited using Facebook (94.0%), were aged 50-64 years (83.7%) and female (85.7%). Most participants were renting from a housing association (72.0%) and had low education (61.0%). Higher motivation to quit was statistically significantly associated with a higher intensity of previous quit attempts ($p=0.03$), higher quit confidence ($p=0.01$), higher smoking self-efficacy ($p=0.01$), a lower risk-minimising beliefs score ($p=0.01$) and using traditional nicotine replacement therapy when trying to stop smoking or cut down ($p<0.001$).

Conclusion

Older smokers from deprived backgrounds face complex barriers to quitting smoking. Interventions are needed to increase self-efficacy for quitting, modify risk-minimising beliefs and target elements of previous quit attempts (i.e. the use of nicotine replacement therapy) that are associated with motivation to stop smoking.

Strengths and limitations of this study

- This research adds knowledge to the context of targeted smoking cessation interventions for a population who are at high-risk of developing a variety of smoking related diseases, including lung cancer
- An online survey, disseminated through Facebook advertising was useful for recruiting the target population
- There was an underrepresentation of older individuals (i.e. 65 years and older) and males
- Due to the cross-sectional study design, caution is needed when interpreting associations with quit motivation

INTRODUCTION

Tobacco smoking is estimated to cause the premature deaths of approximately six million individuals worldwide and 96,000 within the UK per year (1), resulting in an average of ten life years lost (2). Smokers who do not stop smoking also begin to suffer diseases of old age around ten years earlier in comparison to non-smokers (3). Most deaths related to smoking arise from cancers, respiratory disease and cardiovascular disease (1). For example, lung cancer mortality is around fifteen times higher in current smokers compared to never-smokers and increases with smoking amount and duration (4).

Smoking is a major health inequality concern due to higher smoking rates among people from low socioeconomic groups in developed countries. The high prevalence of cigarette smoking among low socioeconomic groups demonstrates the striking relationship between social context and health behaviour (5, 6).

Quit attempts by older smokers from deprived backgrounds are less likely to be successful due to higher levels of nicotine dependence and/or a lack of self-efficacy (7, 8). Research has indicated that smokers from deprived backgrounds find quitting more difficult due to having less social support when making a quit attempt (9, 10). Self-exempting beliefs, also known as risk-minimising beliefs, have also been shown to influence continued smoking among individuals from low socioeconomic groups. These beliefs may be adopted as a mechanism to help rationalise or justify smoking despite the well-known harms (11). Perceived risk of smoking-related diseases, such as lung cancer, has been linked to smoking, with absolute and relative lung cancer risk perception being positively related to cigarette-smoking behaviours (12). Furthermore, previous research involving deprived smokers aged 40 years or older has found perceived lung cancer risk to be higher among this population compared to non-smokers (13).

A systematic review of behavioural smoking cessation interventions indicated that offering incentives, use of peer facilitators and more intensive behavioural counselling are promising for encouraging smoking cessation in older smokers from deprived backgrounds (14).

However, further evidence is needed regarding psychosocial targets for smoking cessation interventions aimed at this population (14).

In this study, we aimed to identify modifiable psychosocial determinants of motivation to stop smoking among older smokers from socioeconomically deprived backgrounds. The selected survey measures were driven by a variety of theories including PRIME Theory of Addiction and the Extended Parallel Process Model (15, 16). It was anticipated that higher motivation to quit smoking would be associated with lower nicotine dependence, higher self-efficacy, higher perceived social support, lower self-exempting beliefs and higher perceived lung cancer risk. The evidence may be used to improve smoking cessation interventions for the target population.

METHODS

Participants and recruitment methods

Sample size was determined on the basis of (i) tobacco smoking rates in the UK population of older smokers (17) and (ii) expected response rate among smokers (18, 19). Although we planned from the outset to measure the primary outcome of motivation to stop smoking on a 7-point scale, it was impossible to know in advance whether its conditional distribution given predictors would allow analysis using linear regression. The decision was thus taken to calculate the sample size based on a dichotomisation of the outcome, which is conservative given that dichotomisation decreases power. A sample of 300 respondents was chosen to provide 80% power to detect an odds ratio of 2.0 in the dichotomised primary outcome at a 5% significance level (20).

