Are Patterns of Smoking Cessation and Related Behaviours Associated with Socioeconomic Status?

An Analysis of Data from the International Tobacco Control Four Country Survey

by

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

Considerable socioeconomic disparities have been identified for smoking and cessation: lower socioeconomic status (SES) groups have higher rates of tobacco use, are less likely to successfully quit, and may also be less likely to intend or attempt to quit. However, results are inconsistent for some quitting-related outcomes, and little is known about how socioeconomic disparities may vary across countries and over time.

This study examined the extent to which SES was associated with smoking cessation and related constructs among representative samples of smokers in Canada, the US, the UK, and Australia, using data from the first five waves (2002-2006) of the ITC Four Country Survey (35 532 observations from 16 458 respondents). Generalized estimating equations modeling was used to examine whether education and income were related to intentions to quit (any, and within the next six months), incidence of quit attempts, smoking abstinence (for at least one, six and 12 months), and reduction in daily cigarette consumption by at least half. Potential differences in the associations over time and across countries were also considered. In addition, logistic regression modeling examined associations between education and income, reasons for quitting, and use of cessation assistance, using a cross-sectional sample of the most recent survey wave.

Respondents with higher education were more likely to intend to quit, have made a quit attempt, and be abstinent for at least one and six months, and those with higher income were more likely to intend to quit and be abstinent for at least one month. Associations were stable throughout the time period under study. Country differences were observed in quit intentions: UK and US respondents were less likely to intend to quit than Australians and Canadians. Also, UK respondents were least likely to attempt to quit overall, but those that did attempt were more likely to be abstinent for at least one and six months. Socioeconomic and between-country differences were also identified in the cross-sectional analyses of use and access to cessation assistance and reasons for quitting. The results suggest that socioeconomic disparities exist at multiple stages in the path to smoking cessation.

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1.0 Introduction

Inequalities in health between higher and lower socioeconomic status (SES) groups have been consistently documented in multiple countries and for multiple health outcomes (Mackenbach, 2006; Mackenbach et al., 2008; Hofrichter, 2003). There is evidence that inequalities in health are not only persistent, but have grown in recent years (Mackenbach, 2006; Hofrichter, 2003). Increasing health inequalities have drawn considerable attention, and reducing them has become an important public health and social justice issue, as well as a stated priority for many governments and organizations.

Tobacco use is the leading preventable cause of death in Canada and other developed countries (Makomaski Illing & Kaiserman, 2004; Stellman & Resnicow, 1997). This risk behaviour is not randomly distributed within the population; smoking prevalence exhibits a clear gradient, with lower socioeconomic status groups showing increasing rates of tobacco use (Jarvis & Wardle, 2006). Smoking cessation tends to follow an inverse pattern, with higher socioeconomic status (SES) groups having the highest quit ratios (Kunst, Giskes, & Mackenbach, 2004). The burden of tobacco use and related illness is thus disproportionately borne by lower socioeconomic status groups, making tobacco use a substantial contributor to overall health disparities (Jarvis & Wardle, 2006).

Reducing smoking in lower socioeconomic populations is therefore a key strategy for reducing overall health inequalities (Ogilvie & Petticrew, 2004). Population-level policy interventions to reduce tobacco use are currently being implemented in many countries; however, there is a lack of research on what effect these efforts have had, or may have in the future, on tobacco-related health disparities. As overall smoking prevalence declines in developed countries (Chapman, 2007), it is particularly important to examine whether the decline is uniform across socioeconomic groups, or whether these interventions may in fact exacerbate existing tobacco-related inequalities.

This study examined the extent to which patterns of smoking cessation and related behaviours varied by socioeconomic status in Canada, the United States (US), the United Kingdom (UK), and Australia. In particular, the study addressed the question of whether smokers in higher SES groups were more likely to quit than those in lower SES groups, and whether other quitting-related constructs such as quit intentions, attempts and reducing consumption, differed by SES. As a second step, the study examined whether reasons for quitting and use of cessation assistance varied by SES group. Potential differences in the associations of interest over time and by country were also considered.

To answer these questions, survey data from the International Tobacco Control (ITC) Four Country Survey was analyzed. Longitudinal analyses of five waves of data (2002-2006) was conducted to examine whether SES was associated with differing patterns of quit intentions, quit attempts, abstinence from smoking, and reduction in cigarette consumption. In addition, cross-sectional analyses with the 2006 survey data tested whether there were socioeconomic differences in reasons for quitting and in use of and access to cessation aids.

2.0 Literature Review

2.1 Socioeconomic Status and Health

2.1.1 The relationship between SES and health outcomes

Socioeconomic status (SES) is a strong predictor of health outcomes and risk behaviours. An association between SES and health has been consistently documented across countries and for multiple outcomes. This relationship does not apply only to those at the bottom of the socioeconomic ladder, but follows a gradient. In other words, there are differences at every step in the SES gradient in risk factors, health status, disease incidence, and mortality across a wide range of disorders (Health Disparities Task Group, 2005). With declining SES, decreases in life expectancy (NCHS, 1998), higher premature mortality rates (Mackenbach, 2006), and higher mortality rates for most causes of death (including communicable diseases, injuries, and chronic diseases) (NCHS, 1998) are observed. Further, socioeconomic inequalities in mortality rates are also found for many specific causes of death, including cardiovascular disease and a number of cancers (Mackenbach, 2006; Mackenbach et al., 2008), including lung cancer (Van der Heyden et al., 2008). Self-reported health status also shows an inverse relationship with income in both Canada (Frohlich, Ross, & Richmond, 2006) and the US (NCHS, 1998), and with income and education in Europe (Mackenbach et al., 2008). In addition, major risk factors for chronic disease are patterned by socioeconomic status: prevalence of tobacco use, overweight, and lack of physical activity are all more common in lower SES groups (Acheson, 1998; Frohlich et al., 2006; Mackenbach, 2006; Mackenbach et al., 2008; Najman, Toloo, & Siskind, 2006; NCHS, 1998).

2.1.2 Health inequalities

There is evidence that inequalities in health between higher and lower socioeconomic status groups are not only persistent, but have grown in recent years (Hofrichter, 2003; Mackenbach, 2006). The gap between rich and poor in industrialized countries is widening (Mackenbach, 2006; Yalnizan, 2007), and social and economic inequality is growing worldwide (Hofrichter, 2003). This inequality in the distribution of resources may itself be a cause of health disparities, given the relationship that exists between income inequality and health status (Hofrichter, 2003). Increasing health inequalities have drawn considerable attention from governments, organizations, and the public, and reducing

these inequalities has become a political priority. Reducing inequalities is not only beneficial for lower SES groups, but also the population as a whole. A Canadian report suggests that "the most appropriate and effective way to improve overall population health status is by improving the health of those in lower SES groups and other disadvantaged populations" (Health Disparities Task Group, 2005). A number of countries, including Canada, the UK, Australia, Sweden, the Netherlands, and the US, have dedicated resources toward eliminating health inequities. For example, one of the two goals of the Integrated Pan-Canadian Healthy Living Strategy is to reduce health disparities (Secretariat for the Intersectoral Healthy Living Network, 2005). Health and public policies play an important role in reducing health inequalities (Bobak, Jha, Nguyen, & Jarvis, 2000).

2.1.3 Contribution of tobacco use to health inequalities

Deaths attributable to smoking follow the same socioeconomic gradient as overall mortality, with higher death rates observed in lower socioeconomic groups (Bobak et al., 2000; Jarvis & Wardle, 2006). In addition to higher levels of tobacco use among low SES populations, the harmful effects of smoking may be amplified by other conditions, further exacerbating inequalities in tobacco-related harm (Jarvis & Wardle, 2006). For example, factors such as earlier age of smoking initiation and poor diet quality among lower SES groups may compound the harms of smoking because of increased exposure to carcinogens and a physiological state that increases susceptibility to disease (Jarvis & Wardle, 2006). Lower SES groups are also more likely to be exposed to environmental and occupational hazards, and other physical and psychological challenges that contribute to disease susceptibility (Hofrichter, 2003).

Smoking is the individual health behaviour with the single largest impact on health inequalities (Jarvis & Wardle, 2006). A recent analysis of data from Canada, England and Wales, Poland, and the US found that smoking is responsible for much of the socioeconomic gradient in male mortality, and that eliminating smoking would approximately halve the social gradient in mortality for males, with similar but smaller effects for females (Jha et al., 2006). In addition, Australian data indicate that smoking contributes substantially to socioeconomic differentials in mortality (Siahpush, English, & Powles, 2006), and US research has identified smoking as a major contributor to the increasing educational differences in mortality and life expectancy observed over the past twenty years (Meara, Richards, & Cutler, 2008). A European study including 22 countries also estimated that mortality due to smoking was responsible for 21% and 6% of the overall inequalities in all-cause mortality among men and women, respectively (Mackenbach et al., 2008). Overall, the burden of smoking is

disproportionately borne by lower socioeconomic status groups, making it a major contributor to overall health inequalities. Therefore, reducing smoking in lower socioeconomic groups is a key strategy for reducing overall socioeconomic inequalities in health (Ogilvie & Petticrew, 2004).

2.2 Socioeconomic Status and Tobacco Use

Tobacco use remains a leading preventable cause of death in Canada (Makomaski Illing & Kaiserman, 2004), the US (CDC, 2002a), Australia (AIHW, 2006), the UK (Department of Health, 1998), and other developed countries (Stellman & Resnicow, 1997). Although many of these deaths are due to past use, current patterns in smoking and population structure suggest that tobacco use will continue to be a considerable burden on the world's populations in the future. Despite decreased use in developed countries, tobacco use is increasing globally (Mackay, Eriksen, & Shafey, 2006). Currently, smoking accounts for 12% of global adult mortality (Mackay et al., 2006), and it is projected to be the leading worldwide cause of death by 2020 (Murray & Lopez, 1997).

2.2.1 Patterns of tobacco use by SES

Although smoking prevalence has steadily declined in most developed countries, smoking rates among some sub-groups remain high, and a disproportionate share of current smokers are from lower socioeconomic status groups. A clear gradient is observed for smoking prevalence by income, occupational class, education level, and various other measures of disadvantage (Jarvis & Wardle, 2006). For example, in Canada, smoking rates were twice as high among workers in blue collar occupations (36%) than among workers in administrative sectors (18%) (Health Canada, 2003). Similar trends were observed in Australia, where the smoking rate among lower blue collar workers was 36%, compared to 16% among upper white collar workers (White, Hill, Siahpush, & Bobevski, 2003). In the US, those with a high school education or less were more than three times more likely to smoke, and those with a General Educational Development (GED) diploma were almost 8 times more likely to smoke as those with a college degree (Barbeau, Krieger, & Soobader, 2004). In 2006, smoking prevalence was highest among adults who had earned a GED diploma, at 46%, and lowest among those with graduate degrees, at less than 7% (CDC, 2007a). Young adults in the US with a household income below $20 000 were 47% more likely to report current smoking and 49% more likely to report daily smoking, compared to those with income above $20 000; additionally, those not enrolled in school were more than twice as likely as students to be current and daily smokers (Lawrence, Fagan, Backinger, Gibson, & Hartman, 2007). In 2006, the current smoking rate was

31% among adults living below the poverty level and a third less at 20% for those at or above the poverty level (CDC, 2007a). Similarly, Canadian data revealed that smoking prevalence among people with a family income below $15 000 was nearly twice that of those with an income of $80 000 or more (37% vs. 20% for men and 30% vs.16% for women) (Physicians, 2005). These findings, as well as a considerable body of research, demonstrate a strong and consistent relationship between smoking and socioeconomic disadvantage.

2.2.2 Time trends in tobacco use by SES

Data from multiple countries suggest that inequalities in smoking rates between socioeconomic groups are persistent over time, and may be increasing. In the US, an educational gradient in smoking prevalence emerged in the 1960s and has grown and persisted since then (de Walque, 2004; Meara et al., 2008): smoking prevalence has substantially declined among men with at least a high school education but has changed much less for men who did not complete high school, and the same general pattern has been observed among women, although with a considerable time lag (Escobedo & Peddicord, 1996; Meara et al., 2008). Between 1990 and 2004, while overall prevalence decreased, educational inequalities in smoking increased in almost all US states (Harper & Lynch, 2007). More recently, a study in New York City between 2002 and 2006 revealed greater decreases in smoking prevalence among higher-educated groups than lower-educated groups: 21% versus 6% reduction (CDC, 2007b). A series of national cross-sectional surveys conducted between 1983 and 1993 revealed that the smoking rate among those below the poverty line declined from 40% in 1983 to 32% in 1993, while the rate among those at or above the poverty threshold went from 32% to 24% (Flint & Novotny, 1997). On examining more recent data from the same national survey, Fagan and colleagues (2007) noted that disparities in smoking rates between those above and below the poverty line had not changed in the last 10 years. In New Zealand, between 1981 and 1996, smoking prevalence declined in all groups, although socioeconomic differences increased in relative terms over this time (Hill, Blakely, Fawcett, & Howden-Chapman, 2005). Likewise, Australian data for the period from 1989-90 to 2001 showed a decrease in smoking prevalence each year for both males and females, but few differences were seen between socioeconomic groups in the percentage decline (Najman et al., 2006).

Several European studies have also examined inequalities in smoking using national surveys, comparing multiple countries within the European Union. In these studies, a significant educational gradient was observed for men in all or most countries (Cavelaars et al., 2000; Giskes et al., 2005;

Huisman, Kunst, & Mackenbach, 2005a, 2005b). Women with lower education/socioeconomic status were more likely to smoke in Northern countries, but less likely to smoke in Southern countries (Cavelaars et al., 2000; Giskes et al., 2005; Graham, 1996; Huisman et al., 2005a, 2005b), although this pattern has recently shown signs of reversing to parallel the one observed in Northern Europe (Borras, Fernandez, Schiaffino, Borrell, & La Vecchia, 2000; Federico, Kunst, Vannoni, Damiani, & Costa, 2004; Huisman et al., 2005a). The relationship between education and smoking was stronger among men, and in younger age groups (Cavelaars et al., 2000; Federico et al., 2004; Huisman et al., 2005a, 2005b; Schaap et al., 2008). The same pattern in smoking was also observed for income, although the relationship was not as strong as with education (Huisman et al., 2005b). These findings support the four-stage smoking epidemic theory, where smoking is initiated first by men and those of higher SES, then women and those of lower SES, with smoking declines following the same pattern (Lopez, Collishaw, & Piha, 1994); Northern countries are in a more advanced stage than Southern Europe. In addition, between 1985 and 2000, greater declines in smoking prevalence and consumption levels were seen among higher educated groups in most of the countries studied, leading to increasing inequalities within this time period (Giskes et al., 2005). However, it is of note that two countries (Italy and Britain) actually showed the opposite trend in this study, with greater declines in smoking among the lowest-educated groups (Giskes et al., 2005). In general, European studies have found evidence of growing inequalities in smoking over time, with the Northern countries showing greater disparities, presumably because they are at later stages of the tobacco epidemic.

2.2.3 Patterns of smoking cessation by SES

Smoking cessation follows a pattern inverse to that of tobacco use, with higher SES smokers consistently displaying the highest quit ratios (Kunst et al., 2004). The observed declines in smoking have been faster in higher socioeconomic groups, leading to increased socioeconomic differences in smoking prevalence (Bobak et al., 2000; de Walque, 2004; Giovino, Henningfield, Tomar, Escobedo, & Slade, 1995; Giskes et al., 2005; Jarvis & Wardle, 2006; NCHS, 1998).

Socioeconomic status has been identified as a predictor of quit intentions, quit attempts and quitting success in a number of studies, although there is some variability in the findings. Data from the ITC Four Country Survey showed that smokers with less than a high school education had 40% greater odds of having no intentions to quit smoking, compared to smokers with some university (Siahpush, McNeill, Borland, & Fong, 2006). Also, smokers with low income (below $30 000/£15 000) had 23% greater odds of having no intention to quit than smokers with high income ($60

000/£30 001 and over) (Siahpush et al., 2006). A US study of young adults also found that smokers with moderate income ($25 000 – 49 999) were less likely to intend to quit in the next 6 months than smokers with higher incomes (Fagan et al., 2007). In addition, a Dutch study among smokers in deprived neighbourhoods found that those with higher education were more likely to intend to quit smoking (Dotinga, Schrijvers, Voorham, & Mackenbach, 2005). On the other hand, another Dutch study did not observe any relationship between education and intention to quit in the next month (Droomers, Schrijvers, & Mackenbach, 2004), and a recent Canadian analysis also failed to find an association between education and intention to quit smoking in the next six months (Reid, Hammond, & Driezen, 2008).

Some studies have also observed differences in quit attempts by socioeconomic measures. A US study found that daily smokers with lower education levels and those with income below $20 000 were less likely to have made a quit attempt in past year compared to college graduates and smokers with income over $75 000; in addition, smokers with income below $10 000 were significantly less likely to remain abstinent for at least three months (Levy, Romano, & Mumford, 2005). Likewise, a different US study found that smokers with high school or less education had about half as many 24-hour quit attempts and 3-month periods of abstinence as college graduates (Gilman et al., 2008). Another study found that smokers with household incomes of $15 000-$25 000 and over $60 000 were most likely to have attempted to quit in the past year, as were smokers with at least some college education, compared to those with high school or less (Shiffman, Brockwell, Pillitteri, & Gitchell, 2008b). An older study noted that compared to smokers with 16 or more years of education, high school graduates were 47% less likely to make a major (at least 7-day) quit attempt (Hatziandreu et al., 1990). More recent US data show similar findings that smokers with some college or college graduates were more likely to have attempted to quit in the past year, compared to high school graduates (Lillard, Plassman, Kenkel, & Mathios, 2007). This study also tested income, but found it was not a significant predictor of quit attempts (Lillard et al., 2007). In another study, the proportion of smokers who attempted to quit in the past year was similar among educational and income groups (Barbeau et al., 2004). Similarly, analysis of data from first two waves of the ITC Four Country Survey did not find an association between education or income and making a serious quit attempt since the last survey (Hyland et al., 2006). Recent studies in Canada (Reid et al., 2008) and the UK (West, 2008) have also failed to find an association between education (in Canada) or social class (in the UK) and likelihood of having made a quit attempt. Overall, these findings indicate that lower SES smokers are either less or equally likely to make quit attempts than their higher SES peers; in all

cases where differences have been found, they were in the direction of greater attempts with higher SES.

Lower SES groups are also generally less likely to be successful quitters, although there is some variation in whether education and/or income are significantly related to quitting, and to what degree. Many Canadian and American studies have documented a relationship between education and cessation. In one longitudinal study, educational attainment was significantly related to likelihood of quitting, with each additional year of education associated with 25% higher odds of quitting, even after adjusting for other SES measures in childhood and adulthood (Gilman, Abrams, & Buka, 2003), and another analysis with similar variables controlled found that smokers with less than high school or a GED had only a third the odds of quitting of college graduates (Gilman et al., 2008). An analysis of data from 1940 to 2000 demonstrated that the likelihood of quitting smoking increased with education level, and the strength of this relationship increased among younger birth cohorts; probability of quitting increased by 8% for every additional year of education (de Walque, 2004). Canadian data have shown the quit ratio for post-secondary graduates was 2.2, while only 1.4 for those who did not complete high school (Physicians, 2005). Likewise, US data indicated that in 2000, the percentage of ever smokers who had quit ranged from 34% among those with a GED diploma to 74% among those with graduate degrees (CDC, 2002b). A recent study found that those with some college and college graduates had 15-23% and 34-67%, respectively, higher odds of successfully quitting compared to high school graduates, but income was not a significant predictor of successfully quitting (Lillard et al., 2007). Another study found that the proportion of former smokers among those with at least a four-year college degree was 20%, whereas it was only 6% among those who did not complete high school, and 18% among those with a high school diploma (Barbeau et al., 2004).

Conversely, some studies have found no relationship with education, but noted relationships with income. In a sample of unemployed adults in the US, those with lower family income had half the odds of successfully quitting for at least 12 months, although education was not significantly related to quitting success (Fagan, Shavers, Lawrence, Gibson, & Ponder, 2007). However, this same study found that those with less than 16 years of education or household income less than $25 000 were half as likely to be former smokers than those with 16 or more years of education or household income over $50 000 (Fagan et al., 2007). In addition, a five-year follow-up of participants in the COMMIT study revealed 34% and 47% higher odds of quitting for at least six months among smokers with

income of $25 000 to $40 000, and over $40 000, respectively, compared to smokers with income below $10 000; in this study, education was not a significant predictor of cessation (Hymowitz et al., 1997).

Additional studies have observed a relationship between cessation and income. In a US population study, former smokers made up just over 13% of those who were below the poverty line or up to double the poverty line income, but were 22% of those with income of three times the poverty line or more (Barbeau et al., 2004). In a series of national cross-sectional surveys between 1983 and 1993, those below the poverty line were significantly less likely to be quitters in each survey year, and were about a third less likely to quit in the most recent years (Flint & Novotny, 1997). Similarly, survey data from 2000 indicates that 50% of ever smokers above the poverty line had quit smoking, compared to only 34% of those below (CDC, 2002b). More recently, a different national survey found that living below the poverty line was associated with 25-40% reduced odds of quitting (Agrawal, Sartor, Pergadia, Huizink, & Lynskey 2008).

Comparable results are seen in European countries. For example, a Swedish study found that middle-aged adults in higher non-manual occupations were twice as likely to have stopped smoking as unskilled manual workers (Lindstrom, Hanson, Ostergren, & Berglund, 2000). Also, a twin study in Finland found that men with a university degree were more than twice as likely to quit smoking, and university-educated women were almost four times more likely to have quit smoking than respondents with primary school or less (Broms, Silventoinen, Lahelma, Koskenvuo, & Kaprio, 2004); very similar results were found in a Spanish study (Fernandez et al., 2001). A Danish longitudinal study showed that social status was a significant predictor of abstinence for at least one year, with smokers in the lowest two social strata having only 40% the chance of successful quitting as those in the highest two strata (Osler & Prescott, 1998). Another study indicated that Danish women with lower education were also less likely to quit smoking (Osler et al., 1999). Moreover, a two-year follow-up study of British women smokers found that age at school leaving was significantly related to likelihood of being an ex-smoker at follow-up, with 20% of women who left school at 17 or older having quit, compared to only 8% of women who left at 16 or younger (Graham & Der, 1999). Finally, an analysis of national surveys from 18 European countries found that higher educated smokers were more likely to have quit than lower educated smokers in all countries and within each age- and sex-specific group studied (Schaap et al., 2008).