Participants were recruited to an online cross-sectional survey pragmatically and were current smokers, aged 50 years or more, from deprived backgrounds. Participants were given the option to be entered into a £50 shopping voucher prize draw and consented to be contacted if they won a voucher. A link to the online questionnaire was disseminated using Facebook, a population survey platform (HealthWise Wales:

www.healthwisewales.gov.wales) and a Wales based cancer charity (Tenovus Cancer Care). Snowball sampling was also used to recruit the target sample.

To determine eligibility, participants completed five questions based on socioeconomic deprivation, smoking status and age. Participants were eligible if they were ≥50 years of age, a current smoker and met the threshold for at least two out of three individual-level deprivation indicators. Thresholds for deprivation indicators were: 1) *Education* - educated to O-level or GCSE equivalent (mostly grade D-G) or below; 2) *Household income* - casual labourer, pensioner, student, unemployed (e.g. pensioner without private pension and anyone living on basic benefits), semi-skilled and unskilled manual worker, skilled manual worker and those with no previous or current employment within the household; 3) *Home ownership* - renting from local authority/housing association or living with family/friends.

Ethical approval

The study received ethical approval from Cardiff University School of Medicine (SMREC Reference Number: 19/06).

Patient and public involvement

Public involvement was integrated according to national standards (21), and used during the development and design of the survey questions and structure. An appointed research partner presented feedback on the survey at various stages including the final version, prior to recruitment commencing. The research partner also assisted in the recruitment of participants for cognitive interviews used for survey development.

Measures

Cognitive interviews were first carried out with the target population to ascertain the suitability of the questionnaire. Interviews were conducted with five participants (three female and two male, aged 50-88 years) from a socioeconomically deprived area of South Wales. Content validity of unvalidated items was assessed by a panel of six academics with

experience in the field of health behaviours. These steps were conducted in order to assess acceptability and comprehension of items, and resulted in adaptations to item wording and inclusion of selected items for the final version of the survey (see Supplementary Material).

Demographic characteristics

Data were collected on gender, age, relationship status, highest level of education, home ownership, household employment and co-morbid conditions (22). A total score was created for number of comorbid conditions, with a higher score indicating the presence of more comorbid conditions (score range 0-14).

Smoking characteristics

Nicotine dependence was assessed using the Fagerstrom Test for Nicotine Dependence (23) in order to create a total nicotine dependence score. Number of previous quit attempts (24) and intensity of previous quit attempts (number of attempts combined with duration of the longest previous quit attempt) were also measured. Participants were asked whether they were currently trying to cut down and were asked to select multiple options from a list of smoking cessation aids (nicotine gum, lozenges, patches, inhalator, mouth spray, electronic cigarette, behavioural counselling or not using anything to help stop smoking).

Motivation to stop smoking (primary outcome)

The Motivation to Stop Scale (MTSS) (25) is a validated measure that assesses the key elements of quit motivation: belief, desire and intention (15). The MTSS is a single-item instrument and assesses a smoker's motivation to stop smoking. The scale score ranged from 1-7: (1) 'I don't want to stop smoking', (2) 'I think I should stop smoking but don't really want to', (3) 'I want to stop smoking but haven't thought about when', (4) 'I REALLY want to stop smoking but I don't know when I will', (5) 'I want to stop smoking and hope to soon', (6) 'I REALLY want to stop smoking and intend to in the next 3 months' and (7) 'I REALLY want to stop smoking and intend to in the next month'.

Social support and smoking

The social support and smoking questions (26) measured how supported the participant felt during a previous quit attempt. Respondents were asked about various forms of social support experienced during a previous quit attempt, for example "*Encourage you to keep at quitting", "Celebrate your quitting with you", "Say you were going to start smoking again*". Response options were rated on a scale of 1 to 5 (1=Never, 5=Very often). Principal components analysis (PCA) of the adapted social support items yielded two factor-derived subscales that were labelled positive smoking social support (8 items, α=0.85) and negative smoking social support (3 items, α=0.64). Total possible score range for positive social support was 8-40 with higher scores indicating higher positive social support during a previous quit attempt. Total possible score range for negative social support was 3-15 with higher scores indicating higher negative social support during a previous quit attempt. Participants were also asked how supported they felt by their partner, friends, colleague and GP/ healthcare professional during a previous quit attempt, with response options ranging from 1-5 (1=not at all, 5=extremely).