On the other hand, some studies have not found a relationship between SES and quitting, particularly in multivariate analyses including other important factors. Longitudinal analysis of data from first two waves of the ITC Four Country Survey found that education and income were not generally associated with quitting success (smoking less than once per month), although a few particular levels in certain countries were significantly associated with quitting success (Hyland et al., 2006). In addition, an Australian study noted that while education had the strongest relationship with smoking cessation of all the sociodemographic variables included, the relationship between higher education and increased odds of cessation disappeared when other personal and environmental factors were included in the analysis (Siahpush, Borland, & Scollo, 2003). The authors suggested that these results may be indicative of environmental variables such as household smoking restrictions and friends smoking mediating the relationship between SES and cessation (Siahpush et al., 2003). Similarly, a Danish study found that although smokers in the highest social class were twice as likely to have quit as those in the lowest, heavy smoking and work environment accounted for over half of the social differences observed (Albertsen, Hannerz, Borg, & Burr, 2003). It appears that various individual and environmental factors may at least partially mediate the relationship observed between SES and smoking cessation.

2.2.4 Time trends in cessation by SES

Analyses of smoking cessation patterns over time in Western countries have documented a trend toward increasing cessation in higher SES groups, widening inequalities in smoking. In the US, data from 1950 to 1990 has indicated that quit rates increased five-fold during this time, but the increase was lower among the lower-educated (Gilpin & Pierce, 2002). In the most recent year, quit rates among the college-educated were more than twice that of smokers who did not finish high school (Gilpin & Pierce, 2002). Similarly, quit rates between 1977 and 1990 were highest among professional occupations and lowest among blue-collar workers, leading to increased differences in current smoking by occupational group in the US (Covey, Zang, & Wynder, 1992). In the UK, smoking cessation rates doubled from 25% in 1973 to 58% in 2003 among the affluent, but the rates of the lowest groups remained unchanged at about 10% (Jarvis & Wardle, 2006). Among a British cohort born in 1958, quit rates varied significantly by social class, with smokers from professional/managerial backgrounds more likely to quit than those from a manual background, and quit rates of the highest groups almost double that of the lowest (Jefferis, Power, Graham, & Manor,

2004). This social gradient in smoking increased with age, largely due to increased quitting among higher SES groups (Gilpin & Pierce, 2002; Jefferis et al., 2004).

European studies on smoking cessation show a similar pattern over time. In a study of 12 countries, the relationship observed between higher education and lower smoking prevalence was weaker for ever smoking than current smoking, suggesting that higher-educated groups have had higher rates of quitting (Cavelaars et al., 2000). Similarly, an 18-country study found the greatest educational differences in quit ratios among younger people, suggesting a widening of the socioeconomic gap in smoking and quitting over time (Schaap et al., 2008). A Spanish study of cessation between 1987 and 1997 indicated that among men, quit ratios were higher among the more educated, and educational differences in cessation increased over this time period (Fernandez, Schiaffino, Garcia, & Borras, 2001). Among women, quit ratios actually decreased during this time, particularly in the lower education groups, and educational inequalities increased (Fernandez et al., 2001). Another Spanish study found that the incidence of quitting smoking increased between 1965-66 and 1999-2000 among both males and females (although increases were greater among males and older people); however, while quitting incidence continued to rise among adults with higher education, it levelled off in lower education groups, leading to widening educational differences in smoking (Schiaffino et al., 2007). Likewise, an Italian study of three cohorts born between 1940 and 1969 found that smokers with at least high school were more likely to have quit than smokers with less than a high school education (Federico, Costa, & Kunst, 2007). Although smoking prevalence declined in each subsequent cohort, the largest decline was in higher-educated males (Federico et al., 2007). In addition, while higher-educated females had higher prevalence in the oldest cohort, this trend reversed by the youngest cohort (Federico et al., 2007). This study revealed an overall pattern of increasing inequality, with the greatest socioeconomic differences in smoking among the youngest cohort; widening inequalities in initiation were seen among men, and women showed higher smoking uptake in lower education groups and increasing differences in cessation (Federico et al., 2007). All in all, lower SES populations are more likely to smoke and less likely to quit than higher SES populations.

2.3 Potential Explanations for SES Differences in Tobacco Use and Cessation

2.3.1 Explanations for socioeconomic patterns in tobacco use

Lower SES populations are at increased risk of starting to smoke, are more dependent if they do, and also have reduced chances of quitting successfully (Bobak et al., 2000; de Walque, 2004; Fagan et al., 2007; Gilman et al., 2003; Jarvis, 2004; Jarvis & Wardle, 2006; Kunst et al., 2004; McCaffery et al., 2007). A number of explanations have been posited for why these patterns are observed, relating to both material and psychosocial theories of health disparities. Material conditions, such as education, economic circumstances, and living/working conditions may promote smoking. The educational explanation posits that the poor and less educated are less aware of the health hazards of smoking, and thus are more likely to engage in the behaviour (Bobak et al., 2000). Research indicates that lower SES populations have lower health knowledge regarding the harmful nature of tobacco (Brownson et al., 1992; Siahpush, McNeill, Hammond, & Fong, 2006; Viswanath et al., 2006), supporting this explanation. According to the economic theory, assuming the same perceived benefits, lower income earners have less to lose from future health problems and subsequent losses caused by smoking (Bobak et al., 2000). The social environment, including the smoking behaviour of role models and peers (Jarvis & Wardle, 2006) and other environmental characteristics, may also encourage smoking and/or discourage quitting. For example, Honjo and colleagues (2006) found that exposure to smoking in the home was a significant mediator in the relationship between social class and smoking cessation, with higher home smoking exposure among those of lower SES; the work environment has also been found to contribute to SES differences in smoking (Albertsen et al., 2003; Sorensen, Emmons, Stoddard, Linnan, & Avrunin, 2002).

Among smokers, greater nicotine dependence is observed among those who are disadvantaged, as shown by dependence indicators and quantitative intake measures (Bobak, Jarvis, Skodova, & Marmot, 2000; Jarvis, 2004; Jarvis & Wardle, 2006). Increased dependence decreases the likelihood of quitting smoking among low SES groups; this can be observed in their lower quit ratios. Lower SES groups may seek higher nicotine doses because of psychosocial factors (Jarvis & Wardle, 2006). The self-medication hypothesis suggests that smoking may be used for mood regulation, stress management, and coping with material deprivation (Bobak et al., 2000; Jarvis & Wardle, 2006). Smoking may also be used as a replacement reward by those whose lives lack other positive rewards,

or smoking have greater rewarding properties for lower SES smokers (Bobak et al., 2000; Jarvis & Wardle, 2006).

Continued smoking is not only due to increased dependence, but also a lack of resources and support for quitting (Bobak et al., 2000). Lower SES groups have reduced access to economic capital (money, time), cultural capital (education, knowledge, history) and social capital (networks and connections) (Frohlich et al., 2006); this affects access to knowledge sources, health care, and cessation assistance, among other things. Low SES populations may also have lower levels of self-efficacy (Siahpush et al., 2006), coping skills (Stronks, van de Mheen, Looman, & Mackenbach, 1997), and social support for quitting (Droomers, Schrijvers, & Mackenbach, 2002). All of these explanations may play some role, and various factors likely interact and act together to increase the likelihood of lower socioeconomic groups smoking and decrease their likelihood of quitting.

2.3.2 Cessation assistance

Despite the growing assortment of aids for quitting smoking, previous research indicates that the vast majority of smokers who attempt to quit do not use any form of cessation assistance (Cokkinides, Ward, Jemal, & Thun, 2005; Fiore et al., 1990; Shiffman, Brockwell, Pillitteri, & Gitchell, 2008b; Statistics Canada, 2003; Zhu, Melcer, Sun, Rosbrook, & Pierce, 2000). Many smokers believe that they can quit on their own without assistance, or that help is not necessary (Gross et al., 2008; Hammond, McDonald, Fong, & Borland, 2004; Vogt, Hall, & Marteau, 2008). Furthermore, many smokers are misinformed about cessation aids, believing them to be unsafe and/or ineffective (Gross et al., 2008; Hammond et al., 2004; Roddy, Antoniak, Britton, Molyneux, & Lewis, 2006; Vogt et al., 2008). In addition to attitudes and beliefs that do not favour use of assistance, smokers face social and environmental barriers to use, such as access and affordability of cessation aids (Gross et al., 2008). Smokers may be unaware of existing forms of assistance (Hammond et al., 2004; Roddy et al., 2006), or perceive them as too expensive (Gross et al., 2008; Roddy et al., 2006). Barriers to the use of assistance are potentially more common in lower SES populations that may have less knowledge and access to effective cessation assistance.

Differential access to and use of effective cessation aids may contribute to lower quit rates among lower SES populations (Moolchan et al., 2007). The literature is limited in the area of socioeconomic patterns in what types of cessation assistance are used and are effective, and many of the existing studies on disparities focus on insurance status or racial/ethnic disparities. However, some studies

have documented a relationship between SES and use of cessation assistance overall, and also for various types of assistance, including nicotine replacement therapy, counselling from health professionals, and telephone helplines.

Studies examining the relationship between SES and the use of cessation assistance in general and for a range of products and programs have found evidence of lower usage among lower socioeconomic groups. Fiore and colleagues (1990) found that more educated smokers were more likely to use an assisted cessation method (such as attending a program, consulting a psychologist, or nicotine replacement therapy), and another more recent study found that more educated and higher-income smokers were more likely to undertake any treatment (Shiffman, Brockwell, Pillitteri, & Gitchell, 2008a). However, others have found no difference by education in seeking cessation assistance, or in use of specific types of assistance (Zhu et al., 2000). Another American study found that although education and income were not significantly directly linked to smoking cessation, smokers with higher education and income were significantly more likely to use resources for quitting, which significantly increased chances of quitting success (Honjo et al., 2006); use of cessation resources was thus proposed as an important mediator of the relationship between socioeconomic status and smoking cessation (Honjo et al., 2006). Concerning more specific types of assistance, an analysis comparing methods of cessation chosen by smokers of varying SES found that choice of quit methods varied with socioeconomic characteristics, including education and income (Lillard et al., 2007). When modeling the probability of having used programs or products (compared to no-cost methods), those with less than a high school education were 22% more likely to use a product and 20% more likely to use a program than high school graduates (Lillard et al., 2007). Income was also positively associated with using a program and using a product, compared to using a no-cost method (Lillard et al., 2007). Similarly, Shiffman and colleagues (2008a) found that medications were used more often by smokers with higher incomes and higher education level, and also that higher-educated smokers were more likely to combine behavioural and pharmacological treatments.

Nicotine replacement therapy (NRT) has been shown to increase one's chances of quitting by 50-100% (Etter & Stapleton, 2006; Stead, Perera, Bullen, Mant, & Lancaster, 2008) and is a recommended treatment for quitting smoking (Fiore et al., 2000). However, studies show that lower SES smokers are generally less likely to use this type of cessation aid. A study in Massachusetts revealed that only 17% of lower income past-year smokers used NRT in a quit attempt, compared to

26% of higher income smokers (Thorndike, Biener, & Rigotti, 2002). Similarly, a study using data from the COMMIT trial in the US found that smokers with higher household income (above $40 000) were more than twice as likely to use the nicotine patch as those with income below $10 000 (Cummings, Hyland, Ockene, Hymowitz, & Manley, 1997). Education was also tested in this study, but was not significantly associated with nicotine patch use (Cummings et al., 1997). More recently, a study of the characteristics of smokers who elect to use NRT found that smokers with higher education were more likely to use NRT (those with college education had 40% higher odds of use than those with less than high school), and smokers with higher household income (over $40 000) were also significantly more likely to use NRT than smokers with income below $15 000 (Shiffman, Di Marino, & Sweeney, 2005). In addition, a recent review suggests that the switch to over-the-counter status for NRT may have decreased access for lower SES smokers who are not reimbursed for non-prescription medications (Moolchan et al., 2007). The cost of NRT creates a barrier to use (Gross et al., 2008), particularly for lower SES smokers, although subsidization of NRT may help to overcome this obstacle (Giskes et al., 2007).

Advice from a physician or other health professional is another form of assistance found to increase cessation rates in the general population (Gorin & Heck, 2004; Stead, Bergson, & Lancaster, 2008). However, some disparities in provision of advice and assistance by health professionals has been documented, most notably by race/ethnicity (Arday, 2000; Doescher & Saver, 2000; Frank, Winkleby, Altman, Rockhill, & Fortmann, 1991; Gilpin, Pierce, Johnson, & Bal, 1993; Houston, Scarinci, Person, & Greene, 2005; Hymowitz, Jackson, Carter, & Eckholdt, 1996; Lopez-Quintero, Crum, & Neumark 2006), but also by socioeconomic status. For example, a national survey in the US found that among those who had visited a health care provider in the last 12 months, those with greater socioeconomic advantage (as defined by a composite measure of income, education, and health insurance status) were more likely to have received assistance to quit smoking, and this relationship followed a gradient (Browning, Ferketich, Salsberry, & Wewers, 2008). Similarly, a different national survey identified a relationship between lower education and lower rates of receiving advice to quit from a health care provider, even after adjusting for a number of other health and socio-demographic factors (Houston et al., 2005). A study in Rhode Island also found that patients with income above $20 000 were more likely to receive assistance, and more educated patients were more likely to receive assistance or receive a prescription (Goldstein et al., 1997). On the other hand, other US studies have found that physicians were more likely to discuss smoking cessation with lower-income smokers than high-income smokers (Taira, Safran, Seto, Rogers, &

Tarlov, 1997), that patients with more education were less likely to report being advised to quit (Arday, 2000), and that low SES patients (defined as on medical assistance, having no insurance, or with income below 150% of the poverty level) were more likely to report being asked if they smoked and advised to quit (Solberg, Brekke, & Kottke, 1997). A UK study found no difference by occupational class in the provision of advice from a health professional, but also that smokers in routine/manual occupations were more likely to have asked a health professional for assistance in quitting compared to smokers in managerial/professional occupations (Lader, 2007). From these findings, it is unclear whether lower SES smokers are more or less likely to receive tobacco screening and cessation advice from their primary health care providers, but there is potential for differential effects in either direction.

Telephone helplines are another form of cessation assistance that has been proven effective (Stead, Perera, & Lancaster, 2006) but may be underutilized by lower SES smokers, although findings are mixed. Studies in the US and Australia have suggested that low SES smokers were less likely to use quitlines than higher SES smokers (Niederdeppe, Fiore, Baker, & Smith, 2007; Siahpush, Wakefield, Spittal, & Durkin, 2007). A UK study, however, found that the social class profile (percentage in manual occupations or unemployed) of helpline callers accurately reflected the social class profile of all adult smokers (Owen, 2000). In addition, a European review suggested that telephone helplines may be particularly effective in reaching low SES groups (Giskes et al., 2007). Media campaigns advertising quitlines have been successful in increasing lower-SES callers in some cases (Pierce, Anderson, Romano, Meissner, & Odenkirchen, 1992; Platt, Tannahill, Watson, & Fraser, 1997), but not in others (Niederdeppe et al., 2007; Siahpush et al., 2007).

In summary, existing research indicates that socioeconomic factors may affect the use of cessation assistance: lower SES smokers appear less likely to use any assistance, cessation programs, and pharmacological treatments, and SES differences may also exist for advice from a health professional and use of a telephone helpline, although findings are not consistent. Some studies also demonstrated a relationship between income and use of cessation aids that are associated with a financial cost. Use of cessation assistance is a potentially important reason for the lower smoking cessation rates observed in lower SES groups, since lower SES smokers may be less likely to use available cessation methods (Moolchan et al., 2007). In addition, even if there is equitability in provision and use of assistance for lower SES patients, the effectiveness of that assistance may not be equal across SES groups. Given the lower likelihood of quitting for lower SES smokers, in order to decrease

inequalities in smoking cessation, lower SES groups need better, not just equitable, access to services (Low, Unsworth, Low, & Miller, 2007). Services that offer low- or no-cost assistance, such as telephone helplines or subsidized cessation programs and medications, have the potential to reduce inequalities, if accessed. For example, the UK National Health Service targeted disadvantaged areas with their free stop-smoking services and evaluations found evidence of "positive discrimination," where services were being used by a higher proportion of smokers in disadvantaged areas compared to more affluent areas, leading to increased quitting among lower SES smokers despite their tendency to be less successful in a given cessation attempt (Bauld, Judge, & Platt, 2007; Chesterman, Judge, Bauld, & Ferguson, 2005).

2.3.3 Population-level tobacco control interventions and SES

Another potential contributor to socioeconomic disparities in smoking and cessation may be differential effects of interventions, as the tobacco control environment may impact smoking and quitting behaviour differently depending on SES. While tobacco control interventions are largely focussed on more downstream determinants of health (individual behaviour, health knowledge, etc.), upstream social determinants of health (both material and psychosocial) may be helpful in explaining the postulated differences in intervention effectiveness. Intervention effectiveness is likely affected by the same factors that influence smoking; these may include access to material resources (such as money, education, health care, etc), environmental conditions, cultural factors (e.g. locus of control) and psychosocial factors (such as marginalization, stress and coping, support, self-efficacy, etc.) (Stronks, van de Mheen, Looman, & Mackenbach, 1997). Although the past decade has seen an increase in the introduction of various population-level interventions to reduce tobacco use in many developed countries, little is known about whether these interventions have affected all segments of the population equally, or if there have been differential effects on some sub-groups, particularly those of lower SES. Recent reviews that have attempted to address this question found that for most types of policies, there was insufficient evidence to gauge such effects (Giskes et al., 2007; Thomas et al., 2008); a "review of reviews" found that studies of population-level interventions rarely report whether effects vary by sociodemographic group (Main et al., 2008). Potential differential effects of these tobacco control policies are important to explore and document, given their implications for socioeconomic disparities in smoking rates (Fagan et al., 2004; Moolchan et al., 2007). The following sections describe the rationale for and current state of knowledge on differential effects of

interventions, generally, and specifically in the areas of taxation, smoking restrictions, and health communications.

General policy effects

Only a few studies have examined the overall effects of national-level policies on sub-groups over time. In an effort to determine the effects of tobacco control policy implementation in New Zealand, survey data from 1981 to 1996 was analysed by SES, revealing that socioeconomic differences increased in relative terms during this period of enhanced tobacco control activity (Hill et al., 2005). Conversely, a recent analysis of Canadian data suggested that current policies have not only been effective for all levels of SES, but may actually be reducing some inequities in smoking (McDonald, 2006). Likewise, using a computer simulation to model the effects of policies (including price, clean air laws, media campaigns and youth access policies) on smoking prevalence and cessation in the US from 1997 to 2003, similar patterns emerged for the general population and most age, sex, and racial-ethnic groups; however, the predominant trends were explained mainly by changes in price, with only some effect of the other policies (Levy, Nikolayev, & Mumford, 2005). Also, European studies of policy implementation and smoking prevalence in six countries between 1985 and 2000 found parallel trends in increasing policy implementation and decreasing smoking prevalence among lower-educated men (but no decrease among lower-educated women), and suggested that declines among the less educated may have been in response to tax increases and other policies reaching disadvantaged populations (Giskes et al., 2005, 2007). However, the authors noted that it was not clear whether policies were directly responsible for this trend, or if cessation was simply diffusing from higher to lower SES groups (Giskes et al., 2005, 2007). In addition, a study using national survey data from 18 European countries found that although a composite measure of strength of national tobacco control policies was associated with national quit ratios, this association did not vary consistently between higher and lower educated groups, indicating that both educational groups benefited equally from national tobacco control policies (Schaap et al., 2008). Of the specific policy types considered in the analysis, price policies were the most strongly associated with quit ratios in both higher and lower educational groups, followed by advertising bans, which had a stronger relationship with quit ratios in the higher educated group (Schaap et al., 2008). However, the existing educational differences in smoking persisted regardless of the strength of tobacco control policies in each country (Schaap et al., 2008). Taken together, these studies indicate that national smoking

policies have an impact on smoking and cessation, although this impact may vary by SES and depending on the policy, and that price policies may have the largest effect on lower SES smokers.

Taxation

Increased taxation, which in turn increases the real price of cigarettes, has the potential to reduce tobacco consumption more in low SES groups, thus reducing smoking inequalities. Since these groups have fewer material resources and less money to spend on cigarettes, the impact of increased taxation would be greater, thus increasing quitting. Tax increases are thus a progressive public health policy, since they cause greater reductions in smoking among lower rather than higher income groups (Warner, 2000). Evidence from the UK has indicated that lower socio-economic groups are more likely to decrease their cigarette consumption in response to rising tobacco prices (Townsend, Roderick, & Cooper, 1994). American data also show that low income smokers (Farrelly & Bray, 1998) and women with low education (Levy, Mumford, & Compton, 2006) are most responsive to price. A review in the area found that most existing evidence indicated that price increases had greater effects on those with lower incomes and those in manual occupations (Thomas et al., 2008).

However, there is some controversy about the equitability of taxation effects. Lower SES smokers have higher levels of dependence and greater difficulty quitting, and they may not quit in response to increased taxation, which would then make them worse off (Remler, 2004). Those who do not quit may instead to switch to cheaper products, possibly reduce consumption and compensate by smoking more intensely, or just direct more of their limited resources to tobacco (Giskes et al., 2007). These consequences would not lead to any reduction in health risks from smoking, and the latter may increase financial stress, thus increasing stress, decreasing resources available for other necessities, and ultimately increasing disparities. An analysis of US data between 1984 and 2004 found that although cigarette prices increased, declines in smoking prevalence were greater in higher-income groups (Franks et al., 2007). In addition, price elasticities decreased over this time until they were not significantly different between SES groups, suggesting taxation may no longer be effective (Franks et al., 2007). There is, however, some debate about this study (Farrelly & Engelen, 2008; Franks, Jerant, & Leigh, 2008), with a similar analysis showing that increasing cigarette prices discourages smoking, although effects may have been less on those with the lowest income (Farrelly & Engelen, 2008). The review noted above also found some evidence of greater effects among those with higher education, although these effects may have been study-specific (Thomas et al., 2008). Regardless,

based on existing evidence, reviews suggest that increasing the price of tobacco through taxation is effective in reducing tobacco consumption, particularly in lower income groups, and may be the most effective policy for reducing socioeconomic disparities (Giskes et al., 2005; Greaves et al., 2006; Thomas et al., 2008).