Self-exempting beliefs

The self-exempting beliefs measure comprises 16 items, with two subscales for self-exempting ("bulletproof") beliefs and risk-minimising ("jungle", "skeptic", "worth it") beliefs (27). Examples of risk-minimising beliefs items included: *"Smoking cannot be all that bad for you because many people who smoke live long lives", "I would rather live a shorter life and enjoy it than a longer one where I will be deprived of the pleasure of smoking"* and *"You have got to die of something, so why not enjoy yourself and smoke".* Agreement with each item was rated on a scale of 1 to 5 (1=totally disagree, 5=totally agree*).* Two factor-derived subscales labelled risk-minimising beliefs (5 items, α=0.83) and scepticism (2 items, α=0.54) were derived from PCA. Total possible score ranges were 5-25 for the risk-minimising beliefs scale and 2-10 for the scepticism scale, with higher scores indicating higher levels of agreement.

Smoking self-efficacy

The eight-item smoking self-efficacy questionnaire (SEQ-12) (28) was originally designed to measure current smokers' confidence in their ability to abstain from smoking in high-risk situations. The instrument presents participants with situations in which people might be tempted to smoke such as when they feel nervous, depressed, angry, have the urge to smoke, are with other smokers and when they are having a tea or coffee. Participants responded on a 5-point Likert scale from 1 ("not at all sure") to 5 ("absolutely sure"). Total score range for this measure was 6-30 with higher scores indicating greater smoking self-efficacy (α=0.88). After PCA, two items were removed and a smoking self-efficacy scale was created.

Quit confidence

Quit confidence was measured using a single item (29): "*How confident are you that you could quit smoking for good if you wanted to*?". The response options were on a scale of 1 to 5 where 1="not at all" and 5="extremely".

Lung cancer experience

Lung cancer experience was measure using seven items to assess personal experience of lung cancer as well as experience of social contacts (family, friends, member of community) (30). Response options for this measure were 'yes', 'no', 'don't know' and 'prefer not to say'.

Lung cancer risk perception

Three items were used to assess lung cancer risk perception (31). Absolute risk perception was measured using the item "*How likely do you think it is that you will develop lung cancer in your lifetime?"* with response options from 1 ("very unlikely") to 5 ("very likely"). Comparative risk perception was measured by asking "*Compared to others your age and sex, what do you think is your chance of getting lung cancer in your lifetime?"* with response options from 1-5 ('much lower' to 'much higher'). Affective risk perception was measured

using the question "*How worried are you about getting lung cancer in your lifetime*?", with response options on a scale of 1 ("not at all") to 4 ("extremely").

Statistical analyses

Data were analysed using SPSS version 25. In order to deal with missing data in preparation for univariable and multivariable analysis, multiple imputation using chained equations was conducted on the original dataset (32). All the incomplete variables were either dichotomous or (treated as) continuous. For each incomplete variable being imputed, all other variables were included in its imputation model. Where the incomplete variables were constituent parts of a composite score (e.g. positive and negative social support scale), the imputation was performed on the individual questionnaire responses, and these imputed variables were then summed to create the imputed composite score. Those who responded with '*Don't know'* to MTSS were removed from analysis.

PCA was used to identify the underlying factor structure of unvalidated measures (social support and smoking, self-exempting beliefs, smoking self-efficacy) that had been adapted on the basis of cognitive interviewing and content validity assessment.

Univariable associations between MTSS and demographic (age, gender, education, income, living situation, presence of comorbid conditions, lung cancer experience), smoking-related factors (nicotine dependence, previous quit attempts, smoking abstinence, smoking cessation aids) and psychosocial variables (self-efficacy, quit confidence, perceived social support for quitting, self-exempting beliefs, lung cancer risk perception) were assessed. Independent T-tests, Spearman's Rank Correlation and Pearson's Correlation were used to test for univariable associations. A multivariable linear regression analysis was conducted, in which all variables were entered in a single step. Confidence intervals of 95% were calculated for the associations between MTSS and variables that were statistically significant at $p \leq 0.05$ in univariable analyses.

MTSS was treated as a continuous variable, with a low score demonstrating an absence of any belief, desire or intention to stop smoking and a high score demonstrating strong desire and short-term intention. Examination of the distribution of the outcome variable, and its mean and variance given predictors, suggested that a multivariable linear regression model was a suitable choice.

RESULTS

Sample characteristics

A total of 578 individuals consented to take part in the survey. Of those who consented, 278 (48.1%) did not meet the inclusion criteria due to age (n=2), smoking status (n=24) and level of deprivation (n=252). Of 300 eligible participants, most were recruited using Facebook advertising (94%). The majority of participants were aged between 50 and 64 years of age (83.7%) and female (85.7%).

Almost half of participants (43.7%) reported that they did not want to stop smoking (see Table 1). Most participants had made a serious previous quit attempt (73.3%) and were currently trying to cut down on how much they smoked (66%). The most commonly used smoking cessation aid when trying to cut down/stop smoking was e-cigarettes (28.3%), with over half the sample (51.1%) not using anything to help them cut down/stop smoking.

Univariable analysis of factors associated with motivation to stop smoking

At univariable analysis, MTSS was significantly associated with 12 variables (see Table 2 and 3). As depicted in Table 2, higher motivation to stop smoking was statistically significantly associated with lower nicotine dependence ($p=0.05$), higher intensity of previous quit attempts ($p<0.001$), currently trying to cut down on smoking ($p<0.001$), using a smoking cessation aid when trying to help cut down/quit smoking ($p<0.001$) and trying to cut down/quit without any smoking cessation aid ($p=0.04$) (Table 2). Associations between MTSS and gender, age, relationship, education, employment, housing and comorbidity were not statistically significant.

As shown in Table 3, higher motivation to stop smoking was statistically significantly associated with higher positive social support when making a quit attempt (p=0.04), higher smoking self-efficacy (p<0.001), higher quit confidence (p<0.001) and lower risk-minimising beliefs (p<0.001). Higher motivation to stop smoking was statistically significantly associated with higher perceived comparative (p=0.01) and affective (p<0.001) lung cancer risk, and having experienced lung cancer in a close friend (p=0.01).

Multivariable regression of factors associated with motivation to stop smoking

Conditional on all other predictors in the model, a unit increase in intensity of previous quit attempts was associated with an estimated 0.17 increase in MTSS (p=0.03, 95% CI=0.02, 0.32). A unit increase for quit confidence was associated with an estimated 0.20 increase in MTSS (p=0.01, 95% CI=0.06, 0.35), self-efficacy was associated with an estimated 0.22 increase in MTSS (p=0.01, 95% CI=0.06, 0.37) and a unit increase in risk-minimising beliefs was associated with an estimated 0.18 decrease in MTSS (p=0.01, 95% CI= 0.04, 0.32). Those who reported using traditional nicotine replacement therapy (NRT) when trying to stop smoking or cut down scored on average a 0.26 higher MTSS score (p<0.001, 95% CI=0.12, 0.39) compared to those who did not (Table 4).

DISCUSSION

To our knowledge this is the first study to examine psychosocial determinants of quit motivation in a sample of older smokers, aged 50+ from deprived backgrounds. Higher motivation to quit was associated with higher intensity of previous quit attempts, higher quit confidence, higher smoking self-efficacy, lower risk-minimising beliefs and using traditional nicotine replacement therapy when trying to stop smoking or cut down.

Previous studies suggest that smokers from deprived backgrounds are equally motivated to try and quit smoking but less likely to be successful during a quit attempt compared to more affluent smokers (33-36). This paradox results in lower quit rates and potentially exacerbates inequalities in the prevalence of smoking. An important factor that contributes to higher smoking rates among deprived smokers lies in the lack of research output that target this population (37) and the general scarcity of literature for effective smoking cessation interventions for more disadvantaged smokers (38).

The current findings suggest that the salient determinant of quit motivation in the target population was the use of traditional NRT (e.g. patches, gum, lozenges) during a previous attempt to cut down or quit smoking. Use of NRT has been shown to increase cessation success (39) and is more effective at promoting cessation in older age groups compared to younger groups (40, 41). Our findings confirm that NRT is an important tool in encouraging motivation to stop smoking in older smokers from deprived backgrounds. However, evidence for which type of NRT works best for this population is limited and the provision of NRT may need to be tailored in order to fit the needs and preferences of this population.