Smoking restrictions

Fully implemented public smoking restrictions should protect all people equally, and may even have a greater impact on those who would otherwise be exposed to higher levels of second-hand smoke (SHS). Workplace smoking bans are effective for reducing smoking prevalence and cigarette consumption by workers (Bauer, Hyland, Li, & Cummings, 2005; Fichtenberg & Glantz, 2002; Moher, Hey, & Lancaster, 2005), but there is a lack of data on whether they have differential impact on sub-groups (Giskes et al., 2007; Greaves et al., 2006). The prevalence and potential impact of smoking bans may differ by occupation and SES. Smoking restrictions are generally implemented first in schools, hospitals and offices, which have higher SES employees, and last in service industry and blue-collar settings, which have more low SES employees; outdoor occupations (which are often manual labour) are usually not included in workplace restrictions. Indeed, a review in the area concluded that although the evidence is weak, workplace smoking restrictions may be more effective for those in higher occupational grades (Thomas et al., 2008). A New Zealand study demonstrated that second-hand smoke exposure among non-smokers was strongly and inversely related to SES, at a time when government policies restricted smoking only in office workplaces (Whitlock et al.,1998), suggesting that smoke-free workplace policies may have contributed to the gradient in exposure. In addition, a study of US women found a socioeconomic gradient for the prevalence of having workplace or home smoking restrictions (Shavers et al., 2006), and another national study revealed an income gradient in exposure to second-hand smoke and less of a decrease in SHS exposure over time among lower income groups (CDC, 2008). When partially implemented, smoking bans may increase tobacco-related disparities, but if fully implemented they have the potential to decrease smoking inequalities (Giskes et al., 2005).

Health communications

Health communication strategies for tobacco control, including mass media campaigns and tobacco warning labels, can have significant effects on reducing tobacco use in the general population (Bala,

Strzeszynski, & Cahill, 2008; Friend & Levy, 2002; Hammond, Fong, McDonald, Cameron, & Brown, 2003; Hammond, Fong, McNeill, Borland, & Cummings, 2006; Hammond, McDonald, Fong, Brown, & Cameron, 2004; Hammond et al., 2007; Sowden & Arblaster, 1998; Wakefield et al., 2008). However, there is little data to show the effects of health communications by socioeconomic status. For example, there has been no analysis of graphic warning labels by SES, and little is known about the effectiveness of mass media campaigns by SES.

Although health communication efforts have the potential to reach all segments of the population, all may not respond equally. Traditional tobacco control communications have focussed on informing individuals about the risks of smoking, with the goal of increasing perceptions of personal risk and susceptibility, and prompting individual behaviour change. This approach assumes that the individual will attend to and understand the message, react as intended, and have the ability to change. For this reason, health promotion messages may have the greatest impact on those who are better educated and have better access to material resources. Trends in smoking prevalence over the last 40 years suggest early anti-smoking campaigns likely had a greater impact on higher SES groups. Indeed, Townsend and colleagues (1994) found that "health publicity" was most effective in reducing smoking in higher SES groups, and observed a significant linear gradient. However, an Australian study found mass media campaigns in the 1980s were generally equally successful in decreasing smoking prevalence across educational groups, and did not increase the educational gap in smoking, and so proposed it as a method to reduce tobacco-related health disparities (Macaskill, Pierce, Simpson, & Lyle, 1992). A more recent study of policy effects on a national sample of US women over a ten year period (1992-2002) found that smoking rates declined at a greater rate among lower educated than more highly educated women during this time, and that low- and medium-educated women were particularly responsive to media messages (Levy et al., 2006). Another US study found that in a state-wide mass media campaign, a message about persisting in trying to quit smoking was more effective in promoting quit attempts among higher educated populations compared to those with high school or less (Niederdeppe, Fiore, Baker, & Smith, 2008). Finally, a recent comprehensive review of media campaigns promoting cessation concluded that such campaigns are often less effective at increasing cessation among socioeconomically disadvantaged populations, although sometimes they have been shown to be equally effective, and rarely they are more effective (Niederdeppe, Kuang, Crock, & Skelton, 2008). Further, the authors posit that there may be socioeconomic differences in exposure to media campaigns, smokers' motivation to quit in response to the messages, and/or ability to stay quit (Niederdeppe et al., 2008).

The information and motivational approaches of health communication campaigns may be more effective if they are tailored and reach people with lower awareness about the harms of smoking. However, while such campaigns may increase health knowledge, education alone is not likely to be sufficient to reduce inequalities in smoking among low SES groups. Other contextual factors may be more important to one's smoking, including dependence, personal resources, social and environmental influences, and one's own lived experience. Overall, the evidence for effectiveness of health communications in reducing smoking inequalities is limited and inconsistent, although it has some potential.

Summary of population-level tobacco control interventions

There is limited research in the area of population-level tobacco control interventions and effectiveness by SES, much of it conflicting and sometimes speculative in nature. In fact, reviews that have attempted to evaluate the potential differential effectiveness of policy interventions in different social groups concluded that effects by socioeconomic status are largely unexplored (Greaves et al., 2006; Main et al., 2008; Ogilvie & Petticrew, 2004; Thomas et al., 2008). However, some of these policies and programs have the potential to reduce smoking inequalities in addition to reducing overall smoking rates, and are recommended as promising strategies. For example, European reports suggest that tobacco control measures such as banning advertisements, raising tobacco prices, workplace interventions, removing barriers to cessation therapies, and telephone helplines, have the potential to reduce overall smoking prevalence while also achieving the largest reductions among lower socio-economic groups (Giskes et al., 2005, 2007). Similarly, Australian reports suggest that tobacco control programs that include media campaigns to promote quitting, real increases in the price of cigarettes, and increased restrictions on smoking in public places, can work to reduce smoking among all socioeconomic groups and can be particularly effective with lower socioeconomic groups (White et al., 2003). Further research is needed in this area to measure the effects of interventions on various socioeconomic groups, and to identify policies that are effective in reducing tobacco-related disparities.

2.4 Summary of Literature

Socioeconomic status has been clearly linked to poorer overall health outcomes and these inequalities in health may be increasing. Smoking is the largest single contributor to socioeconomic health inequalities, since lower SES populations are both more likely to smoke and less likely to quit.

Evidence suggests that inequalities in tobacco use are increasing in Western countries. As a consequence, reducing smoking in low SES populations has been identified as a key strategy for reducing health disparities. Reducing tobacco-related health disparities will require both prevention of smoking initiation among lower socioeconomic status youth and increased cessation among current smokers.

A number of factors may contribute to the existing socioeconomic gap in smoking and cessation, including lower use of cessation assistance among lower SES populations and possible differential effects of tobacco control policies. Various population-level interventions have the potential to impact tobacco-related inequalities, but the research in this area is limited, and the findings are mixed with respect to what impact socioeconomic characteristics may have on intervention effectiveness. As policies that may impact smoking and cessation are currently being implemented or enhanced in many countries, it is important to monitor their effects on socioeconomic disparities.

3.0 Study Rationale and Objectives

3.1 Rationale

The World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC) is the first international public health treaty, and has been ratified by over 150 countries to date. The FCTC requires countries to implement a range of tobacco control policies. Policy-makers around the world need reliable and complete information about the effects of implementing national tobacco control policies, including what works and for whom, and there is a lack of research to guide them. The ITC project was designed to fill this knowledge gap, and inform future policies as countries implement the FCTC. The ITC Four Country Survey in particular includes the leaders in tobacco control, and evaluates what are likely the most important and most powerful national policies for tobacco control.

As policies in accordance with the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC) are implemented, it is important to evaluate not only their general effectiveness, but to examine any effects such policies may have on tobacco-related inequalities within populations. This research capitalizes on a unique opportunity to study the relationship of socioeconomic status and smoking cessation during a time of considerable policy change in the area of tobacco control. The findings from this project may be used to estimate the equitability of the overall effects of tobacco control polices implemented in recent years, and potentially inform future policies and interventions. Given the political and social priorities of reducing inequalities in health, research that may inform the reduction of tobacco-related disparities through national policies is particularly valuable. As a first step, research is needed to examine recent socioeconomic trends in smoking and cessation (Fagan et al., 2004).

In addition, in order to increase cessation among current smokers, we require a greater understanding of what interventions and policies are acceptable to and effective for lower SES smokers. This research may contribute to a better understanding of who uses which methods to quit, and provide some insight into how to better target interventions and resources to encourage smokers, particularly those of lower SES, to quit.

3.2 Purpose and Research Questions

This study examined the extent to which patterns of smoking cessation and related constructs were associated with socioeconomic status in the ITC four countries (Canada, the United States, the United Kingdom, and Australia) over a four-year period from 2002-2006. In particular, the study addressed the question of whether smokers in higher SES groups were more likely to quit than those in lower SES groups, and whether other quitting-related constructs such as quit intentions, quit attempts and reducing cigarette consumption, differed by SES. As a second step, the study examined whether reasons for quitting and use of cessation assistance varied by SES group. Potential differences in the associations of interest across countries and over time (for research questions 1 through 4) and were also considered.

The specific research questions addressed were:

1. Do intentions to quit differ by SES?
2. Does the incidence of serious quit attempts differ by SES, overall and for those who intend to quit?
3. Does smoking abstinence vary by SES, overall and for those who attempt to quit?
4. Are there SES differences in making substantial reductions in cigarette consumption, overall and among current smokers?
5. Are there SES differences in reasons for thinking about quitting or staying quit?
6. Does the use of and access to cessation assistance vary by SES?

    a) Does the use of various types of cessation aids vary by SES?

    b) Do the sources and payment arrangements for stop-smoking medications vary by SES?

    c) Do opinions about access to stop-smoking medications vary by SES?

These questions were addressed through analysis of data from the ITC Four Country Survey, as described in the following section.

4.0 Methods

4.1 The ITC Four Country Survey

4.1.1 Overview

The International Tobacco Control (ITC) Project is a multinational study to evaluate the impact of policies implemented in accordance with the World Health Organization's Framework Convention on Tobacco Control (FCTC). The ITC Four Country Survey is intended to measure the psychosocial and behavioural impact of key policies included in the FCTC, as they are implemented in four countries: Canada, the United States, the United Kingdom, and Australia. This longitudinal cohort survey is conducted via telephone interviews with nationally representative samples of adult smokers in each country. Annual follow up of the cohort allows assessment of any national-level interventions implemented in the intervening time periods. To date, six waves of data have been collected, providing rich data sets for analysis, and future waves are planned through 2009.

4.1.2 Study design

The ITC policy evaluation survey takes advantage of natural experiments occurring in tobacco control by using a quasi-experimental design wherein countries are compared to themselves over time, and concurrently with other countries having different (or no) policies (Fong et al., 2006). These comparisons are possible because the study is both international and longitudinal, unique features in the field of tobacco control policy evaluation (Fong et al., 2006). Much of the existing research on national policies is cross-sectional and/or ecological and lacking comparison groups, making measurement of policy effects difficult (Fong et al., 2006). The parallel prospective cohort design in multiple countries allows detection of policy effects over time and between countries. The conceptual model of the ITC also includes multiple mediating variables so that pathways to the outcomes of interest may be examined, strengthening causal inferences (Fong et al., 2006). The real world setting of the project confers high external validity, and ensures the relevance of project findings. Further details of the conceptual framework of the ITC project are available in Fong and colleagues (2006).

The current study involved secondary analysis of existing ITC Four Country Survey data. The ITC project relies on natural experiments, which are noted for their important role in investigating the

determinants of health inequalities, and their potential for estimating the impacts of interventions on health inequalities (Petticrew et al., 2005). These roles are particularly important to the current study, making the natural experiment approach the most appropriate methodology for the research questions.

4.1.3 Samples

The ITC Four Country Survey includes nationally representative samples of over 2000 adult smokers in each country. Sample sizes were selected to allow high statistical power to detect changes in national proportions, even with anticipated between-wave attrition (Thompson et al., 2006). Eligible respondents were identified and recruited via random-digit dialed telephone surveys, using probability sampling methods.

4.1.3.1 Eligibility

To be eligible, participants had to be 18 years or older, have smoked at least 100 cigarettes in their lifetimes, and have smoked at least once in the last 30 days at the time of recruitment.

4.1.3.2 Response rates

In Wave 1, co-operation rates (proportion of screened respondents who agree to participate) were high (78.7-83.2%), although overall response rates (proportion of potentially eligible respondents who agreed to participate) for the recruitment survey were much lower (25.6-49.5%) (Table 1). However, these rates are comparable to other telephone surveys in the same countries, when calculated using the same measures. Most respondents who completed the recruitment survey (85.5-89.8%) also completed the main survey (Table 2).

Table 1: Wave 1 recruitment survey response rates[a]

	Canada	US	UK	Australia
Total Respondents (n=10 290)	2507	2493	2728	2562
Screener Completion Rate	68.3%	33.7%	53.5%	67.4%
Household Eligibility Rate	8.1%	9.6%	14.1%	14.3%
Cooperation Rate	82.3%	83.2%	78.7%	78.8%
Response Rate (AAPOR#4)	49.5%	25.6%	37.8%	45.8%
Mean Survey Length (min)	11.8	13.2	10.3	9.1

[a]From Hammond, Fong, Thompson & Driezen, 2004

Table 2: Wave 1 main survey response rates[a]

	Canada	US	UK	Australia
Total Respondents (n=9058)	2214	2138	2401	2305
Refusal Rate	4.6%	4.7%	6.5%	3.7%
Non-Contact Rate	7.4%	9.8%	5.6%	6.6%
Follow-Up Rate	88.0%	85.6%	88.0%	89.8%
Mean Survey Length (min)	43.4	44.6	38.6	38.7

[a]From Hammond et al., 2004

4.1.3.3 Recruitment and replenishment

At Wave 1, over 2000 adult smokers from each country were recruited and interviewed (Canada = 2214, US = 2138, UK = 2401, Australia = 2305) (Thompson et al., 2006). These same respondents were contacted at Wave 2 (75.8% in Canada, 62.8% in the US, 77.7% in the UK and 81.4% in Australia were retained). To replenish any respondents lost to follow up between waves, additional individuals were sampled using the same design and protocols. As a result, replenishment samples are representative of the population at each wave (Thompson et al., 2006). Respondents who quit smoking were retained in the sample for future waves. The same sampling process was followed for each subsequent wave; Figure 1 and Table 3 show retention and replenishment over waves, and by country. This design allows collection of both longitudinal data and repeated cross-sectional data.

Table 3: Sample recruitment and retention by Wave, by country

		Wave 1	Wave 2	Wave 3	Wave 4	Wave 5
Country	**Cohort**	**n**	**n**	**n**	**n**	**n**
Canada	**Wave 1**	2507	1679	1201	885	668
	Wave 2	--	603	362	250	181
	Wave 3	--	--	650	375	258
	Wave 4	--	--	--	630	321
	Wave 5	--	--	--	--	770
	Total	**2507**	**2282**	**2213**	**2140**	**2198**
US	**Wave 1**	2493	1344	800	534	382
	Wave 2	--	850	399	235	177
	Wave 3	--	--	1283	493	326
	Wave 4	--	--	--	1013	404
	Wave 5	--	--	--	--	1108
	Total	**2493**	**2194**	**2482**	**2275**	**2397**
UK	**Wave 1**	2728	1865	1328	1012	713
	Wave 2	--	304	166	115	79
	Wave 3	--	--	684	413	287
	Wave 4	--	--	--	648	327

	Wave 5	--	--	--	--	931
	Total	**2728**	**2169**	**2178**	**2188**	**2337**
Australia	**Wave 1**	2562	1876	1377	1111	831
	Wave 2	--	297	194	159	113
	Wave 3	--	--	586	397	287
	Wave 4	--	--	--	425	251
	Wave 5	--	--	--	--	905
	Total	**2562**	**2173**	**2157**	**2092**	**2387**

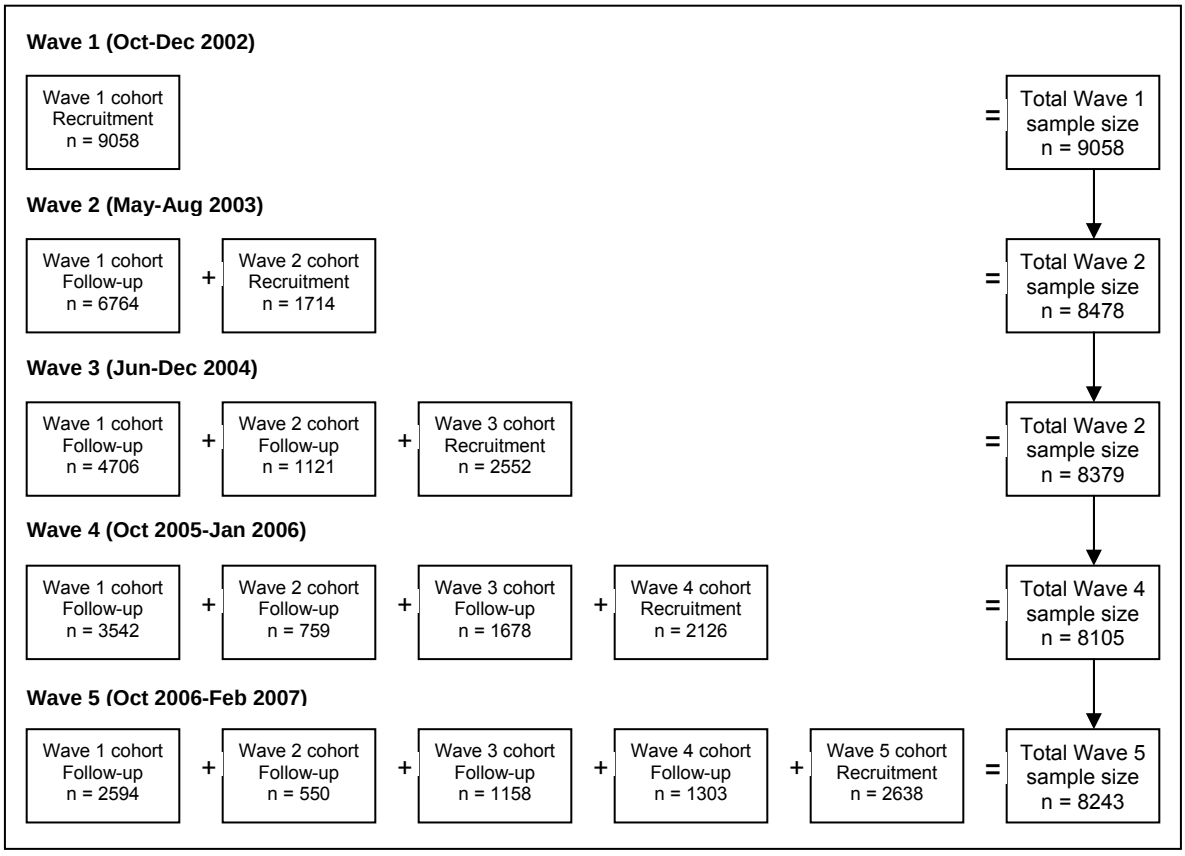

Figure 1: Sample size, retention, and timing of each ITC Four Country Survey wave

4.1.3.4 Sample representativeness

The sampling design was intended to provide a random, unbiased and representative sample of adult smokers within each country (Thompson et al., 2006). In accordance with national benchmarks, sampling weights were calculated to account for any uneven representation of some sub-groups of the population (Thompson et al., 2006). Comparisons between the Wave 1 ITC samples and national benchmark surveys indicated that the demographic profile of each sample resembled the overall

distribution of sociodemographic characteristics within each country (see Table 4). In addition, the sample is weighted using these national benchmarks to adjust for any variation. The ITC has been relatively successful in surveying traditionally hard-to-reach respondents, such as lower SES populations (Thompson et al., 2006). The ITC samples include similar populations of low education groups when compared with these national benchmark surveys. The existing sample sizes for lower education groups (at Wave 1, n = at least 1000 in each country with high school or less) and lower income groups (at Wave 1, n = at least 600 in each country for income under $30 000 (Canada, US, and Australia) or under £15 000 (UK)) are adequate for making comparisons (Thompson, 2005).

Table 4: Demographic profile of daily smokers in the ITC Four Country Survey sample at Wave 1 (unweighted percentages) compared to national benchmarks[a]

	Canada		US		UK		Australia	
Measure	**ITC**	**CCHS[b]**	**ITC**	**NHIS**	**ITC**	**GHS**	**ITC**	**NHS**
Age								
18-24	15.0	11.0	16.5	14.7	9.1	12.7	17.3	15.6
25-39	31.3	34.6	30.3	31.3	31.8	36.3	36.3	38.8
40-54	35.2	36.3	34.4	34.7	32.8	27.1	32.5	29.4
55+	18.6	18.1	18.9	19.4	26.3	24.0	13.8	16.1
Sex								
Female	53.4	54.4	54.0	52.2	55.1	50.5	51.5	55.6
Male	46.6	45.6	46.0	47.8	44.9	49.5	48.5	44.4
Race/Ethnicity[c]								
White	86.8	91.9	75.7	79.7	94.3	94.3	85.0	86.6
Other/Mixed	13.2	8.1	24.3	20.3	5.7	5.5	15.0	13.4
Education								
12 years or less	47.9	51.9	44.8	38.9	65.3	66.2	66.0	--
More than 12 years	52.1	48.1	55.2	61.1	34.7	33.8	34.0	--

Abbreviations: ITCPES – International Tobacco Control Policy Evaluation Survey; CCHS – Canadian Community Health Survey; NHIS – National Health Interview Survey; GHS – General Household Survey; NHS – National Health Survey

[a] From Hammond et al., 2004

[b] CCHS data only available for respondents 20 years of age or older

[c] In Australia, race/ethnicity was assessed by language spoken at home (English vs. Other)

4.1.3.5 Study sample

The sample for the current study was limited to respondents who were daily smokers at entry into the study. Non-daily smokers comprised less than 10% of the overall sample, and also present some difficulty for applying conventional definitions of cessation. This analysis included data from Waves 1 through 5, and included all observations for eligible respondents, regardless of their time of entry or exit.

4.1.4 Survey protocols

Interviews were conducted over the telephone by trained interviewers at professional research firms and according to standard protocols. Respondents who provided consent to participate initially completed a 10-minute recruitment survey; thank you letters and compensation ($10 US, $15 CDN, $15 AUS, or a £7 voucher for Boots shops in the UK) were then promptly sent, and the respondent was re-contacted for the 35-minute main survey one week later. For subsequent waves, a letter with compensation was sent one week prior to re-contact by telephone for the survey. Calling protocols were designed to reduce bias and maximize response rates (Thompson et al., 2006). Further details of survey protocols are available in Thompson and colleagues (2006).

The ITC Four Country Survey protocols were granted ethics approval by institutional review boards or research ethics boards in each country: University of Waterloo (Canada), Roswell Park Cancer Institute (US), University of Illinois-Chicago (US), University of Strathclyde (UK), and The Cancer Council Victoria (Australia). This secondary analysis of the ITC data for the current study also received ethics clearance from the University of Waterloo's Office of Research Ethics (ORE #14478).

4.2 Analysis

4.2.1 Measures

4.2.1.1 Socioeconomic status

Two main variables for socioeconomic status were used: education and income. **Education** level was determined by response to the survey item, "What is the highest level of formal education that you have completed?" Response options varied by country, but were equivalent to: less than high school, high school completion, technical/trade/college completion, some university, completed university degree, and post-graduate degree. These options were re-coded into three categories: low (high school or less), moderate (some post-secondary: technical/trade/college completion or some university), and high (university degree or higher).

Income level was determined by response to the survey item: "Which of the following categories best describes your ANNUAL household income, that is the total income before taxes, or gross income, of all persons in your household combined, for one year?" Response options for Canada, the

US and Australia included: Under $10,000, $10,000-29,999, $30,000-44,999, $45,000-59,999, $60,000-74,999, $75,000-99,999, $100,000-149,999, and $150,000 and over. In the UK, response options included: Under £6,500, £6,500-15,000, £15,001-30,000, £30,001-40,000, £40,001-50,000, £50,001-65,000, £65, 001-95,000, and £95,001 and over. These options were re-coded into three categories: low (=<$30,000/£15,000), moderate ($30-59,000/£15,000-30,000), and high ($60,000+/>£30,000). A fourth category included those who did not provide income information.

A **composite SES measure,** based on the work of Hyland et al. (unpublished), was also tested in addition to education and income in preliminary analyses. This measure was created using the 3- or 4-category classifications for education and income described above, and combining them as follows: low SES if both education and income were low, high SES if education and income were both moderate or high, and moderate SES for all other combinations of income and education levels. However, only exploratory analyses with this measure are reported, as composite measures are not deemed ideal or necessary for analyses with socioeconomic status, since they may obscure important differences in associations with individual SES measures (Liberatos, Link, & Kelsey, 1988).

Income and education were added to the models concurrently, and as independent variables, to measure the effect of each in the other's presence. An interaction term for education by income was also created to test the combined influence of education and income.

Exploratory analysis was also conducted to examine the role of **financial stress**. Financial stress was determined by response (yes/no) to the item: "In the last month, because of a shortage of money, were you unable to pay any important bills on time, such as electricity, telephone or rent bills?" This measure provides an indication of current financial difficulties that may be related to general stress and smoking behaviour. Since this variable was available only for Waves 4 and 5, it was not used for the longitudinal analyses, but was used only in descriptive analyses and to compare SES variables.

In addition, the event of changes to SES variables was of interest, and exploratory analyses were conducted with income changes and education changes (as measured by responses to the item, "In the last 2 years – that is, since [24M anchor: month, year] -- have there been any major changes to your income, education level, marital status, or the number of children living in the home?"). These demographic change variables were available only for Waves 3 to 5, and so were also not included in the longitudinal analyses, but used only in descriptive analyses and to compare SES variables.

The SES variables (income and education) collected at the time of each observation were used in the analysis, with one exception: Wave 2 values for income and education were imputed from Wave 1 values due to missing data (data collection error). In this way, any changes to SES variables that occurred over the course of the study were captured.

4.2.1.2 Covariates

All analyses included the following demographic covariates:

- **country** (Australia, Canada, UK, US)
- **age** (continuous)
- **sex** (male, female)
- **ethnicity** (minority, non-minority)
- **marital status** (married/common-law, separated/divorced/widowed, single)

A measure of dependence, the **heaviness of smoking index** (HSI), was included in most analyses (since if lower SES smokers are less likely to quit, the reason may be greater dependence). Depending on the analysis, the HSI variable reflected either current HSI, HSI at the previous wave, or HSI at entry into the study; for analyses that included former smokers, quitters (smoking status categories 4, 5 and 6) were assigned an HSI value of 0. The HSI was calculated as the sum of the scores from two categorical variables: time to first cigarette and cigarettes per day (Hyland, 2006). Time to first cigarette was assigned a value of 0 for >60 minutes, 1 for 31-60 minutes, 2 for 6-30 minutes, or 3 for 5 or fewer minutes. Cigarettes per day (CPD) was assigned a value of 0 for 0-10 CPD, 1 for 11-20 CPD, 2 for 21-30 CPD, or 3 for >30 CPD. Possible HSI values ranged from 0 to 6.

To control for the potential effects of repeated testing, **time in sample** was included in the core set of covariates: this variable was simply the number of waves that the respondent had been in the sample (i.e. the number of times that they had been interviewed). Longitudinal analyses also included **wave** (1-5) as a measure of calendar (or "outside") time. **Wave** was used for the time interactions outlined in the Analysis Plan for research questions 1 through 4 (i.e. interactions between wave and SES measures).

4.2.1.3 Outcome variables

Quit intentions

The primary measures for quit intentions were derived from the survey item "Are you planning to quit smoking . . . within the next month, within the next 6 months, sometime in the future beyond 6 months, or are you not planning to quit?" A dichotomous variable for **any intentions** (first three response categories), compared to no intentions (last category) was created. In addition, a **six-month intentions** variable was created to compare those who intended to quit within the next six months (first two categories) with those who did not intend to quit within the next six months (last two categories).

Quit attempts

Starting in Wave 2, smokers were asked "Have you made any attempts to stop smoking since we last talked with you, that is since [last survey date]?" Responses (yes/no) to this item determined the dichotomous **quit attempt since the last survey** variable for each wave.

Abstinence from smoking

Smoking status was derived from up to seven survey items (see Appendix A), and included six categories: daily smoker, weekly smoker, monthly smoker, quit within the last month, quit within the last six months, and quit more than six months ago. Two measures of "point abstinence" were included, to represent short-term (at least one-month) abstinence, as well as slightly longer-term (six-month) abstinence. The **one-month abstinence** measure included smoking status categories 5 and 6 (vs. 1-4). Similarly, a **six-month abstinence** measure was created, using smoking status category 6 (vs. 1-5). In addition, longer-term quitting was measured using **12-month abstinence**. Those who were quit (smoking status 4-6) at the previous wave were asked if they had stayed quit in the following two items: "The last time we spoke to you in [LSD], you were not smoking. Are you back smoking or are you still stopped?" and for those who answered they were still quit, "So you have been quit the entire time since [Quit Date] -- is that correct?". All those who were quitters both currently and at the previous wave, and answered positively to the abstinence items were classified as 12-month quitters.

Cigarette consumption

Daily consumption was measured as the average number of **cigarettes per day** (CPD) on a continuous scale. A **change in consumption** variable was created for each wave, by subtracting the

CPD value at wave of entry (time 1) from the CPD value at subsequent waves (times 2, 3, 4 and 5, as applicable). The number of cigarettes at each wave was compared to the CPD value at study entry to determine whether **at least a 50% reduction in CPD** had been achieved (vs. not).

Reasons for quitting smoking/staying quit

Reasons for quitting/staying quit were assessed using twelve survey items. Respondents were asked to rate whether each item in Table 5 had led them to think about quitting/were reasons for their quit attempt/helped them stay quit "not at all," "somewhat," or "very much". The specific question wording varied by smoking status: current smokers (smoking status 1-3) were asked "In the past 6 months, have each of the following things led you to think about quitting?", recent quitters (smoking status 4-5) were asked "To what extent, if at all, were each of the following things reasons for your quit attempt?" and longer-term quitters (smoking status 6) were asked "To what extent, if at all, have each of the following things helped you to stay quit?". For each of the reasons, a dichotomous variable (not at all vs. any) was created by grouping the "somewhat" and "very much" response categories together.

Table 5: Reasons for thinking about quitting/attempting to quit/staying quit

Concern for your personal health
Concern about the effect of your cigarette smoke on non-smokers
That society disapproves of smoking
The price of cigarettes
Smoking restrictions at work
Smoking restrictions in public places like [restaurants or bars/ cafes or pubs]
Advice from a doctor, dentist, or other health professional to quit
Free, or lower cost, stop-smoking medication
Availability of telephone helpline/ quitline/ information line
Advertisements or information about the health risks of smoking
Warning labels on cigarette packages
Setting an example for children

Cessation assistance

Use of cessation assistance

A number of survey items asked about use of various forms of cessation assistance in the past year, including assistance from a health professional, use of stop-smoking medications, and other forms of assistance. A series of questions about cessation help received from health professionals was asked of all current and former smokers who indicated that they had seen a doctor in the past year, and included the following forms of assistance to quit: advice (or support, for former smokers), referral, prescription for medication, or a pamphlet. Respondents who had received any of these forms of help were coded as having received **assistance from a health professional**. Respondents were also asked if they had used other sources of assistance in the past year, including: a **telephone helpline**, the **internet**, or **local services**.

To assess **use of stop-smoking medications**, all respondents were asked: "Since [last survey date], have you used any stop-smoking medications, such as nicotine replacement therapies like nicotine gum or the patch, or other medications that require a prescription, such as Zyban?". Respondents were also asked, "Which of the following were reasons you used [products mentioned]?" with one option being "to stop smoking completely". Those who responded affirmatively and used the SSM to quit were asked as an open-ended question: "The last time you used medications *to quit smoking*, which product or combination of products did you use? This includes both NRTs and prescription medications." Responses were coded under the following specific products: **NRT** (nicotine patch, nicotine lozenges, nicotine (sub-lingual) tablets, nicotine inhaler, nicotine nasal spray, nicotine water, and other nicotine replacement products), **prescription medications** (Zyban/Bupropion/Wellbutrin, Champix/Chantix/Varenicline, Accomplia/Rimonabant, Nortriptyline, and other prescription medications), and other (unknown or generic medicine). All respondents were also asked if they had used any other stop-smoking medications since [last survey date]", and if so, which one(s), using the same product coding as above.

For each quit aid listed above, a dichotomous variable for use (vs. non-use) in the past year was created. In addition, several dichotomous (e.g. use vs. non-use) summary measures were created: any health professional assistance (if any type was used), any NRT (if any NRT product was used), any prescription stop-smoking medication (if any presciption medication was used), any type of medication (if any NRT product or prescription SSM was used), and any type of cessation assistance (if any of NRT, SSMs, health professional, telephone helpline, internet, or local services were used).

Access to cessation assistance

Since access to cessation assistance was hypothesized as being of potential importance for socioeconomic analysis, a number of items around access were included, including **obtaining SSMs/NRT**, **paying for SSMs/NRT**, and **opinions about access**. Respondents who had used any prescription medication were asked how they obtained the last SSM they had used: by prescription, over-the-counter, from a friend, or free from a doctor. They were also asked whether they had paid full price for it, got it at a discount, or got it free. Similarly, respondents who indicated that they had used NRT were asked how they obtained the last NRT they used: by prescription, over-the-counter, from a friend, or free from a doctor; they were also asked if they had paid full price, got it at a discount, or got it free. Each access type (e.g. paid full price, discount, free) was coded as yes/no.

All respondents were asked to indicate their agreement (on a 5-point Likert sclae from strongly agree to strongly disagree) with a number of statements about stop-smoking medications (both nicotine replacement medications and prescription medications). These statements included: "Stop-smoking medications are too expensive," "You don't know enough about how to use stop-smoking medications properly," and "Stop-smoking medications are too hard to get." Variables for each were dichotomized into "agree" or "other."

For specific question wording and details of variables, refer to Appendix A.

4.2.2 Analyses

All analyses were conducted in SAS version 9.1 (SAS Institute Inc., Cary, North Carolina). The general methods and specific analyses for each research question are outlined below, and summarized in Appendix B.

4.2.2.1 Descriptive statistics

Univariate descriptive statistics were computed for all measures, by wave and country. Where applicable, the range, mean, and standard deviation were also calculated. Bivariate analyses examined the associations between the SES measures, and each of the outcomes. Unless otherwise noted, the descriptive statistics reported in the Results are weighted estimates.

4.2.2.2 Multivariate modeling

The generalised estimating equations (GEE) method was used for all longitudinal analyses (research questions 1 to 4). This type of modeling is appropriate for longitudinal data, as it accounts for measuring the same subjects repeatedly, treating each subject as a cluster of responses. In addition, GEE allows for analysis of the overall group trend (population average) without relying on individuals to be present at all time points. Since the primary objective of this analysis was to look at overall patterns within and between socioeconomic groups and over time, all available data over the five waves was used where possible, regardless of whether particular individuals were present for the entire study period. The specific samples for each analysis are outlined in Appendix C.

Separate GEE models were created for each of the outcome variables. Country, age, sex and ethnicity were forced into all the models, since they were used in the sampling design and weights. Wave and SES variables were also forced into all models, as they were key variables for the research questions, and time in sample, marital status, HSI (where applicable), and intention to quit (for model 4) were also forced in, since they were theorized to be important variables to control for. In addition to these covariates (the base model), all two-way interactions between the SES variable(s) and covariates, plus the interaction of country and wave, were screened for significance at $p<0.05$ with the base model and added sequentially to the models using forward selection until no other interactions were significant at the $p<0.05$ level.

Logistic regression analysis was used for research questions 5 and 6. The same list of covariates was included, with the exception of wave. Specific outcomes, methods and analysis issues relevant to each of the research questions are described below and in Appendix B.

Question 1: Do intentions to quit differ by SES?

Two separate GEE models were conducted to examine whether quit intentions differed by SES. Model 1A used the outcome variable of intending to quit at all (vs. not). Model 1B used intending to quit within six months (vs. not). Each analysis modeled the outcome using a core set of variables (country, wave, time in sample, age, sex, ethnicity, marital status, HSI) and SES variables (education, income, and education*income). In addition, all two-way interactions between the SES variables and covariates were screened and added to the model using a forward selection procedure. To examine whether the relationship between SES and quit intentions changed over time, the interaction terms for wave*education, wave*income, and wave*education*income were included in the list of interactions; if any were significant, indicating that the relationship varied over time, then the relationship at each

time point was examined using dummy variables for time (wave). Country interactions with time (wave) and the SES variables were also tested. These analyses included all current smokers (former smokers were not asked the question) in all 5 waves.

Question 2: Does the incidence of serious quit attempts differ by SES, overall and for those who intend to quit?

GEE models were created to examine whether the incidence of making a serious quit attempt since the last survey varied by SES. The probability of having made a quit attempt was modeled using the core set of variables (country, wave, time in sample, age, sex, ethnicity, marital status, HSI at previous wave) and SES variables. In addition, all two-way interactions between the SES variables and covariates were screened and added to the model using a forward selection procedure. To examine whether the relationship between SES and quit attempts changed over time, the interaction terms for wave*education, wave*income, and wave*education*income were included in the list of interactions; if any were significant, indicating that the relationship varied over time, then the relationship at each time point was examined using dummy variables for time (wave). Country interactions with time (wave) and the SES variables were also tested. These models were conducted using data for Waves 2 through 5 for respondents who were smokers at the previous wave, first with the entire sample (Model 2A1), and also only for those who intended to quit at the previous wave (Model 2A2), in order to answer the question of whether there were SES differences in progressing from intending to quit to making an actual quit attempt. Data from the wave of recruitment (i.e. first wave in sample) for each respondent was not used, as there was no opportunity for having quit since last survey date at their initial appearance in the sample.

Question 3: Does smoking abstinence vary by SES, overall and for those who attempt to quit?

Separate GEE models were constructed for each of the abstinence outcomes: Model 3A used one-month abstinence, Model 3B used six-month abstinence, and Model 3C used 12-month abstinence. Each analysis modeled the outcome using a core set of variables (country, wave, time in sample, age, sex, ethnicity, marital status, HSI at study entry) and SES variables (education, income, and education*income). In addition, all two-way interactions between the SES variables and covariates were screened and added to the model using a forward selection procedure. To examine whether the relationship between SES and abstinence changed over time, the interaction terms for wave*education, wave*income, and wave*education*income were included in the list of interactions; if any were significant, indicating that the relationship varied over time, then the relationship at each

time point was examined using dummy variables for time (wave). Country interactions with time (wave) and the SES variables were also tested. Models 3A and 3B included all respondents from Waves 2 through 5, and Model 3C included respondents from Waves 3 through 5. Data from the wave of recruitment (i.e. first wave in sample for 3A and 3B; and first 2 waves in the sample for 3C) for each respondent was not used, as there was no opportunity for having quit for that length of time at their initial appearance in the sample. Each model was run first using the full sample (Models 3A1, 3B1, 3C1), and then only for those who had attempted to quit since entry into the study (Models 3A2, 3B2, 3C2), to see whether abstinence rates differed by SES given a quit attempt.

Question 4: Are there SES differences in making substantial reductions in cigarette consumption, overall and among current smokers?

GEE models were created to examine whether reducing cigarette consumption (CPD) by at least 50% differed depending on SES. The 50% reduction outcome was modeled using a core set of variables (country, wave, time in sample, age, sex, ethnicity, marital status, HSI at study entry, intent to quit at study entry) and SES variables (education, income, and education*income). In addition, all two-way interactions between the SES variables and covariates were screened and added to the model using a forward selection procedure. To examine whether the relationship between SES and the outcome changed over time, the interaction terms for wave*education, wave*income, and wave*education*income were included in the list of interactions; if any were significant, indicating that the relationship varied over time, then the relationship at each time point was examined using dummy variables for time (wave). Country interactions with time (wave) and the SES variables were also tested. Data from the wave of recruitment (i.e. first wave in sample) for each respondent was not used, as there was no opportunity for having reduced consumption yet at their initial appearance. This analysis was conducted with Waves 2 through 5, first for the full sample (Model 4A1), and also with only those who were classified as current smokers (Model 4A2), to avoid counting decreases in consumption that were due to quitting.

Question 5: Are there SES differences in reasons for thinking about quitting or staying quit?

First, descriptive statistics for frequencies of each reason by SES group were examined overall and by country. Subsequently, logistic regression models examined whether there were differences between SES groups in the frequency of each reason for thinking about quitting/staying quit, using cross-sectional data from Wave 5, and including both current and former smokers. Separate models were created for each reason, and also for each smoking status group [current smokers (5A-L1),

recent quitters (5A-L2), and former smokers (5A-L3)], since the question wording varied substantially based on smoking status (refer to section 4.2.1.3). The logistic regression models included the core set of variables (country, age, sex, ethnicity, marital status, time in sample) and the SES variables, as well as HSI for the models with current smokers.

Question 6: Does the use of and access to cessation assistance vary by SES?

Cross-sectional data from Wave 5, including both current and former smokers, was used to examine whether there were differences in the use of cessation assistance by SES. Initially, the usage rate for each cessation aid was examined to determine which types of assistance were used frequently enough (by SES group) to allow adequate power in the planned analyses. Then, for each type of assistance (i.e. NRT, prescription SSMs, health professional, telephone helpline, internet, local services), a separate logistic regression model was created to test for any differences in frequency of use by SES group. Similarly, separate logistic regression models were created for each of the access variables (where there was enough data to analyse by SES group), and opinions regarding access. Each regression model included the core set of covariates (country, age, sex, ethnicity, marital status, time in sample) and SES variables.

4.2.2.3 Sample Weights

The samples were weighted cross-sectionally on country, age, sex, and ethnicity (in the US only) using standardized weights to ensure representative samples from each country. Additional information on sample weighting can be found in section 4.1.3.4 and in Thompson et al., 2006. Each respondent's weight at time of entry was applied to their observation(s) in each subsequent wave. The core analyses were conducted both weighted and un-weighted for comparison.

4.2.3 Attrition issues

Preliminary analyses of between-wave attrition for Waves 1 to 2, 2 to 3, and 3 to 4 indicated that there are some significant relationships between attrition rates and some variables of interest (see Appendix D). Logistic regression analysis using weighted estimates modeled the probability of between-wave attrition for each wave in relation to key socio-demographic and smoking variables. Attrition varied over time and by country. Younger respondents and males were more likely to be lost between waves for each time period analysed, as were respondents of minority ethnicity between Waves 3 and 4. Of interest to the current study, moderate and high income respondents were more

likely to remain in the sample, compared to those who did not provide income information. In addition, compared to those with low education levels, those with moderate education at Waves 1 and 2, or high education at Wave 3, were more likely to remain in the sample at the next wave. Respondents who had quit smoking, those who smoked less frequently, and those who did not intend to quit were also more likely to be lost to attrition in some waves. The patterns of attrition observed in this study are similar to others which have found greater attrition among respondents who were male, younger, less educated, and lower income (Bull, Pederson, Ashley, & Lefcoe, 1988; Psaty et al., 1994).

Although the analyses outlined above (and in Appendix D) reveal differential attrition by SES group and some outcome variables, the impact on the results of the proposed study are not directly quantifiable. Any biases that may be introduced into the proposed analysis were reduced by including the covariates associated with attrition in the analyses. In this way, their impact is partially controlled.