Previous studies have found deprived smokers to be less likely to use NRTs and that one of the barriers to quitting includes inability to access treatment (42). Making NRTs easily available to this population could increase motivation to stop smoking and encourage older smokers from deprived backgrounds to make serious quit attempts that are more likely to be successful. Although an association between quit motivation and the presence of comorbid

conditions was not observed in the current study, it has been proposed that smoking cessation interventions (specifically NRTs) for older adults should be personalised due to the presence of comorbidities and medication that can reduce the use and effectiveness of NRT (43).

Furthermore, the current research suggests that a higher intensity of previous quit attempts is associated with higher motivation to stop smoking. Future interventions should focus on encouraging the target population to persist with their quit attempts as well as promote the use of behavioural support and NRT in order to improve motivation to quit.

The current study further illustrates the importance of quitting self-efficacy in relation to improving motivation to stop smoking among older smokers from deprived backgrounds. Previous research from Siahpush et al (44) showed that low self-efficacy can explain the lower smoking cessation rate observed among low socioeconomic smokers. Individuals from deprived backgrounds are more likely to be exposed to stressful and disadvantaged lives and have less access to material and social resources, which in turn can reduce self-efficacy and motivation to stop smoking (45, 46).

Risk-minimising beliefs may be adopted in order to justify continued smoking despite the risks to health (27, 47). Similarly, previous studies indicate that individuals from socially deprived backgrounds are more likely to hold self-exempting beliefs (27, 47-49). Older smokers who have previously been shown to hold these beliefs consider themselves as '*survivors*', resulting in a lower motivation to stop smoking (1).

Methodological limitations of the current study are acknowledged. Although we were able to demonstrate representation of smokers from a low socioeconomic background in the sample there are issues of generalisability. Men and those aged 65 years or older were under-represented which could be due to older adults being less likely to have access to social media or the internet (50) and men being traditionally more difficult to recruit to research (51). Due to the cross-sectional study design, caution is needed when interpreting

associations due to shared-method variance and inability to infer causal relationships (52). Further limitations include the variable internal validity of factor-derived subscales and the use of self-reported measures. Suitable validated measures are needed to better capture evidence of psychosocial influences on smoking behaviour in older smokers from deprived backgrounds.

This research is valuable in the context of targeted smoking cessation interventions for a population who are at high-risk of developing a variety of smoking-related diseases, including lung cancer. The target population face a breadth of complex barriers to quitting smoking and interventions are needed to increase self-efficacy for quitting, dispel risk-minimising beliefs and target elements of previous quit attempts (i.e. NRTs used) that are associated with motivation to stop smoking. Findings from this research could be used in the adaptation of behavioural smoking cessation interventions by addressing identified psychosocial determinants. This has the potential to improve quit motivation and could encourage a smoking cessation attempt in older smokers from deprived backgrounds.

Contributors: PS, KB, AN, RM and GM were responsible for the concept, overall design and conduct of the study. RD gave additional support and advice on multiple imputation for missing data and statistical analysis. PS was responsible for collection of data and manuscript preparation. All authors were involved in the interpretation of the results and approved the final version of the manuscript. No competing interests were declared by authors.

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DATA SHARING AND COMPETING INTERESTS

All data relevant to the study are included in the article or uploaded as supplementary information. The authors declare that they have no conflict of interest.

Table 1. Sample characteristics (N=300)