5.0 Results

5.1 Samples

5.1.1 Longitudinal sample

The full ITC sample for Waves 1 through 5 consisted of 18 090 unique respondents (Canada: 4389, US: 5198, UK: 4358, Australia: 4143), providing 42 263 observations. Of these 18 090 respondents in the full ITC sample, 1630 were excluded for not being daily smokers at recruitment (1315 non-daily smokers, 315 quitters), and 2 were excluded for missing smoking status at their wave of recruitment. The sample for the longitudinal analyses (research questions 1 to 4) thus consisted of 16 458 unique respondents (Canada: 3995, US: 4739, UK: 4013, Australia: 3711), providing 38 532 observations. Table 6 shows the sample characteristics for unique respondents, by wave of recruitment, and Table 7 shows the sample characteristics for all observations by wave.

When considering unique respondents (Table 6) almost half were recruited in the first wave, with around 2000 recruited in each subsequent wave (although this varied considerably). About a quarter of respondents were from each country, although there were slightly more respondents from the US and slightly fewer from Australia, due to differential retention (and subsequent replenishment) rates. The sample was a little over half female, about 13% minority ethnicity, and with a mean age of just over 40 years. About half of respondents were married. Over half the sample had low education level, about a third had moderate education, and 13% had a high education level. About a third of the sample were in each of the low and moderate income categories, with another quarter in the high income category; 7.5% of the respondents did not provide income information. All respondents were daily smokers at entry into the study, and the mean number of cigarettes consumed per day at entry was 18.6.

The characteristics of the 'all observations' sample (Table 7) were generally comparable to the unique respondents, although numbers were slightly lower than for the unique respondents for groups with greater attrition rates (e.g. respondents who were in the US, younger, not married, of minority ethnicity), mean age was higher, and mean CPD was somewhat lower.

Table 6: Sample characteristics of unique respondents (n=16 458), by wave of recruitment[a]

	Wave 1 (n=8167)	**Wave 2** (n=1548)	**Wave 3** (n=2335)	**Wave 4** (n=1968)	**Wave 5** (n=2440)	**Total** (n=16 458)
Country						
Canada	24.4% (1996)	30.4% (470)	21.2% (496)	24.4% (480)	22.7% (553)	24.3% (3995)
US	23.5% (1916)	40.3% (624)	35.0% (816)	34.9% (686)	28.6% (697)	28.8% (4739)
UK	27.0% (2201)	14.5% (224)	23.5% (548)	24.1% (474)	23.2% (566)	24.4% (4013)
Australia	25.2% (2054)	14.9% (230)	20.3% (475)	16.7% (328)	25.6% (624)	22.6% (3711)
Age - mean (SD; range)	41.8 (14.4;18-88)	42.8 (14.3;18-88)	43.0 (14.1;18-90)	43.5 (14.7;18-86)	44.8 (14.2;18-84)	42.7 (14.4;18-90)
Sex						
Male	45.4% (3710)	47.5% (735)	45.1% (1054)	42.2% (831)	43.9% (1072)	45.0% (7402)
Female	54.6% (4457)	52.5% (813)	54.9% (1281)	57.8% (1137)	56.1% (1368)	55.0% (9056)
Ethnicity						
Non-minority	87.3% (7115)	85.3% (1314)	89.0% (2070)	88.1% (1734)	87.5% (2134)	87.5% (14 367)
Minority	12.8% (1040)	14.7% (227)	11.0% (257)	11.9% (234)	12.5% (304)	12.6% (2062)
Marital status						
Married/common-law	50.0% (4076)	50.3% (777)	50.7% (1183)	48.4% (952)	47.5% (1158)	49.6% (8146)
Divorced/separated/ windowed	22.9% (1864)	24.0% (371)	23.5% (549)	25.9% (510)	28.1% (684)	24.2% (3978)
Single	27.1% (2207)	25.7% (397)	25.8% (602)	25.6% (504)	24.4% (595)	26.2% (4305)
Education level						
Low (high school or less)	57.3% (4664)	46.2% (715)	56.0% (1303)	55.7% (1092)	57.3% (1395)	55.9% (9169)
Moderate (college/some university)	31.0% (2518)	42.6% (658)	28.6% (665)	28.7% (562)	28.0% (682)	31.0% (5085)
High (university or higher)	11.7% (952)	11.1% (172)	15.5% (360)	15.6% (306)	14.7% (357)	13.1% (2147)
Income level						
Low (under $30K/£15K)	31.3% (2545)	32.8% (505)	31.5% (735)	34.0% (669)	32.7% (797)	32.0% (5251)
Moderate ($30-60K/£15-30K)	34.5% (2802)	33.8% (519)	34.8% (811)	31.7% (623)	31.4% (765)	33.7% (5520)
High (over $60K/£30K)	26.4% (2147)	26.1% (402)	27.8% (648)	27.4% (539)	27.5% (671)	26.9% (4407)
Not stated	7.7% (628)	7.3% (112)	6.0% (139)	7.0% (137)	8.5% (207)	7.5% (1223)
SES composite						
Low	21.0% (1702)	18.3% (281)	21.5% (499)	23.6% (463)	21.7% (529)	21.3% (3474)
Moderate	49.1% (3972)	46.3% (711)	46.5% (1082)	44.5% (873)	49.1% (1196)	47.9% (7834)
High	29.9% (2415)	35.4% (5432	32.0% (745)	31.8% (624)	29.1% (709)	30.8% (5036)
CPD – mean (SD;range)	18.6 (10.8;1-230)	18.8 (11.1;1-200)	18.5 (11.2;1-227)	18.3 (11.0;1-202)	19.1 (11.1;1-115)	18.6 (10.9;1-230)

[a]Presented as unweighted percentage (unweighted n) unless otherwise specified

Table 7: Sample characteristics for all observations (n=35 532), by wave

	Wave 1 (n=8167)	**Wave 2** (n=7664)	**Wave 3** (n=7651)	**Wave 4** (n=7453)	**Wave 5** (n=7597)
Country					
Canada	24.4% (1996)	26.0% (1995)	25.3% (1937)	25.2% (1877)	24.8% (1880)
US	23.5% (1916)	24.0% (1838)	25.0% (1916)	24.8% (1850)	24.8% (1885)
UK	27.0% (2201)	25.2% (1930)	25.1% (1918)	25.5% (1897)	24.7% (1878)
Australia	25.2% (2054)	24.8% (1901)	24.6% (1880)	24.5% (1829)	25.7% (1954)
Age - mean (SD; range)	41.8 (14.4; 18-88)	44.0 (14.3; 18-89)	45.3 (14.1; 18-90)	46.6 (14.1; 18-91)	47.5 (13.8; 18-92)
Sex					
Male	45.4% (3710)	45.1% (3456)	44.2% (3379)	42.9% (3200)	42.6% (3237)
Female	54.6% (4457)	54.9% (4208)	55.8% (4272)	57.1% (4253)	57.4% (4360)
Ethnicity					
Non-minority	87.3% (7115)	88.2% (6742)	89.7% (6847)	90.3% (6725)	90.0% (6827)
Minority	12.8% (1040)	11.8% (903)	10.3% (787)	9.7% (719)	10.0% (761)
Marital status					
Married/common-law	50.0% (4076)	51.6% (3944)	52.6% (4010)	52.9% (3933)	52.3% (3967)
Divorced/separated/ windowed	22.9% (1864)	23.6% (1803)	24.3% (1857)	25.5% (1893)	27.1% (2055)
Single	27.1% (2207)	24.8% (1899)	23.1% (1764)	21.6% (1606)	20.6% (1561)
Education level					
Low (high school or less)	57.3% (4664)	54.7% (4180)	54.3% (4141)	54.0% (4007)	53.8% (4070)
Moderate (college/some university)	31.0% (2518)	33.5% (2556)	31.9% (2433)	31.0% (2298)	30.5% (2308)
High (university or higher)	11.7% (952)	11.8% (905)	13.7% (1046)	15.1% (1118)	15.8% (1194)
Income level					
Low (under $30K/£15K)	31.3% (2545)	30.9% (2368)	30.4% (2325)	30.9% (2299)	30.7% (2334)
Moderate ($30-60K/£15-30K)	34.5% (2802)	34.5% (2641)	35.0% (2676)	34.2% (2546)	33.1% (2515)
High (over $60K/£30K)	26.4% (2147)	27.4% (2093)	28.0% (2137)	28.4% (2115)	29.1% (2214)
Not stated	7.7% (628)	7.2% (552)	6.7% (511)	6.6% (493)	7.0% (534)
SES composite					
Low	21.0% (1702)	20.2% (1540)	20.0% (1520)	20.3% (1508)	20.0% (1517)
Moderate	49.1% (3972)	48.0% (3661)	47.3% (3605)	46.5% (3451)	46.8% (3546)
High	29.9% (2415)	31.8% (2430)	32.7% (2493)	33.2% (2464)	33.1% (2509)
Financial stress[b]					
Yes	N/A	N/A	N/A	10.6% (580)	9.8% (507)
No	N/A	N/A	N/A	89.4% (4901)	90.2% (4644)

Income change[b]					
Yes	N/A	N/A	22.4% (1193)	24.7% (1353)	23.5% (1213)
No	N/A	N/A	77.6% (4123)	75.3% (4132)	76.5% (3944)
Education change[b]					
Yes	N/A	N/A	5.6% (298)	5.2% (283)	4.8% (246)
No	N/A	N/A	94.4% (5018)	94.8% (5202)	95.2% (4911)
Smoking status					
Daily smoker	100.0% (8167)	91.6% (7018)	88.8% (6795)	87.1% (6492)	85.7% (6514)
Weekly smoker	--	1.8% (140)	1.8% (137)	0.6% (48)	1.1% (86)
Monthly smoker	--	0.4% (31)	0.5% (36)	0.4% (27)	0.5% (34)
Quit <1 mo.	--	1.6% (119)	1.4% (109)	1.0% (77)	1.1% (83)
Quit 1-6 mo.	--	4.0% (309)	2.6% (202)	2.7% (204)	2.7% (202)
Quit >6 mo.	--	0.6% (47)	4.9% (372)	8.1% (605)	8.9% (678)
CPD – mean (SD; range)	18.6 (10.8; 1-230)	17.7 (10.1; 0-200)	17.8 (10.4; 0-227)	17.8 (10.1; 0-202)	18.0 (10.1; 0-115)

[a]Presented as unweighted percentage (unweighted n) unless otherwise specified
[b]Only asked of cohort respondents (W3: n=5316, W4: n=5485, W5: n=5157)

5.1.2 Cross-sectional sample

The cross-sectional analyses (research questions 5 and 6) used the full Wave 5 sample, consisting of 8243 observations from as many unique respondents. Unlike the longitudinal sample, the cross-sectional sample was not limited to only daily smokers at entry into the study. Characteristics of this sample are displayed below in Table 8.

Table 8: Characteristics of the cross-sectional sample

	Wave 5 (n=8243)
Country	
Canada	24.5% (2022)
US	26.7% (2033)
UK	24.5% (2019)
Australia	26.3% (2168)
Age – mean (SD; range)	47.2 (13.9; 18-92)
Sex	
Male	42.7% (3520)
Female	57.3% (4722)
Ethnicity	
Non-minority	89.6% (7379)
Minority	10.4% (854)
Marital status	
Married/common-law	52.2% (4292)
Divorced/separated/ windowed	26.7% (2197)
Single	21.1% (1737)
Education level	
Low (high school or less)	52.7% (4332)
Moderate (college/some university)	30.5% (2503)
High (university or higher)	16.8% (1380)
Income level	
Low (under $30K/£15K)	30.4% (2504)
Moderate ($30-60K/£15-30K)	32.8% (2705)
High (over $60K/£30K)	29.8% (2457)
Not stated	7.0% (576)
SES composite	
Low	19.7% (1616)
Moderate	46.2% (3797)
High	34.1% (2802)
Financial stress[b]	
Yes	9.8% (551)
No	90.2% (5046)
Income change[b]	
Yes	23.6% (1324)
No	76.4% (4280)
Education change[b]	
Yes	4.9% (272)
No	95.2% (5332)

Smoking status	
Daily smoker	80.7% (6652)
Weekly smoker	3.7% (308)
Monthly smoker	0.9% (77)
Quit <1 mo.	2.1% (169)
Quit 1-6 mo.	3.0% (245)
Quit >6 mo.	9.6% (791)
CPD – mean (SD; range)	17.3 (10.3; 0-115)

[a]Presented as unweighted percentage (unweighted n) unless otherwise specified
[b]Only asked of cohort respondents (n=5157)

The sample was approximately evenly split between the four countries, over half female (57%), and about 10% minority ethnicity, with a mean age of 47 years. About half the respondents were married. Concerning SES measures, a little over half of respondents had low education, and another third had moderate education; about a third of the respondents were in each income group, although 7% did not provide income information; using the SES composite measure, almost half were of moderate SES. Almost 10% experienced financial stress, a quarter had experienced income changes in the past 2 years, and just 5% had experienced changes to education level in the past 2 years. Eighty percent of the sample were daily smokers, and 15% had quit smoking.

5.2 SES Variables

The SES measures described in section 4.2.1.1 were examined both for frequency within the sample and for their inter-relationships. The sample tables above (Table 6, Table 7 and Table 8) show the frequencies of all SES measures (education, income, SES composite measure, and financial stress). Table 9 below shows the correlations between these measures.

Table 9: Correlations[a] between SES measures

	Education	**Income[b]**	**SES composite**	**Financial stress**
Education	------	r = 0.220 p<0.0001[c] (n=39 131)	r = 0.753 p<0.0001[c] (n=42 039)	r = -0.024 p=0.0110[c] (n=11 527)
Income		------	r = 0.665 p<0.0001[c] (n=39 131)	r = -0.146 p<0.0001[c] (n=10 825)
SES composite			------	r = -0.088 p<0.0001[c] (n=11 527)
Financial stress				------

[a] Spearman rank order correlation
[b]'Not stated' category for income excluded from analysis; correlations were similar, but somewhat weaker with 'not' stated' category included

[c] Since all available observations were included in the correlation analysis, respondents present at multiple waves contributed more than one observation, thus decreasing the p values presented

The SES variable correlated well with income and education, being a composite measure of the two. Education and income had a fairly low correlation (r = 0.22), suggesting that each reflects a somewhat unique component of socioeconomic status. The financial stress variable was negatively correlated with the other SES measures (i.e. higher education/income was related to less financial stress), although weakly.

Changes to SES variables

Questionnaire items regarding changes to demographic variables, including income and education, were asked starting in Wave 3. The timing indicated in the question included the last 2 years, so it is possible that the same particular change event may have been recorded at multiple survey waves (to a maximum of two).

Table 10 shows the frequency of self-reported changes to demographics and SES variables in the cohort sample. Over a third of respondents reported some change to their demographic information (income, education level, marital status, or the number of children living in the home) in the past 2 years. Education level did not change frequently, reported by only about 5% of those asked, and all changes were unidirectional (since only increase was possible). For these reasons, the focus of further analysis of demographic changes was on income. Just under a quarter of respondents reported changes to their income in the past 2 years.

Table 10: Self-reported changes to demographics, income and education

	Wave 3 (n=5827)	**Wave 4** (n=5979)	**Wave 5** (n=5605)
Demographic change (any)[a]			
Yes	34.8% (2029)	37.1% (2218)	34.9% (1954)
No	65.2% (3798)	62.9% (3761)	65.1% (3651)
Income change[a]			
Yes	22.6% (1319)	24.9% (1491)	23.6% (1324)
No	77.4% (4508)	75.1% (4488)	76.4% (4280)
Education change[a]			
Yes	5.9% (341)	5.5% (326)	4.9% (272)
No	94.2% (5486)	94.6% (5653)	95.2% (5333)

[a]Only asked of cohort respondents

Further analysis of changes to income compared consecutive time points to assess changes in the reported income category (both the original 8-category income question, and the 3-category version

used for the main analyses). Differences in income category could only be calculated for cohort respondents in Waves 3 through 5, because respondents needed to be present for a previous wave.

Table 11 shows the difference in the 3-category income variable for each wave. The vast majority of respondents did not report income changes that were large enough to move them between categories. Of the roughly 8% of those who did, approximately equal proportions (3.5-4.5%) reported increased and decreased incomes.

Table 11: Changes to self-reported income[a] in cohort respondents, by wave

	Change in income categories[b]				
	Decreased 2 levels	**Decreased 1 level**	**No change**	**Increased 1 level**	**Increased 2 levels**
Wave 3 (n=5387)	0.6% (31)	3.2% (173)	92.4% (4980)	3.5% (188)	0.3% (15)
Wave 4 (n=5539)	0.3% (19)	4.0% (219)	91.5% (5069)	3.7% (205)	0.5% (27)
Wave 5 (n=5528)	0.4% (20)	2.8% (145)	92.6% (4820)	3.9% (203)	0.4% (20)

[a] Using the 3-category income variable (high/moderate/low); 'not stated' category excluded
[b] Presented as unweighted percentage (unweighted n)

When income changes were grouped by the 8-category questionnaire item, more change was seen between waves than when using the 3-category version, but there was a considerable discrepancy between the proportion of the cohort sample that reported different income categories (in the 8-category income item) in consecutive waves and the proportion who self-reported experiencing a change to income. In Wave 3, of those who reported an income change, just 58% (representing 13% of the total cohort sample) reported income that was in a different category from the previous wave. Similar results were seen in Wave 4, with 58% (representing 14.5% of the total) reporting a different income category, and Wave 5, with 56% (representing 13% of the total) reporting a different income category. So, respondents either often experience changes to income that are too small to be measured accurately using the questionnaire item for income, or misreport income and/or changes to income.

In subsequent analyses, the values of income and education at the same wave that the outcome was measured were used, so any changes to income and education were captured. The change variable, however, was not further examined as an independent socioeconomic predictor variable, due to the small number of respondents who moved between income categories, and the discrepancies between reported changes and reported income discussed above.

5.3 Quit intentions

5.3.1 Planning to quit at all

Descriptive Statistics

Table 12 and Table 13 below show the proportions of smokers in the sample who were planning on quitting smoking at all, by education and income.

Table 12: Any intentions to quit, by education level (n=34 846)

Education level	**Intending to quit**[a]
Low (high school or less)	67.6%
Moderate (college/some university)	76.2%
High (university or higher)	76.7%
All levels	71.5%

[a]Presented as weighted percentages

Table 13: Any intentions to quit, by income level (n=34 963)

Income level	**Intending to quit**[a]
Low (under $30K/£15K)	66.4%
Moderate ($30-60K/£15-30K)	73.2%
High (over $60K/£30K)	76.6%
Not stated	63.0%
All levels	71.5%

[a]Presented as weighted percentages

Overall, 71.5% of the sample was planning on quitting. Low education respondents had lower rates of intending to quit (68%), when compared to those with moderate and high education (76-77%). Similarly, a smaller proportion of low income respondents intended to quit (66%), as compared to moderate (73%) and high (77%) income; this relationship followed a gradient by income level. Those who did not provide income information had even lower rates of intending to quit (63%) than low income respondents. There was considerable variation in intentions to quit by country: Canada had the highest proportion of respondents intending to quit (78.2%), followed by the Australian (73.7%), US (71.1%), and UK (62.8%) samples.

GEE Models

Base Model

The sample for this analysis included all respondents who were daily smokers at recruitment. The base model shown in Table 14 included country, age, sex, ethnicity, marital status, wave, time in

sample, HSI, income, and education, which were all forced into the model.

Table 14: Base GEE Model[a] 1A: Odds ratios for predictors of planning to quit smoking at all (n=34 712, n clusters = 16 458)

Variables	OR	95% CI	P value
Country			<0.0001
Australia (AU)	1.0		
Canada (CA)	1.2660	1.1367-1.4100	<0.0001
UK	0.6123	0.5543-0.6763	<0.0001
US	0.8537	0.7700-0.9465	0.0027
Wave			0.2162
1	1.0		
2	0.9667	0.8837-1.0575	0.4596
3	0.9560	0.8723-1.0477	0.3357
4	1.0467	0.9463-1.1577	0.3752
5	1.0337	0.9282-1.1512	0.5464
Age	0.9707	0.9679-0.9734	<0.0001
Sex			
Male vs. female (ref.)	0.9009	0.8392-0.9672	0.0040
Ethnicity			
Minority vs. not (ref.)	0.9920	0.8827-1.1148	0.8924
Marital status			0.0098
Married/common-law	1.0		
Separated/divorced/widowed	0.9846	0.9028-1.0738	0.7254
Single	0.8648	0.7864-0.9510	0.0027
Education			<0.0001
Low (high school or less)	1.0		
Moderate (college/some university)	1.3181	1.2148-1.4303	<0.0001
High (university or higher)	1.3596	1.2136-1.5231	<0.0001
Income			<0.0001
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	1.1763	1.0791-1.2823	0.0002
High (over $60K/£30K)	1.2632	1.1430-1.3960	<0.0001
Not stated	0.8185	0.7183-0.9327	0.0027
HSI			<0.0001
0	1.0		
1	1.0741	0.9463-1.2192	0.2687
2	0.8878	0.7878-1.0005	0.0510
3	0.7913	0.7050-0.8883	<0.0001
4	0.6399	0.5662-0.7232	<0.0001
5	0.5370	0.4683-0.6158	<0.0001
6	0.3954	0.3329-0.4695	<0.0001
Tie in sample			0.0035
1 wave	1.0		
2 waves	0.9137	0.8488-0.9837	0.0165
3 waves	0.8890	0.8142-0.9707	0.0087
4 waves	0.7722	0.6615-0.9015	0.0011
5 waves	0.7856	0.6831-0.9034	0.0007

[a]GEE model with binomial variation and logit link

In the base model, all main effects were significant except wave and ethnicity. Intentions to quit varied by country: Canadian smokers were more likely to intend to quit than Australian smokers, whereas UK and US smokers were less likely. Older smokers had lower odds of intending to quit, by about 3% per year with increasing age. Males were less likely to intend to quit than females. There were no significant differences in intentions to quit between married/common-law smokers and those who were separated/widowed/divorced, but single smokers were less likely to intend to quit. With the exception of HSI scores of 1 (vs. 0), heavier smokers were less likely to intend to quit. Those who remained in the sample longer were also less likely to intend to quit. Of particular interest in this study, smokers with moderate and high education had a third greater odds of intending to quit than those with low education, and intentions to quit also increased with income. Those who did not provide income information were less likely to intend to quit.

Model with Interactions

The interactions between country and wave, age and education, and ethnicity and income were significant at the $p<0.05$ level, and were included in a model with the base covariates (Table 15).

Table 15: GEE Model[a] 1A with Interactions: Odds ratios for predictors of planning to quit smoking at all (n=34 712, n clusters = 16 458)

Variables	Odds Ratio	95% Confidence Interval	P value
Country (by wave)			
at Wave 1:			
CA vs. AU (ref.)	1.4362	1.2126-1.7011	<0.0001
UK vs. AU	0.6051	0.5210-0.7027	<0.0001
US vs. AU	0.9609	0.8171-1.1301	0.6300
at Wave 2:			
CA vs. AU	1.5766	1.3278-1.8719	<0.0001
UK vs. AU	0.5777	0.4937-0.6759	<0.0001
US vs. AU	0.9004	0.7653-1.0593	0.2058
at Wave 3:			
CA vs. AU	1.1666	0.9812-1.3870	0.0809
UK vs. AU	0.6003	0.5111-0.7052	<0.0001
US vs. AU	0.7336	0.6233-0.8635	0.0002
at Wave 4:			
CA vs. AU	1.1413	0.9568-1.3615	0.1419
UK vs. AU	0.6672	0.5646-0.7886	<0.0001
US vs. AU	0.7994	0.6723-0.9506	0.0113
at Wave 5:			
CA vs. AU	1.0802	0.9001-1.2963	0.4073
UK vs. AU	0.5955	0.5023-0.7058	<0.0001
US vs. AU	0.8713	0.7284-1.0423	0.1318

Age (by education)			
For low education	0.9725	0.9693-0.9758	<0.0001
For moderate education	0.9724	0.9675-0.9773	<0.0001
For high education	0.9539	0.9462-0.9617	<0.0001
Sex			
Male vs. female (ref.)	0.9009	0.8391-0.9672	0.0040
Marital status			0.0120
Married/common-law	1.0		
Separated/divorced/widowed	0.9896	0.9071-1.0795	0.8133
Single	0.8684	0.7896-0.9550	0.0036
Income (by ethnicity)			
For non-minority ethnicity:			
Moderate vs. low (ref.)	0.8621	0.6678-1.1129	0.2548
High vs. low	0.9014	0.6880-1.1810	0.4514
Not stated vs. low	0.6092	0.4189-0.8860	0.0095
For minority ethnicity:			
Moderate vs. low	1.2418	1.1338-1.3601	<0.0001
High vs. low	1.3369	1.2030-1.4856	<0.0001
Not stated vs. low	0.8587	0.7472-0.9870	0.0320
HSI			<0.0001
0	1.0		
1	1.0809	0.9520-1.2273	0.2299
2	0.8925	0.7918-1.0061	0.0628
3	0.7963	0.7094-0.8939	0.0001
4	0.6459	0.5714-0.7301	<0.0001
5	0.5411	0.4718-0.6206	<0.0001
6	0.4000	0.3367-0.4751	<0.0001
Time in sample			0.0041
1 wave	1.0		
2 waves	0.9225	0.8565-0.9937	0.0335
3 waves	0.8814	0.8068-0.9630	0.0052
4 waves	0.7751	0.6634-0.9058	0.0013
5 waves	0.7951	0.6884-0.9123	0.0012

[a]GEE model with binomial variation and logit link
Overall 3 df test for country: p<0.0001
Overall 4 df test for wave: p=0.3627
12 df test for country x wave interaction: p=0.0007
Overall 1 df test for age: p<0.0001
Overall 2 df test for education: p<0.0001
2 df test for age x education interaction: p<0.0001
Overall 1 df test for ethnicity: p=0.0226
Overall 3 df test for income: p=0.0754
3 df test for ethnicity x income interaction: p=0.0164

The model including interactions showed the same pattern of results as in the base model for variables not involved in interactions. However, there were significant interactions between country and wave, age and education, and ethnicity and income, which modified the relationship of these variables to quit intentions. Canadian smokers were significantly more likely to quit than Australian smokers in the first two waves, while UK smokers were much less likely to intend to quit in all 5

waves, and US smokers were less likely to quit in Waves 3 and 4. The effect of age was significant at all education levels, and was stronger in higher education groups. For respondents of minority ethnicity, intentions to quit increased with higher income, but were not significantly associated with income for non-minorities. Those who did not provide income information were less likely to intend to quit, among both minority and non-minority groups.

5.3.2 Planning to quit in the next six months

Descriptive Statistics

Table 16 and Table 17 below show the proportions of smokers in the sample who were planning on quitting smoking within the next six months, by education and income.

Table 16: Intentions to quit in the next six months, by education level (n=34 846)

Education level	**Intending to quit in next 6 months** [a]
Low (high school or less)	30.1%
Moderate (college/some university)	36.2%
High (university or higher)	40.1%
All levels	33.3%

[a]Presented as weighted percentages

Table 17: Intentions to quit in the next six months, by income level (n=34 963)

Income level	**Intending to quit in next 6 months** [a]
Low (under $30K/£15K)	30.6%
Moderate ($30-60K/£15-30K)	33.4%
High (over $60K/£30K)	37.3%
Not stated	27.1%
All levels	33.3%

[a]Presented as weighted percentages

Overall, a third of the sample planned on quitting in the next six months – a little less than half of those who were intending to quit at all. In this sample, a gradient was observed in intentions to quit in the next six months for both education and income, with up to 10% absolute differences observed between the lowest and highest groups. Again, those who did not provide information on income had even lower rates of intending to quit (27%) than low income respondents. As with intentions to quit at all, intentions to quit in the next 6 months varied by country, from 40% of the Canadian sample, to 33.5% of the Australian sample, 31.3% of respondents in the US, and 28.2% of UK respondents.

GEE Models

Base Model

As in the model for planning to quit at all, the sample for this analysis included all those who were daily smokers at recruitment, but the outcome measure was classified differently, by timeframe, as planning to quit in the next six months (vs. not). In the base model for planning to quit in the next six months, all main effects were significant except sex and ethnicity, and marital status was of borderline significance ($p=0.06$). Intentions to quit in the next six months varied by country: Canadian smokers were more likely to intend to quit than Australian smokers, whereas US and UK smokers were less likely to intend to quit, compared to Australians. Smokers were more likely to intend to quit in the most recent waves (4 and 5). Odds of intending to quit decreased with increasing age, by a little less than 1% per year. There was no difference in intentions to quit between married/common-law smokers and those who were separated/widowed/divorced, but single smokers were (borderline) less likely to intend to quit. With the exception of HSI scores of 1 versus 0 (which was borderline), heavier smokers were less likely to intend to quit. Those who remained in the sample longer were also less likely to intend to quit. Of particular interest, intentions to quit increased with education: moderately educated smokers had about 20% greater odds of intending to quit than smokers with low education, and highly educated smokers had almost 40% greater odds. In addition, high income smokers were more likely to intend to quit in the next six months than those with low income, and those who did not provide income information were less likely to intend to quit.

Comparing the base models for the two quit intentions outcomes (planning to quit at all vs. planning to quit in the next six months), some differences were observed. Considering the main effects, wave was not significant in the model for any intentions, but was significant in the model for six-month intentions; conversely, sex was not significant in the six-month intentions model, but was significant in the model for any intentions. Marital status, although of only borderline significance in the six-month intentions model, had similar effects in both. Similar effects were also observed for country, HSI, time in sample, and age (although effects were lesser in the six-month intentions model). Considering SES measures, similar effects were observed for education (although smaller for moderate in the six-month intentions model), and income (although somewhat weaker in six-month intentions, and moderate income did not reach significance).

Table 18: Base GEE Model[a] 1B: Odds ratios for predictors of planning to quit smoking in the next six months (n=34 712, n clusters = 16 458)

Variables	Odds Ratio	95% Confidence Interval	P value
Country			<0.0001
Australia	1.0		
Canada	1.2812	1.1704-1.4025	<0.0001
UK	0.7731	0.7050-0.8478	<0.0001
US	0.8557	0.7816-0.9369	0.0008
Wave			<0.0001
1	1.0		
2	0.9238	0.8495-1.0045	0.0637
3	1.0435	0.9577-1.1370	0.3308
4	1.1284	1.0281-1.2386	0.0110
5	1.1709	1.0636-1.2891	0.0013
Age	0.9924	0.9899-0.9948	<0.0001
Sex			
Male vs. female (ref.)	1.0404	0.9767-1.1082	0.2189
Ethnicity			
Minority vs. not (ref.)	0.9702	0.8780-1.0721	0.5528
Marital status			0.0605
Married/common-law	1.0		
Separated/divorced/widowed	1.0353	0.9541-1.1234	0.4049
Single	0.9219	0.8489-1.0012	0.0536
Education			<0.0001
Low (high school or less)	1.0		
Moderate (college/some university)	1.2111	1.1273-1.3011	<0.0001
High (university or higher)	1.3845	1.2568-1.5253	<0.0001
Income			<0.0001
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	1.0507	0.9732-1.1344	0.2055
High (over $60K/£30K)	1.1654	1.0682-1.2715	0.0006
Not stated	0.8130	0.7143-0.9253	0.0017
HSI			<0.0001
0	1.0		
1	0.8996	0.8059-1.0041	0.0592
2	0.7960	0.7179-0.8827	<0.0001
3	0.6715	0.6069-0.7429	<0.0001
4	0.5703	0.5112-0.6363	<0.0001
5	0.5369	0.4724-0.6101	<0.0001
6	0.4716	0.3934-0.5653	<0.0001
Time in sample			<0.0001
1 wave	1.0		
2 waves	0.8511	0.7944-0.9118	<0.0001
3 waves	0.7959	0.7316-0.8658	<0.0001
4 waves	0.6477	0.5596-0.7497	<0.0001
5 waves	0.7233	0.6312-0.8288	<0.0001

[a]GEE model with binomial variation and logit link

Model with Interactions

Different interactions models emerged for the two quit intentions outcomes (planning to quit at all vs. planning to quit in the next six months): while both included the interactions of country and wave, and age and education, the model for planning to quit at all also included the interaction of income and ethnicity and the model for planning to quit in the next six months also included the interactions of country and income, and HSI and education.

Results for the model including interactions (Table 19) followed the same pattern as the base model for variables not involved in interactions. However, significant interactions were found between country and wave, country and income, age and education, and HSI and education. Canadian smokers were significantly more likely to intend quit than Australian smokers in the first two waves, while UK smokers were much less likely to intend to quit than Australians in all waves except Wave 4, and US smokers were less likely to intend to quit than Australians in Waves 3 and 5. Age was significantly associated with six-month quit intentions at all education levels, but the effect of age was stronger for those with high education. In Canada, moderate and high income smokers had greater odds of intending to quit compared to low, although those who did not provide income information were not different from those with low income. In the UK, high income smokers were more likely to intend to quit in the next six months compared to low income smokers, and no differences were observed between the other levels and low income. In Australia and the US, those who did not provide income information were less likely to intend to quit than those with low income, but no significant differences were seen between moderate or high income, compared to low. For all levels of HSI except 1 and 6, high education smokers were more likely to intend to quit than low, and moderate education smokers were not significantly different from low.

Table 19: GEE Model[a] 1B with Interactions: Odds ratios for predictors of planning to quit smoking in the next six months (n=34 712, n clusters = 16 458)

Variables	Odds Ratio	95% Confidence Interval	P value
Country (by wave) [b]			
at Wave 1:			
CA vs. AU (ref.)	1.2356	1.0152-1.5037	0.0347
UK vs. AU	0.6129	0.5010-0.7498	<0.0001
US vs. AU	0.9648	0.7964-1.1688	0.7139
at Wave 2:			
CA vs. AU	1.3474	1.0969-1.6551	0.0045
UK vs. AU	0.5407	0.4343-0.6733	<0.0001
US vs. AU	0.9718	0.7940-1.1894	0.7813

at Wave 3:			
CA vs. AU	0.9731	0.7943-1.1920	0.7919
UK vs. AU	0.6880	0.5584-0.8477	0.0004
US vs. AU	0.7952	0.6529-0.9684	0.0227
at Wave 4:			
CA vs. AU	1.0578	0.8600-1.3011	0.5947
UK vs. AU	0.8763	0.7105-1.0808	0.2173
US vs. AU	0.9907	0.8102-1.2113	0.9273
at Wave 5:			
CA vs. AU	0.8814	0.7100-1.0942	0.2524
UK vs. AU	0.7451	0.5997-0.9258	0.0079
US vs. AU	0.7889	0.6388-0.9743	0.0277
Age (by education) [c]			
For low education	0.9924	0.9893-0.9955	<0.0001
For moderate education	0.9957	0.9915-0.9998	0.0417
For high education	0.9847	0.9783-0.9911	<0.0001
Sex			
Female vs. male (ref.)	0.9649	0.9058-1.0279	0.2687
Ethnicity			
Minority vs. not (ref.)	0.9659	0.8742-1.0672	0.4954
Marital status			0.0948
Married/common-law	1.0		
Separated/divorced/widowed	1.0329	0.9519-1.1208	0.4367
Single	0.9285	0.8549-1.0085	0.0787
Income (by country) [d]			
In Australia:			
Moderate vs. low (ref.)	1.0344	0.8859-1.2078	0.6686
High vs. low	1.0389	0.8830-1.2222	0.6455
Not stated vs. low	0.7276	0.5539-0.9558	0.0223
In Canada:			
Moderate vs. low	1.2252	1.0560-1.4216	0.0074
High vs. low	1.3438	1.1439-1.5787	0.0003
Not stated vs. low	1.0361	0.8039-1.3354	0.7839
In UK:			
Moderate vs. low	1.0829	0.9239-1.2691	0.3256
High vs. low	1.4178	1.1919-1.6865	<0.0001
Not stated vs. low	0.8836	0.6942-1.1247	0.3148
In US:			
Moderate vs. low	0.9332	0.8128-1.0713	0.3262
High vs. low	0.9949	0.8483-1.1670	0.9504
Not stated vs. low	0.6419	0.4873-0.8455	0.0016
Education (by HSI) [e]			
For HSI=0:			
Moderate vs. low (ref.)	0.8358	0.6385-1.0942	0.1919
High vs. low	1.3339	0.9244-1.9248	0.1237
For HSI=1:			
Moderate vs. low	1.1044	0.8484-1.4377	0.4604
High vs. low	1.9216	1.3366-2.7627	0.0004
For HSI=2:			
Moderate vs. low	0.9723	0.7611-1.2421	0.8219
High vs. low	2.1060	1.4904-2.9758	<0.0001
For HSI=3:			

Moderate vs. low	1.1787	0.9269-1.4988	0.1799
High vs. low	2.2350	1.5818-3.1578	<0.0001
For HSI=4:			
Moderate vs. low	1.0474	0.8080-1.3578	0.7266
High vs. low	1.8938	1.2761-2.8105	0.0015
For HSI=5:			
Moderate vs. low	1.0510	0.7776-1.4205	0.7464
High vs. low	1.7276	1.1117-2.6848	0.0151
For HSI=6:			
Moderate vs. low	0.8526	0.5571-1.3047	0.4624
High vs. low	1.6973	0.8860-3.2510	0.1107
Time in sample			<0.0001
1 wave	1.0		
2 waves	0.8691	0.8105-0.9319	<0.0001
3 waves	0.7930	0.7287-0.8630	<0.0001
4 waves	0.6750	0.5822-0.7826	<0.0001
5 waves	0.7177	0.6258-0.8230	<0.0001

[a]GEE model with binomial variation and logit link
[b]Country also interacts with income; results shown here are collapsed across levels of income
[c]Education also interacts with HSI; results shown here are collapsed across levels of HSI
[d]Country also interacts with wave; results shown here are collapsed across levels of wave
[e]Education also interacts with age; results shown here are collapsed across levels of age
Overall 3 df test for country: p<0.0001
Overall 4 df test for wave: p=0.0013
12 df test for country x wave interaction: p<0.0001
Overall 1 df test for age: p<0.0001
Overall 2 df test for education: p=0.0547
2 df test for age x education interaction: p=0.0147
Overall 3 df test for income: p=0.0651
3 df test for country x income interaction: p=0.0132
Overall 6 df test for HSI: p<0.0001
12 df test for HSI x education interaction: p=0.0241

5.4 Quit attempts

Descriptive Statistics

Table 20 and Table 21 below show the proportions of smokers who had made a quit attempt since the last survey date, for the total sample and among only those who intended to quit at the previous wave, by education and income.

Table 20: Attempts to quit since last survey date, by education level

Education level	**Attempted to quit since last survey date** [a]	
	All eligible respondents (n=20 564)	**Those who intended to quit at previous wave** (n=14 479)
Low (high school or less)	35.9%	44.1%
Moderate (college/some university)	38.4%	45.0%
High (university or higher)	41.5%	49.4%
All levels	37.4%	45.1%

[a]Presented as weighted percentages

Table 21: Attempts to quit since last survey date, by income level

Income level	**Attempted to quit since last survey date** [a]	
	All eligible respondents (n=20 645)	**Those who intended to quit at previous wave** (n=14 523)
Low (under $30K/£15K)	36.9%	46.7%
Moderate ($30-60K/£15-30K)	37.4%	44.7%
High (over $60K/£30K)	38.7%	44.9%
Not stated	33.9%	42.1%
All levels	37.4%	45.1%

[a]Presented as weighted percentages

More than a third of the full sample had attempted to quit smoking since the last survey date. In this sample, the proportion of respondents who attempted to quit increased with increasing education level, and also with increasing income level (although to a lesser degree). Quit attempts were more common among respondents who had intended to quit at the previous wave, at 45% overall. For respondents who intended to quit, incidence of quit attempts increased with increasing education level, but was similar across income groups, although somewhat higher among low income respondents and somewhat lower among those who did not provide income information.

Table 22: Attempts to quit since last survey date, by country

Country	**Attempted to quit since last survey date** [a]	
	All eligible respondents (n=20 651)	**Those who intended to quit** (n=14 524)
Australia	38.7%	45.5%
Canada	40.1%	46.1%
UK	34.6%	44.8%
US	35.9%	43.8%

[a]Presented as weighted percentages

Some variation by country (Table 22) was seen in quit attempts, with the greatest proportion of the Canadian sample attempting to quit, and the lowest proportions in the UK and US samples.

GEE Models

GEE models were conducted first with the full sample (2A1) (including all those who were daily smokers at recruitment and smokers at the previous wave), and also with only those intended to quit at the previous wave (2A2). Wave 1 and first wave in sample were excluded from both samples, due to the question about quit attempts only being asked of cohort respondents.

Base Models

Model 2A1 – Quit attempts in the full sample

Table 23: Base GEE Model[a] 2A1: Odds ratios for predictors of attempting to quit smoking since last survey date, full sample (n=20 486, n clusters = 9889)

Variables	Odds Ratio	95% Confidence Interval	P value
Country			0.0004
Australia	1.0		
Canada	1.0756	0.9661-1.1977	0.1835
UK	0.8752	0.7863-0.9740	0.0146
US	0.9013	0.8042-1.0101	0.0740
Wave			<0.0001
2	1.0		
3	1.1664	1.0508-1.2946	0.0038
4	1.3417	1.2036-1.4956	<0.0001
5	1.2206	1.0798-1.3799	0.0014
Age	0.9909	0.9879-0.9939	<0.0001
Sex			
Male vs. female (ref.)	0.9324	0.8632-1.0070	0.0747
Ethnicity			
Minority vs. not (ref.)	1.0378	0.9107-1.1826	0.5781
Marital status			0.1683
Married/common-law	1.0		
Separated/divorced/widowed	1.0879	0.9866-1.1995	0.0911
Single	0.9797	0.8848-1.0847	0.6924
Education			0.0137
Low (high school or less)	1.0		
Moderate (college/some university)	1.0564	0.9689-1.1518	0.2133
High (university or higher)	1.1928	1.0594-1.3431	0.0036
Income			0.3956
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	0.9839	0.8957-1.0808	0.7351
High (over $60K/£30K)	0.9917	0.8926-1.1017	0.8761
Not stated	0.8739	0.7471-1.0222	0.0919
HSI (at previous wave)			<0.0001
0	1.0		
1	0.9418	0.8213-1.0799	0.3901
2	0.7501	0.6614-0.8507	<0.0001
3	0.6524	0.5773-0.7372	<0.0001
4	0.6069	0.5316-0.6927	<0.0001
5	0.5942	0.5095-0.6931	<0.0001
6	0.4919	0.3959-0.6111	<0.0001
Time in sample			0.0488
2 waves	1.0		
3 waves	1.1182	1.0212-1.2243	0.0158
4 waves	0.9988	0.8910-1.1197	0.9837
5 waves	0.9789	0.8452-1.1339	0.7763

[a]GEE model with binomial variation and logit link

In the base model, main effects were significant for country, wave, age, time in sample, HSI at previous wave, and education, but not for sex, ethnicity, marital status, or income. Respondents in the UK were less likely to have made a quit attempt than Australians, but Canadian and US respondents were not significantly different from Australians. Smokers were more likely to attempt to quit in Waves 3, 4 and 5, compared to Wave 2. Odds of having made a quit attempt decreased with increasing age, by about 1% per year. Those who remained in the sample for three waves were more likely to attempt to quit than those who were present for two waves, but those in the sample for four or five waves were no different. With the exception of HSI scores of 1 (vs. 0), heavier smokers were less likely to have attempted to quit: those with an HSI score of 6 at the previous wave had just half the odds of having attempted to quit as those with an HSI of 0. Concerning education, there was no difference in the odds of attempting to quit for moderate education compared to low, but those with high education had 20% greater odds of having made a quit attempt.