Variable	Descriptive statistic	
	n	**%**
Age, years		
50-64 years	251	83.7
65 years or older	49	16.3
Missing	0	0
Gender		
Male	43	14.3
Female	257	85.7
Missing	0	0
Highest level of education		
Finished school at or before age fifteen	76	25.3
No qualifications/ left school at 16	107	35.7
Completed CSEs, O-levels or equivalent (Mostly grade A-C)	56	18.7
Completed CSEs, O-levels or equivalent (Mostly grade D-G)	22	7.3
Completed A levels or equivalent	7	2.3
Completed further education but not degree	30	10
Completed a Bachelor's degree/Masters/PhD	2	0.7
Missing	0	0
Home/Living arrangement		
Own outright	19	6.3
Own mortgage	19	6.3
Rent from local authority/housing association	216	72
Rent privately	35	11.7
Living with family or friends	11	3.7
Missing	0	0
Employment		
Casual labourer, pensioner, student, unemployed (e.g. pensioner without private pension and anyone living on basic benefits)	99	33
Semi-skilled and unskilled manual worker (e.g. assembly line worker, refuse collector, messenger)	88	29.3
Skilled manual worker (e.g. electrician, carpenter)	45	15
Supervisory/ clerical/ junior managerial/ professional/ administrative (e.g. supervisor, bank clerk, salesperson)	19	6.3
Intermediate managerial/professional/ administrative (e.g. middle management, bank manager, teacher)	4	1.3
Higher managerial/professional/administrator (e.g. Chief executive, senior civil servant, surgeon)	0	0
No previous or current employment within the household	45	15
Relationship status		
Married or in a civil partnership	90	30
Living with my partner	38	12.7
Single (never married and not living with a partner)	43	14.3
Divorced or separated and not living with another partner	92	30.7
Widowed and not living with another partner	32	10.7
Prefer not to say	4	1.3
Missing	1	0.3
Pre-existing health conditions	**-**	**-**
Heart disease	28	9.3
High blood pressure	65	21.7

Lung disease	68	22.7
Diabetes	43	14.3
An ulcer or stomach disease	29	9.7
Kidney disease	7	2.3
Liver disease	5	1.7
Anaemia or other blood disease	17	5.7
Cancer	5	1.7
Depression	154	51.3
Osteoarthritis or degenerative	90	30
Back pain	167	55.7
Rheumatoid arthritis	42	14
Motivation to Stop Smoking		
I don't want to stop smoking	41	13.7
I think I should stop smoking but don't really want to	90	30.0
I want to stop smoking but haven't thought about when	40	13.3
I REALLY want to stop smoking but don't know when I will	64	21.3
I want to stop smoking and hope to soon	19	6.3
I REALLY want to stop smoking and intend to in the next 3 months	14	4.7
I REALLY want to stop smoking and intend to in the next month	16	5.3
Don't know*	16	5.3
Previous serious quit attempt		
Yes	220	73.3
No	79	26.3
Missing	1	0.3
Currently trying to cut down smoking		
Yes	198	66.0
No	100	33.3
Missing	2	0.7
Smoking cessation aids *(n= 198)*		
Nicotine gum	4	1.8
Nicotine lozenge	5	2.3
Nicotine patch	14	6.4
Nicotine inhaler/inhalator	6	2.7
Another nicotine product	3	1.4
Electronic cigarette	62	28.3
Nicotine mouth spray	3	1.4
Behavioural counselling (e.g. group sessions, telephone support, individual support)	2	0.9
I am not using anything to help me stop smoking	112	51.1

Participants who responded 'don't know' were removed from further analysis

Table 2. Univariable associations between Motivation To Stop Smoking and demographic/smoking characteristics (n=284)

Variable	N	MTSS mean (SD)	Test statistic/ Correlation Coefficient	*P* value
Gender[1]				
Female	243	3.14 (1.62)	0.22	0.82
Male	41	3.07 (1.84)		
Age[1]				
50-64 years	239	3.10 (1.65)	-0.72	0.47
65 +	45	3.29 (1.69)		
Relationship[1]				
Widowed/divorced/single	161	3.14 (1.65)	0.14	0.89
Married/living with a partner	120	3.11 (1.66)		
Missing data	5			
Education[1]				
Lower education	193	3.11 (1.62)	-0.27	0.79
Higher education	91	3.16 (1.72)		
Employment[1]				
Lower employment level	262	3.13 (1.64)	0.24	0.81
Higher employment level	22	3.05 (1.81)		
Housing[1]				
Own house/ mortgage/ rent privately	70	3.36 (1.70)	1.35	0.18
Rent from housing association/ living with friends or family	214	3.05 (1.63)		
Comorbidity score[2]	284		0.00	0.97
Nicotine dependence score[2]	284		-0.11	**0.05**
Intensity of previous quit attempt score[2]	209		0.26	**<0.001**
Currently trying to cut down on smoking[1]				
Yes	185	3.44 (1.57)	4.53	**<0.001**
No	97	2.54 (1.64)		

Variable	N	MTSS mean (SD)	Test statistic	*P* value
Using traditional NRTs to help cut down/quit[1]				
Yes	23	4.87 (1.55)	-4.95	**<0.001**
No	162	3.24 (1.47)		
Using electronic cigarette to help cut down/quit[1]				
Yes	58	3.21 (1.46)	1.37	0.17
No	226	3.55 (1.61)		
Trying to cut down/quit without any smoking cessation aid[1]				
Yes	104	3.23 (1.44)	2.07	**0.04**
No	81	3.72 (1.70)		

[1] Independent t-test

[2] Pearson's correlation coefficient

Table 3. Univariable associations between Motivation To Stop Smoking and psychosocial variables

Variable	N	MTSS mean (SD)	Test Statistic/ Correlation Coefficient	*P* value
Psychological variables				-
Risk-minimising beliefs [1]	284	-	-0.27	**<0.001**
Scepticism [1]	284	-	-0.07	0.26
Quit confidence [2]	284	-	0.40	**<0.001**
Smoking self-efficacy [1]	284	-	0.21	**<0.001**
Smoking and social support during a previous quit attempt				
Someone to turn during a quit attempt [2]		-	-0.04	0.53
Positive smoking social support [1]	211	-	0.14	**0.04**
Negative smoking social support [1]	210	-	-0.01	0.91
Support from partner during previous quit attempt [2]	180	-	-0.01	0.89
Support from family during previous quit attempt [2]	200	-	0.03	0.63
Support from friends during previous quit attempt [2]	198	-	0.01	0.92
Support from colleagues during previous quit attempt [2]	187	-	-0.00	0.96
Support from GP or HCP during previous quit attempt [2]	188	-	-0.06	0.44
Someone to turn during if finding quitting difficult [2]	284	-	-0.04	0.53
Lung cancer experience [3]				
Self				-
Yes	19	3.19 (1.85)	0.22	0.83
No	246	3.08 (1.63)		
Partner				
Yes	19	3.58 (2.10)	0.77	0.45
No	223	3.13 (1.64)		
Close family member				
Yes	98	3.30 (1.58)	1.13	0.26
No	157	3.05 (1.65)		
Other family member				
Yes	63	3.29 (1.56)	1.38	0.17
No	174	2.96 (1.58)		
Close friend				
Yes	63	3.62 (1.68)	2.78	**0.01**
No	173	2.88 (1.62)		

Variable	N	MTSS mean (SD)	Test Statistic	*P* value
Other friend				
Yes	53	3.34 (1.60)	1.42	0.16
No	174	2.96 (1.55)		
A member of your community				
Yes	87	3.29 (1.66)	1.84	0.07
No	124	2.87 (1.52)		
Lung cancer risk perception [2]				
Absolute risk	284	-	0.11	0.08
Comparative risk	284	-	0.15	**0.01**
Affective risk	284	-	0.36	**<0.001**

[1] *Pearson's correlation coefficient*

[2] *Spearman's Rank Correlation Coefficient*

[3] *Independent t-test*

Table 4. Multivariable associations with Motivation To Stop Smoking

Variable	Estimated adjusted mean difference	Standard Error	95% Confidence Interval	*P* value
Intensity of previous quit attempts	0.17	0.08	0.02, 0.32	**0.03**
Currently trying to cut down on smoking	-0.02	0.31	-0.20, 0.16	0.81
Positive social support during a previous quit attempt	0.00	0.02	-0.14, 0.14	1.00
Smoking self-efficacy	0.22	0.03	0.06, 0.37	**0.01**
Quit confidence	0.20	0.10	0.06, 0.35	**0.01**
Risk-minimising beliefs	-0.18	0.03	-0.32, -0.04	**0.01**
Close friend with a diagnosis of lung cancer**	0.13	0.26	-0.01, 0.26	0.07
Comparative lung cancer risk	-0.04	0.15	-0.18, 0.11	0.64
Affective lung cancer risk	0.12	0.10	-0.02, 0.27	0.10
Using traditional NRTs to help cut down/quit*	0.26	0.43	0.12, 0.39	**<0.001**
Not using any smoking cessation aids to help cut down*	0.02	0.27	-0.14, 0.18	0.78
Nicotine dependence	0.06	0.05	-0.08, 0.20	0.30

**Dichotomous variable (coded yes/no)*

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