Model 2A2 – Quit attempts among those who intended to quit

When the same model was conducted with only those who intended to quit at the previous wave, country, age, and time in sample became non-significant, while marital status reached significance. In this model, main effects were significant for wave, marital status, HSI at previous wave, and education, but not for country, age, sex, ethnicity, time in sample, or income. As in the model with the full sample, smokers who were intending to quit were more likely to have attempted to quit in Waves 3, 4 and 5, compared to Wave 2. With the exception of HSI scores of 1 (vs. 0), heavier smokers were less likely to intend to quit. Concerning education, there was no difference in odds of attempting to quit among those who intended to quit for moderate education compared to low, but those with high education had 20% greater odds of having made a quit attempt. Unlike the full sample model, the main effect of marital status was significant; there was no difference in attempts to quit between those who were married/common-law and those who were single, but those who were separated/widowed/divorced and intended to quit were more likely to have attempted to quit than those who were married/common-law. The effects of income and education on quit attempts did not differ between the full sample and only those who intended to quit.

Table 24: Base GEE Model[a] 2A2: Odds ratios for predictors of attempting to quit smoking since last survey date, among those who intended to quit (n=14 429, n clusters =7892)

Variables	Odds Ratio	95% Confidence Interval	P value
Country			0.2098
Australia	1.0		
Canada	1.0523	0.9362-1.1829	0.3928
UK	0.9743	0.8622-1.1009	0.6760
US	0.9252	0.8142-1.0510	0.2322
Wave			0.0004
2	1.0		
3	1.1642	1.0272-1.3196	0.0174
4	1.3130	1.1581-1.4886	<0.0001
5	1.2284	1.0684-1.4124	0.0039
Age	0.9985	0.9949-1.0021	0.4127
Sex			
Male vs. female (ref.)	0.9549	0.8761-1.0408	0.2937
Ethnicity			
Minority vs. not (ref.)	1.0442	0.9052-1.2045	0.5530
Marital status			0.0037
Married/common-law	1.0		
Separated/divorced/widowed	1.2047	1.0784-1.3457	0.0010
Single	1.0142	0.9049-1.1367	0.8081
Education			0.0213
Low (high school or less)	1.0		
Moderate (college/some university)	1.0341	0.9404-1.1373	0.4888
High (university or higher)	1.2033	1.0552-1.3721	0.0057
Income			0.5341
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	0.9702	0.8709-1.0809	0.5834
High (over $60K/£30K)	0.9554	0.8496-1.0756	0.4501
Not stated	0.8701	0.7194-1.0525	0.1518
HSI (at previous wave)			<0.0001
0	1.0		
1	0.9122	0.7823-1.0636	0.2407
2	0.6966	0.6047-0.8025	<0.0001
3	0.6315	0.5505-0.7244	<0.0001
4	0.5737	0.4938-0.6665	<0.0001
5	0.5832	0.4873-0.6981	<0.0001
6	0.5776	0.4399-0.7583	<0.0001
Time in sample			0.2564
2 waves	1.0		
3 waves	1.0464	0.9371-1.1683	0.4205
4 waves	0.9231	0.8075-1.0552	0.2409
5 waves	0.9163	0.7725-1.0869	0.3156

[a]GEE model with binomial variation and logit link

Models with Interactions

Model 2A1 – Quit attempts in the full sample

Significant interactions were found between country and wave ($p<0.0001$), age and income ($p=0.0008$), sex and income ($p=0.0183$), country and income ($p=0.0326$), and wave and income ($p=0.0282$). Due to the number of significant interactions, the regression modeling was conducted separately for each country (see Appendix E for tables by country). In Australia, only the interaction of age and education was significant (Table E1). The Canadian model had no significant interactions (Table E2). In the UK, income showed a significant interaction with both sex and ethnicity (Table E3). In the US, significant interactions were identified for age and income, and for wave and education (Table E4).

For the Australian sample (Table E1), no main effects were significant except for HSI. HSI scores of 1 (vs. 0) were not significant and an HSI of 2 was borderline significant, but higher scores were associated with decreased odds of having made a quit attempt. The interaction of age and education was significant: there was no effect of age for low education, but at higher education levels age had stronger effects, and was associated with lower odds of attempting to quit.

In the Canadian sample (Table E2), the main effects of ethnicity, education, income, and time in sample were not significantly associated with attempts to quit smoking. The main effect of wave was significant, with higher odds of having made a quit attempt at Wave 4, compared to Wave 2. Age was also significant, with older respondents less likely to have made a quit attempt. Males had about 20% lower odds of having attempted to quit. There was a significant main effect of marital status: those who were separated/divorced/widowed were more likely to have made a quit attempt than married respondents. Again, HSI had a strong association with the outcome: for all levels except 1, higher HSI was associated with decreased odds of attempting to quit, and those with a score of 4, 5 or 6 had just half the odds of attempting (compared to HSI of 0). None of the interactions tested were significant.

In the UK sample (Table E3), all main effects were significant except those of marital status and time in sample. The effect of wave was not significant at Wave 3, but respondents were more likely to have made attempts to quit at Waves 4 and 5. Increasing age was associated with lower odds of attempting to quit. For levels greater than 1 and 2, higher HSI was associated with lower odds of making a quit attempt (compared to HSI of 0). Those with high education were more likely to have

attempted to quit than those with low education. Income interacted significantly with both sex and ethnicity. Income was not significantly associated with attempts to quit for non-minority respondents, except that non-minority males with not stated income had half the odds of having attempted to quit as those with low income. However, income had significant effects within minority groups: females with moderate and high income had four times the odds of attempting to quit as those with low income (and the not stated group followed the same pattern, although was only borderline significant), and males with moderate and high income had five times the odds of attempting to quit as those with low income.

In the US sample (Table E4), the main effects of sex, marital status and time in sample were not significant. Minority ethnicity was associated with lower odds of having made a quit attempt. Higher HSI scores were also associated with lower odds of a quit attempt, except for a score of 1 (vs. 0). There were significant interactions between wave and education, as well as age and income. While educational differences were not seen in Waves 2 or 3, odds of having attempted to quit were greater among those with moderate and high education (vs. low) in Wave 4 and Wave 5 (although Wave 5 effects were of borderline significance). The effect of age was significant only for moderate and high income groups, where increasing age was associated with lower odds of having made a quit attempt.

Considerable differences were seen between countries in the effects of a number of covariates. Wave had significant effects in the UK, with respondents more likely to have attempted to quit in Waves 4 and 5, and in Canada, where Wave 4 respondents were also more likely to have attempted to quit (vs. Wave 2); wave interacted with education in the US, so effects cannot be separated, and was not significant in Australia. Age was significant and had similar effects (about 1% lower odds per year) in Canada and the UK, and interacted with education in Australia and income in the US, where only those with moderate and high SES were less likely to attempt to quit with age. Ethnicity was not significantly associated with quit attempts in Australia or Canada, although in the US, minorities were less likely to attempt to quit, and in the UK ethnicity interacted with income such that income only made a difference for minorities. Marital status was significant only in Canada, where separated/divorced/widowed and single respondents were more likely to have attempted to quit. Income did not have significant overall effects in Australia or Canada (although Canadians with not stated income had just two-thirds the odds of attempting to quit as low income respondents), and interacted with age in the US, and both sex and ethnicity in the UK, such that higher income was associated with over 4 times the odds of having attempted to quit (compared to low income) among

minorities only. Considering education, high education (vs. low) was associated with greater odds of a quit attempt in the UK, and higher education was associated with greater odds of a quit attempt in Wave 4 (and borderline Wave 5) in the US, but was not significantly associated in Canada, and interacted with age in Australia.

Model 2A2 – Quit attempts among those who intended to quit

In the interactions model for only those who intended to quit at the previous wave, the interactions between country and wave, age and income, and sex and income were significant at the $p<0.05$ level (Table 25).

Table 25: GEE Model [a] 2A2 with Interactions: Odds ratios for predictors of attempting to quit smoking since last survey date, among those who intended to quit (n=14 429, n clusters =7892)

Variables	Odds Ratio	95% Confidence Interval	P value
Country (by wave)			
at Wave 2:			
CA vs. AU (ref.)	1.5279	1.2780-1.8267	<0.0001
UK vs. AU	0.9917	0.8204-1.1987	0.9310
US vs. AU	1.1715	0.9619-1.4268	0.1156
at Wave 3:			
CA vs. AU	1.0212	0.8421-1.2383	0.8313
UK vs. AU	0.8189	0.6611-1.0144	0.0674
US vs. AU	0.8396	0.6796-1.0374	0.1053
at Wave 4:			
CA vs. AU	0.8426	0.6932-1.0243	0.0856
UK vs. AU	1.2298	1.0009-1.5111	0.0490
US vs. AU	0.9445	0.7646-1.1668	0.5966
at Wave 5:			
CA vs. AU	0.7918	0.6409-0.9781	0.0304
UK vs. AU	0.8321	0.6669-1.0380	0.1003
US vs. AU	0.7454	0.5956-0.9328	0.0102
Age (by income)[b]			
For low income	1.0046	0.9989-1.0102	0.1111
For moderate income	0.9968	0.9912-1.0024	0.2626
For high income	0.9902	0.9835-0.9969	0.0042
For not stated income	1.0051	0.9937-1.0166	0.3847
Ethnicity			
Minority vs. not (ref.)	1.0483	0.9090-1.2089	0.5170
Marital status			0.0262
Married/common-law	1.0		
Separated/divorced/widowed	1.1629	1.0396-1.3007	0.0083
Single	1.0055	0.8964-1.1279	0.9251
Income (by sex)[c]			
For female:			
Moderate vs. low (ref.)	1.2761	0.8887-1.8323	0.1866
High vs. low	1.5135	1.0224-2.2405	0.0384
Not stated	0.9123	0.4871-1.7083	0.7742

For male:			
Moderate vs. low	1.5212	1.0341-2.2377	0.0332
High vs. low	2.0753	1.3791-3.1231	0.0005
Not stated	0.7674	0.4016-1.4663	0.4229
Education			0.0167
Low	1.0		
Moderate	1.0346	0.9404-1.1382	0.4852
High	1.2109	1.0614-1.3815	0.0044
HSI (at previous wave)			<0.0001
0	1.0		
1	0.9121	0.7818-1.0640	0.2416
2	0.6974	0.6052-0.8038	<0.0001
3	0.6339	0.5522-0.7276	<0.0001
4	0.5775	0.4967-0.6715	<0.0001
5	0.5873	0.4903-0.7035	<0.0001
6	0.5896	0.4481-0.7759	0.0002
Time in sample			0.1640
2 waves	1.0		
3 waves	1.0583	0.9462-1.1837	0.3213
4 waves	0.9240	0.8068-1.0583	0.2538
5 waves	0.8990	0.7558-1.0693	0.2291

[a]GEE model with binomial variation and logit link
[b]Income also interacts with sex; results shown here are collapsed across sexes
[c]Income also interacts with age; results shown here are collapsed across levels of age
Overall 3 df test for country: p<0.0001
Overall 3 df test for wave: p<0.0001
9 df test for country x wave interaction: p<0.0001
Overall 1 df test for age: p=0.1111
Overall 3 df test for income: p=0.1476
3 df test for age x income interaction: p=0.0046
Overall 1 df test for sex: p=0.0161
3 df test for sex x income interaction: p=0.0117

In the model including interactions for quit attempts among those who intended to quit, there were significant interactions between country and wave, age and income, and sex and income. Country and wave interacted with little consistency: Canadians were more likely to have attempted to quit than Australians at Wave 2, but less likely at Wave 5, UK respondents were more likely to have attempted to quit than Australians at Wave 4, and US respondents were less likely to have attempted to quit than Australians at Wave 5. The effect of age was only significant for high income. In addition, the effect of income depended on sex, with stronger effects seen for males: among females, high income respondents had 50% greater odds of having attempted to quit compared to low income respondents, and among males, moderate income respondents had 50% greater odds, and high income respondents had double the odds of having attempted to quit, compared to low income respondents.

For variables not involved in interactions, main effects were significant for marital status, education, and HSI at previous wave, but not for ethnicity and time in sample. Attempts to quit did not differ between those with HSI scores of 0 and 1, but those with scores of 2 or 3 had two-thirds the odds, and those with scores of 4, 5 and 6 had over 40% lower odds of having attempted to quit smoking (vs. HSI of 0). Separated/divorced/widowed respondents were more likely to have attempted to quit compared to married respondents, but single respondents were not significantly different from married respondents. Compared to those with low education, moderately educated respondents were no different, but highly educated respondents were more likely to have attempted to quit.

5.5 Abstinence

5.5.1 Quit for at least one month

Descriptive Statistics

Table 26 and Table 27 below show the proportions of smokers who were quit for at least one month at the time of the survey, both for the total sample and only for those who attempted to quit since entry into the survey, by education and income level.

Table 26: Quit for at least one month at time of survey, by education level

Education level	**Quit for at least one month**[a]	
	All eligible respondents (n=21 989)	**Those who attempted to quit** (n=10 844)
Low (high school or less)	11.1%	23.3%
Moderate (college/some university)	11.5%	22.9%
High (university or higher)	14.8%	28.3%
All levels	11.7%	23.9%

[a]Presented as weighted percentages

Table 27: Quit for at least one month at time of survey, by income level

Income level	**Quit for at least one month**[a]	
	All eligible respondents (n=22 036)	**Those who attempted to quit** (n=10 894)
Low (under $30K/£15K)	9.8%	20.5%
Moderate ($30-60K/£15-30K)	11.3%	22.6%
High (over $60K/£30K)	13.8%	27.4%
Not stated	12.5%	28.4%
All levels	11.7%	23.8%

[a]Presented as weighted percentages

Overall, 12% of the sample had quit for at least one month, which represented 24% of all those who had attempted to quit since entry into the study. Within each education/income group, approximately double the proportion of those who had attempted had quit, compared to the full sample. The proportion of respondents who had quit was approximately the same among low and moderate education respondents, and somewhat greater among high education respondents. The proportion of quitters increased with income level; the not stated group was between the moderate and high income groups for the full sample, but had the greatest proportion of quitters in the sample including only those who had attempted to quit.

Table 28: Quit for at least one month at time of survey, by country

Country	**Quit for at least one month**[a]	
	All eligible respondents (n=22 074)	**Those who attempted to quit** (n=10 894)
Australia	11.8%	23.3%
Canada	11.8%	22.0%
UK	12.8%	28.0%
US	10.0%	22.1%

[a]Presented as weighted percentages

Comparing countries (Table 28), similar proportions of each sample had quit for at least one month, although the UK was somewhat higher and the US was somewhat lower. When considering only those who attempted to quit, very similar proportions had quit in the Canadian, US and Australian samples, but more respondents in the UK had quit.

GEE Models

Separate analyses were conducted with the full sample (3A1), and with a subset who had attempted to quit since entry into the study (3A2). Wave 1 and first wave in sample were excluded from the models, due to the quitting measures only being applicable to cohort respondents.

Base Models

Table 29: Base GEE Model[a] 3A1: Odds ratios for having quit smoking for at least one month (n=21 912, n clusters = 9889)

Variables	**Odds Ratio**	**95% Confidence Interval**	**P value**
Country			0.1872
Australia	1.0		
Canada	0.9910	0.8347-1.1765	0.9178
UK	1.1494	0.9780-1.3507	0.0910
US	0.9768	0.8126-1.1742	0.8026

Wave			<0.0001
2	1.0		
3	1.1947	1.0006-1.4264	0.0492
4	1.5844	1.3096-1.9169	<0.0001
5	1.6699	1.3557-2.0568	<0.0001
Age	0.9983	0.9934-1.0033	0.5091
Sex			
Male vs. female (ref.)	0.9863	0.8724-1.1152	0.8263
Ethnicity			
Minority vs. not (ref.)	0.9332	0.7517-1.1587	0.5315
Marital status			0.0155
Married/common-law	1.0		
Separated/divorced/widowed	0.8840	0.7579-1.0311	0.1164
Single	0.7966	0.6762-0.9384	0.0065
Education			0.0162
Low (high school or less)	1.0		
Moderate (college/some university)	0.9904	0.8627-1.1369	0.8906
High (university or higher)	1.2604	1.0613-1.4967	0.0083
Income			0.0223
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	1.0528	0.9055-1.2241	0.5036
High (over $60K/£30K)	1.2574	1.0664-1.4826	0.0064
Not stated	1.1885	0.9310-1.5172	0.1658
HSI (at study entry)			<0.0001
0	1.0		
1	0.9557	0.7560-1.2082	0.7048
2	0.7191	0.5791-0.8930	0.0028
3	0.5263	0.4265-0.6494	<0.0001
4	0.4778	0.3780-0.6039	<0.0001
5	0.3589	0.2660-0.4843	<0.0001
6	0.3003	0.1946-0.4634	<0.0001
Time in sample			<0.0001
2 waves	1.0		
3 waves	1.9118	1.6645-2.1959	<0.0001
4 waves	2.2822	1.9314-2.6966	<0.0001
5 waves	2.8890	2.3680-3.5247	<0.0001

[a]GEE model with binomial variation and logit link

In the base model for the full sample, the main effects of marital status, HSI at study entry, wave, time in sample, education, and income were all significant; main effects for country, age, sex and ethnicity were not. There were no significant differences between married/common-law smokers and those who were separated/divorced/widowed, but single smokers were less likely to have been quit for at least one month than those who were married/common-law. With the exception of HSI scores of 1 (vs. 0), heavier smokers were less likely to be quit. Respondents were more likely to have been quit in more recent waves, compared to in Wave 2. Those who remained in the sample longer were also more likely to have quit. Of particular interest in this study, those with high education were

more likely to have quit than those with low education, as were those with high income, compared to low income.

Table 30: Base GEE Model[a] 3A2: Odds ratios for having quit smoking for at least one month, among those who had made a quit attempt (n=10 820, n clusters = 5289)

Variables	Odds Ratio	95% Confidence Interval	P value
Country			0.0013
Australia	1.0		
Canada	0.9318	0.7805-1.1125	0.4347
UK	1.3024	1.0978-1.5451	0.0024
US	1.0434	0.8608-1.2647	0.6654
Wave			0.0004
2	1.0		
3	1.0584	0.8790-1.2744	0.5491
4	1.3885	1.1418-1.6885	0.0010
5	1.4313	1.1498-1.7818	0.0013
Age	1.0056	1.0005-1.0107	0.0318
Sex			
Male vs. female (ref.)	1.0420	0.9148-1.1870	0.5357
Ethnicity			
Minority vs. not (ref.)	0.9442	0.7543-1.1818	0.6161
Marital status			0.0173
Married/common-law	1.0		
Separated/divorced/widowed	0.8644	0.7344-1.0174	0.0797
Single	0.7933	0.6656-0.9455	0.0097
Education			0.0664
Low (high school or less)	1.0		
Moderate (college/some university)	0.9675	0.8370-1.1142	0.6328
High (university or higher)	1.2039	1.0030-1.4449	0.0463
Income			0.0055
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	1.0714	0.9153-1.2542	0.3904
High (over $60K/£30K)	1.3027	1.0938-1.5514	0.0030
Not stated	1.3298	1.0246-1.7259	0.0321
HSI (at study entry)			<0.0001
0	1.0		
1	0.9434	0.7360-1.2093	0.6455
2	0.7693	0.6100-0.9701	0.0267
3	0.5772	0.4614-0.7221	<0.0001
4	0.5438	0.4250-0.6958	<0.0001
5	0.4310	0.3146-0.5905	<0.0001
6	0.4067	0.2565-0.6447	0.0001
Time in sample			<0.0001
2 waves	1.0		
3 waves	1.3464	1.1628-1.5590	<0.0001
4 waves	1.3661	1.1505-1.6221	0.0004
5 waves	1.5755	1.2728-1.9501	<0.0001

[a]GEE model with binomial variation and logit link

In the base model for only those who had attempted to quit, significant main effects were found for country, wave, age, marital status, HSI at study entry, time in sample, and income; significant main effects were not found for sex, ethnicity, and education (which was borderline). UK respondents were more likely to be quit than Australians, but Canadian and US respondents were not significantly different from Australians. Older smokers were slightly more likely to be abstinent. Respondents were more likely to be quit at Waves 4 and 5, compared to Wave 2. The difference between married/common-law respondents and those who were separated/divorced/widowed was not significant, although single respondents were less likely to have been quit for at least one month than those who were married/common-law. With the exception of HSI scores of 1 (vs. 0), heavier smokers were less likely to have been quit for at least one month. Those who remained in the sample longer were also more likely to have quit. Of particular interest, respondents with high education were more likely to have quit than those with low education, as were those with high or not stated income, compared to low income.

Comparing the base models for the full sample (3A1) and only those who attempted to quit (3A2), the same general patterns were observed, and similar estimates obtained, with a few exceptions. The main effect of country reached significance only among those who attempted to quit; respondents in the UK were significantly more likely to quit if they had attempted. Also, the not stated income group had a third greater odds of having quit in the group who had attempted to quit, but was not significantly different in the full sample. The main effect of age was also only significantly associated with quitting among those who had made a quit attempt. Although the main effect of wave was associated with quitting in both samples, the specific comparison for Wave 3 vs. Wave 2 (with Wave 3 being more likely to have quit) was significant only for the full sample. Lastly, the effect of time in sample was smaller among those who had attempted to quit: respondents who remained in the sample longer than two waves had 35-58% greater odds of having quit if they had attempted, compared to 91-189% greater odds in the full sample.

Models with Interactions

Table 31: GEE Model[a] 3A1 with Interactions: Odds ratios for having quit smoking for at least one month (n=21 912, n clusters = 9889)

Variables	Odds Ratio	95% Confidence Interval	P value
Country			0.4049
Australia	1.0		
Canada	0.9879	0.8322-1.1727	0.8894
UK	1.1156	0.9492-1.3112	0.1843
US	0.9895	0.8233-1.1893	0.9106

Wave			<0.0001
2	1.0		
3	1.1934	0.9994-1.4251	0.0508
4	1.5865	1.3110-1.9199	<0.0001
5	1.6725	1.3577-2.0604	<0.0001
Age (by education)			
For low education	1.0057	0.9995-1.0119	0.0695
For moderate education	0.9890	0.9805-0.9977	0.0127
For high education	0.9762	0.9762-0.9986	0.0274
Sex			
Male vs. female (ref.)	0.9892	0.8748-1.1185	0.8619
Ethnicity			
Minority vs. not (ref.)	0.9371	0.7509-1.1560	0.5201
Marital status			0.0128
Married/common-law	1.0		
Separated/divorced/widowed	0.8849	0.7584-1.0324	0.1200
Single	0.7909	0.6711-0.9321	0.0051
Income			0.0155
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	1.0701	0.9198-1.2449	0.3804
High (over $60K/£30K)	1.2799	1.0847-1.5101	0.0035
Not stated	1.1918	0.9337-1.5214	0.1589
HSI (at study entry)			<0.0001
0	1.0		
1	0.9586	0.7584-1.2118	0.7238
2	0.7292	0.5871-0.9058	0.0043
3	0.5340	0.4326-0.6591	<0.0001
4	0.4846	0.3831-0.6129	<0.0001
5	0.3634	0.2692-0.4905	<0.0001
6	0.3079	0.1993-0.4757	<0.0001
Time in sample			<0.0001
2 waves	1.0		
3 waves	1.9121	1.6645-2.1964	<0.0001
4 waves	2.2815	1.9305-2.6963	<0.0001
5 waves	2.8932	2.3711-3.5302	<0.0001

[a]GEE model with binomial variation and logit link
Overall 1 df test for age: p=0.0695
Overall 2 df test for education: p=0.0002
2 df test for age x education interaction: p=0.0006

In the model with interactions for the full sample, the effects of wave, marital status, income, HSI, and time in sample were significant, and very similar to the main effects in the base model; significant main effects were not found for country, sex or ethnicity. A significant interaction was found between age and education: older respondents were less likely to quit, and the effect of age was stronger at higher education levels.

Table 32: GEE Model[a] 3A2 with Interactions: Odds ratios for having quit smoking for at least one month, among those who had made a quit attempt (n=10 820, n clusters = 5289)

Variables	Odds Ratio	95% Confidence Interval	P value
Country			0.0031
Australia	1.0		
Canada	0.9267	0.7761-1.1066	0.4005
UK	1.2749	1.0745-1.5126	0.0054
US	1.0549	0.8704-1.2786	0.5859
Wave			0.0003
2	1.0		
3	1.0576	0.8780-1.2739	0.5554
4	1.3924	1.1447-1.6936	0.0009
5	1.4341	1.1517-1.7857	0.0013
Age (by education)			
For low education	1.0116	1.0053-1.0179	0.0003
For moderate education	0.9958	0.9873-1.0044	0.3417
For high education	1.0012	0.9896-1.0129	0.8424
Sex			
Male vs. female (ref.)	1.0442	0.9168-1.1894	0.5148
Ethnicity			
Minority vs. not (ref.)	0.9376	0.7491-1.1736	0.5738
Marital status			0.0178
Married/common-law	1.0		
Separated/divorced/widowed	0.8706	0.7394-1.0251	0.0963
Single	0.7911	0.6636-0.9429	0.0089
Income			0.0047
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	1.0869	0.9281-1.2729	0.3009
High (over $60K/£30K)	1.3209	1.1083-1.5742	0.0019
Not stated	1.3249	1.0196-1.7216	0.0353
HSI (at study entry)			<0.0001
0	1.0		
1	0.9460	0.7383-1.2121	0.6605
2	0.7773	0.6164-0.9803	0.0333
3	0.5849	0.4676-0.7317	<0.0001
4	0.5510	0.4305-0.7054	<0.0001
5	0.4352	0.3177-0.5963	<0.0001
6	0.4175	0.2636-0.6613	0.0002
Time in sample			<0.0001
2 waves	1.0		
3 waves	1.3471	1.1631-1.5601	<0.0001
4 waves	1.3636	1.1484-1.6191	0.0004
5 waves	1.5785	1.2751-1.9540	<0.0001

[a]GEE model with binomial variation and logit link
Overall 1 df test for age: p=0.0003
Overall 2 df test for education: p=0.0079
2 df test for age x education interaction: p=0.0059

Among those who had attempted to quit, the effects of country, wave, marital status, income, HSI, and time in sample were significant and very similar to the main effects in the base model; significant

main effects were not found for sex or ethnicity. A significant interaction was found between age and education: age was not significantly associated with quitting among moderate and high education groups, but among those with less education, older respondents were more likely to quit.

Comparing the models with interactions for the full sample (3A1) and only those who attempted to quit (3A2), the same general patterns were observed, with a few exceptions. The main effect of country was significant only among those who attempted to quit, but not for the full sample; however, only the UK respondents were significantly different, being more likely to quit if they had attempted. Also, the not stated income group had 30% higher odds of quitting in the group who had attempted to quit, but was not significantly different in the full sample. Lastly, the effect of age was different in the two samples: age was significant for moderate and high education respondents in the full sample, but was significant only for low education respondents among those who had attempted, and older respondents were less likely to quit in the full sample, but more likely to quit if they had attempted.

5.5.2 Quit for at least six months

Descriptive Statistics

Table 33 and Table 34 below show the proportions of smokers who were quit for at least six months at the time of the survey, both for the total sample and only for those who attempted to quit since entry into the survey, by education and income.

Table 33: Quit for at least six months at time of survey, by education level

Education level	**Quit for at least six months**[a]	
	All eligible respondents (n=21 989)	**Those who attempted to quit** (n=10 844)
Low (high school or less)	7.0%	14.7%
Moderate (college/some university)	7.5%	14.8%
High (university or higher)	9.8%	18.6%
All levels	7.5%	15.3%

[a]Presented as weighted percentages

Table 34: Quit for at least six months at time of survey, by income level

Income level	**Quit for at least six months**[a]	
	All eligible respondents (n=22 074)	**Those who attempted to quit** (n=10 894)
Low (under $30K/£15K)	6.4%	13.3%
Moderate ($30-60K/£15-30K)	7.2%	14.5%
High (over $60K/£30K)	8.8%	17.4%
Not stated	8.2%	18.8%
All levels	7.5%	15.3%

[a]Presented as weighted percentages

Overall, 7.5% of the sample had quit for at least six months, which represented 15% of all those who had attempted to quit since entry into the study. The same pattern of results by education and income was observed for six-month abstinence as for one-month abstinence.

Table 35: Quit for at least six months at time of survey, by country

Country	**Quit for at least six months**[a]	
	All eligible respondents (n=22 074)	**Those who attempted to quit** (n=10 894)
Australia	7.4%	14.6%
Canada	7.6%	14.2%
UK	8.2%	17.9%
US	6.7%	14.7%

[a]Presented as weighted percentages

As with quitting for one month, similar proportions of the sample in each country had quit for at least six months, with somewhat higher proportions in the UK and lower in the US. Likewise, when considering only those who attempted to quit, very similar proportions had quit in the Canadian, US and Australian samples, but more respondents in the UK had quit for at least six months.

GEE Models

Separate analyses were conducted with the full sample (3B1), and a subset who had attempted to quit since entry into the study (3B2). Wave 1 and first wave in sample were excluded from the models, due to the quitting measures only being applicable to cohort respondents.

Base Models

Table 36: Base GEE Model[a] 3B1: Odds ratios for having quit smoking for at least six months (n=21 912, n clusters = 9889)

Variables	Odds Ratio	95% Confidence Interval	P value
Country			0.3241
Australia	1.0		
Canada	1.0640	0.8584-1.3188	0.5713
UK	1.2063	0.9852-1.4769	0.0694
US	1.1052	0.8788-1.3901	0.3924
Wave			<0.0001
2	1.0		
3	4.5291	3.1823-6.4460	<0.0001
4	6.5437	4.5304-9.4517	<0.0001
5	7.0790	4.8378-10.3585	<0.0001
Age	1.0017	0.9956-1.0079	0.5773
Sex			
Male vs. female (ref.)	0.9730	0.8365-1.1319	0.7233
Ethnicity			
Minority vs. not (ref.)	1.0015	0.7729-1.2977	0.9912
Marital status			0.0371
Married/common-law	1.0		
Separated/divorced/widowed	0.8275	0.6877-0.9958	0.0450
Single	0.8091	0.6587-0.9939	0.0436
Education			0.0163
Low (high school or less)	1.0		
Moderate (college/some university)	1.0327	0.8719-1.2233	0.7093
High (university or higher)	1.3448	1.0917-1.6567	0.0054
Income			0.1809
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	0.9962	0.8265-1.2007	0.9681
High (over $60K/£30K)	1.1724	0.9583-1.4344	0.1221
Not stated	1.2042	0.8858-1.6369	0.2356
HSI (at study entry)			<0.0001
0	1.0		
1	0.9202	0.6899-1.2274	0.5715
2	0.6987	0.5353-0.9119	0.0083
3	0.5378	0.4175-0.6928	<0.0001
4	0.4783	0.3602-0.6350	<0.0001
5	0.3461	0.2396-0.4999	<0.0001
6	0.3358	0.1989-0.5670	<0.0001
Time in sample			<0.0001
2 waves	1.0		
3 waves	2.5088	2.1027-2.9934	<0.0001
4 waves	3.4253	2.7895-4.2058	<0.0001
5 waves	4.1747	3.2841-5.3067	<0.0001

[a]GEE model with binomial variation and logit link

In the base model for the full sample (Table 36), the main effects were significant for all variables except country, age, sex, ethnicity, and income. Separated/divorced/widowed and single respondents were less likely to be quit for at least six months than married/common-law respondents. Those with high education were more likely to have quit than those with low education. With the exception of HSI scores of 1 (vs. 0), heavier smokers were less likely to have quit for at least six months. Respondents had much greater odds (from 4.5 to 7 times) of having quit in more recent waves, compared to in Wave 2. Similarly, those who remained in the sample longer also had greater odds of having quit: respondents in the study for five waves had four times the odds of quitting as those in the study for two waves.

Table 37: Base GEE Model[a] 3B2: Odds ratios for having quit smoking for at least six months, among those who had made a quit attempt (n=10 820, n clusters = 5289)

Variables	Odds Ratio	95% Confidence Interval	P value
Country			0.0255
Australia	1.0		
Canada	1.0525	0.8443-1.3120	0.4347
UK	1.3419	1.0877-1.6554	0.0024
US	1.2239	0.9645-1.5531	0.6654
Wave			<0.0001
2	1.0		
3	4.7968	3.1916-7.2094	<0.0001
4	6.8140	4.5003-10.3172	<0.0001
5	7.4984	4.8868-11.5057	<0.0001
Age	1.0074	1.0012-1.0136	0.0195
Sex			
Male vs. female (ref.)	1.0409	0.8892-1.2186	0.6180
Ethnicity			
Minority vs. not (ref.)	1.0372	0.7940-1.3550	0.7887
Marital status			0.0776
Married/common-law	1.0		
Separated/divorced/widowed	0.8347	0.6874-1.0135	0.0681
Single	0.7933	0.6712-1.0278	0.0876
Education			0.0364
Low (high school or less)	1.0		
Moderate (college/some university)	0.9929	0.8345-1.1815	0.9363
High (university or higher)	1.3022	1.0470-1.6195	0.0176
Income			0.0962
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	1.0010	0.8254-1.2138	0.9902
High (over $60K/£30K)	1.1932	0.9663-1.4734	0.1007
Not stated	1.3171	0.9499-1.8264	0.0986

HSI (at study entry)			<0.0001
0	1.0		
1	0.9213	0.6803-1.2476	0.5962
2	0.7528	0.5691-0.9960	0.0468
3	0.5767	0.4417-0.7532	<0.0001
4	0.5460	0.4057-0.7347	<0.0001
5	0.3942	0.2693-0.5770	<0.0001
6	0.4616	0.2657-0.8022	0.0061
Time in sample			<0.0001
2 waves	1.0		
3 waves	1.8692	1.5499-2.2496	<0.0001
4 waves	2.2421	1.8169-2.7668	<0.0001
5 waves	2.4842	1.9322-3.1938	<0.0001

[a]GEE model with binomial variation and logit link

In the base model for only those who had attempted to quit (Table 37), similar to the full sample model, the main effects were significant for all variables except sex, ethnicity, marital status (borderline) and income. Unlike the full sample model, country was significant: UK respondents were more likely to be quit than Australians, but Canadian and US respondents were not significantly different from Australians. Age also reached significance in the model with those who attempted to quit: older respondents were more likely to have been quit for at least six months. As in the full sample model, those with high education were more likely to have quit than those with low education. The effects of HSI were also similar, although somewhat weaker: with the exception of HSI scores of 1 (vs. 0), heavier smokers were less likely to have been quit for at least six months. Respondents had much greater odds (from 4.8 to 7.5 times) of having quit in more recent waves, compared to in Wave 2. Similarly, those who remained in the sample longer also had greater odds of having quit for at least six months, although a weaker association was observed than in the full sample model.

Models with Interactions

Table 38: GEE Model[a] 3B1 with Interactions: Odds ratios for having quit smoking for at least six months (n=21 912, n clusters = 9889)

Variables	Odds Ratio	95% Confidence Interval	P value
Country			0.5252
Australia	1.0		
Canada	1.0592	0.8547-1.3126	0.5993
UK	1.1571	0.9449-1.4169	0.1580
US	1.1226	0.8932-1.4109	0.3213
Wave			<0.0001
2	1.0		
3	4.5288	3.1811-6.4474	<0.0001
4	6.5618	4.5414-9.4809	<0.0001
5	7.0965	4.8494-10.3849	<0.0001

Age (by education)			
For low education	1.0126	1.0049-1.0204	0.0013
For moderate education	0.9910	0.9805-1.0016	0.0956
For high education	0.9825	0.9688-0.9965	0.0141
Sex			
Male vs. female (ref.)	0.9797	0.8418-1.1401	0.7909
Ethnicity			
Minority vs. not (ref.)	0.9978	0.7714-1.2907	0.9866
Marital status			0.0296
Married/common-law	1.0		
Separated/divorced/widowed	0.8279	0.6875-0.9968	0.0462
Single	0.7978	0.6490-0.9807	0.0320
Income			0.1577
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	1.0207	0.8456-1.2320	0.8314
High (over $60K/£30K)	1.2024	0.9815-1.4730	0.0752
Not stated	1.2076	0.8881-1.6420	0.2289
HSI (at study entry)			<0.0001
0	1.0		
1	0.9220	0.6916-1.2293	0.5802
2	0.7114	0.5444-0.9296	0.0126
3	0.5483	0.4251-0.7073	<0.0001
4	0.4870	0.3660-0.6480	<0.0001
5	0.3530	0.2440-0.5105	<0.0001
6	0.3480	0.2057-0.5886	<0.0001
Time in sample			<0.0001
2 waves	1.0		
3 waves	2.5112	2.1044-2.9966	<0.0001
4 waves	3.4282	2.7910-4.2109	<0.0001
5 waves	4.1883	3.2948-5.3241	<0.0001

[a]GEE model with binomial variation and logit link
Overall 1 df test for age: p=0.0013
Overall 2 df test for education: p<0.0001
2 df test for age x education interaction: p<0.0001

In the model including interactions for the full sample (Table 38), only the interaction of age and education was significantly associated with six-month abstinence. Respondents with low education were more likely to quit with increasing age, while those with high education were less likely, and there were no significant age differences for those with moderate education. The main effects of all other variables were similar to those in the base model.

Table 39: GEE Model[a] 3B2 with Interactions: Odds ratios for having quit smoking for at least six months, among those who had made a quit attempt (n=10 820, n clusters = 5289)

Variables	Odds Ratio	95% Confidence Interval	P value
Country			0.0420
Australia	1.0		
Canada	1.0426	0.8363-1.2998	0.7107
UK	1.3006	1.0543-1.6045	0.0141
US	1.2417	0.9791-1.5747	0.0741

Wave			<0.0001
2	1.0	1.0	
3	4.8089	3.1954-7.2369	<0.0001
4	6.8635	4.5278-10.4042	<0.0001
5	7.5422	4.9117-11.5816	<0.0001
Age (by education)			
For low education	1.0164	1.0085-1.0243	<0.0001
For moderate education	0.9973	0.9871-1.0076	0.6116
For high education	0.9938	0.9798-1.0080	0.3922
Sex			
Male vs. female (ref.)	1.0469	0.8943-1.2256	0.5687
Ethnicity			
Minority vs. not (ref.)	1.0225	0.7835-1.3344	0.8701
Marital status			0.0801
Married/common-law	1.0		
Separated/divorced/widowed	0.8425	0.6936-1.0232	0.0839
Single	0.8242	0.6657-1.0204	0.0759
Income			0.0951
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	1.0233	0.8429-1.2424	0.8157
High (over $60K/£30K)	1.2183	0.9856-1.5059	0.0679
Not stated	1.3142	0.9462-1.8253	0.1031
HSI (at study entry)			<0.0001
0	1.0		
1	0.9232	0.6820-1.2495	0.6047
2	0.7637	0.5765-1.0116	0.0602
3	0.5857	0.4480-0.7657	<0.0001
4	0.5558	0.4121-0.7497	0.0001
5	0.4020	0.2744-0.5889	<0.0001
6	0.4815	0.2772-0.8362	0.0095
Time in sample			<0.0001
2 waves	1.0		
3 waves	1.8709	1.5525-2.2546	<0.0001
4 waves	2.2390	1.8140-2.7637	<0.0001
5 waves	2.4918	1.9389-3.2023	<0.0001

[a]GEE model with binomial variation and logit link
Overall 1 df test for age: p<0.0001
Overall 2 df test for education: p=0.0005
2 df test for age x education interaction: p=0.0011

In the model including interactions for the sample including only those who had attempted to quit (Table 39), again, only the interaction of age and education was significantly associated with six-month abstinence. Respondents with low education were more likely to quit with increasing age, but there were no significant age differences for those with moderate or high education. The effects of all other variables were similar to those in the base model, except that HSI scores of 2 (vs. 0) lost significance in the interactions model.

5.5.3 Quit for at least 12 months

Descriptive Statistics

Table 40 and Table 41 below show the proportions of smokers who were quit for at least 12 months at the time of the survey, both for the total sample and only for those who attempted to quit since entry into the survey, by education and income.

Table 40: Quit for at least 12 months at time of survey, by education level

Education level	**Quit for at least 12 months**[a]	
	All eligible respondents (n=12 134)	**Those who attempted to quit** (n=7232)
Low (high school or less)	7.1%	12.2%
Moderate (college/some university)	6.7%	11.0%
High (university or higher)	8.7%	14.1%
All levels	7.2%	12.1%

[a]Presented as weighted percentages

Table 41: Quit for at least 12 months at time of survey, by income level

Income level	**Quit for at least 12 months**[a]	
	All eligible respondents (n=12 186)	**Those who attempted to quit** (n=7269)
Low (under $30K/£15K)	6.2%	10.6%
Moderate ($30-60K/£15-30K)	7.1%	11.8%
High (over $60K/£30K)	7.8%	12.9%
Not stated	9.0%	15.9%
All levels	7.2%	12.1%

[a]Presented as weighted percentages

Overall, 7.2% of the sample had quit for at least 12 months, which represented 12% of all those who had attempted to quit since entry into the study. The same pattern of results was observed for 12-month abstinence as for one- and six-month abstinence, except that for education, the moderate group was actually slightly lower than the low education group, rather than about the same.

Table 42: Quit for at least 12 months at time of survey, by country

Country	**Quit for at least 12 months**[a]	
	All eligible respondents (n=12 186)	**Those who attempted to quit** (n=7269)
Australia	6.8%	11.2%
Canada	7.8%	12.4%
UK	7.4%	13.1%
US	6.5%	11.6%

[a]Presented as weighted percentages

Similar proportions of respondents across countries had quit for at least 12 months, with somewhat higher proportions of the Canadian and UK samples and somewhat lower proportions of the Australian and US samples having quit (Table 42). The same pattern was observed among those who attempted to quit.

GEE Models

Separate analyses were conducted with the full sample (3C1), and a subset who had attempted to quit since entry into the study (3C2). Due to the timeline for the outcome (i.e. respondents needed to be quit for 2 consecutive waves), only Waves 3 through 5 and time in sample of at least 3 waves were included.

Base Models

Table 43: Base GEE Model[a] 3C1: Odds ratios for having quit smoking for at least 12 months (n=12 090, n clusters = 6051)

Variables	Odds Ratio	95% Confidence Interval	P value
Country			0.8709
Australia	1.0		
Canada	1.1167	0.8558-1.4571	0.4163
UK	1.0801	0.8328-1.4010	0.5613
US	1.0566	0.7853-1.4215	0.7161
Wave			<0.0001
3	1.0		
4	1.1942	0.9039-1.5777	0.2116
5	1.8481	1.3523-2.5257	0.0001
Age	1.0055	0.9975-1.0136	0.1773
Sex			
Male vs. female (ref.)	1.0326	0.8497-1.2549	0.7468
Ethnicity			
Minority vs. not (ref.)	0.8555	0.6023-1.2151	0.3834
Marital status			0.0254
Married/common-law	1.0		
Separated/divorced/widowed	0.7521	0.5894-0.9597	0.0220
Single	0.7665	0.5794-1.0140	0.0625
Education			0.3191
Low (high school or less)	1.0		
Moderate (college/some university)	0.9926	0.7950-1.2392	0.9474
High (university or higher)	1.2101	0.9251-1.5830	0.1640
Income			0.4344
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	1.0056	0.7917-1.2774	0.9634
High (over $60K/£30K)	1.1460	0.8885-1.4782	0.2940
Not stated	1.2701	0.8571-1.8820	0.2335

HSI (at study entry)			<0.0001
0	1.0		
1	0.8578	0.5889-1.2495	0.4241
2	0.6671	0.4700-0.9469	0.0235
3	0.5143	0.3696-0.7156	<0.0001
4	0.4168	0.2866-0.6062	<0.0001
5	0.3960	0.2518-0.6227	<0.0001
6	0.2388	0.1178-0.4838	<0.0001
Time in sample			<0.0001
3 waves	1.0		
4 waves	2.1776	1.7196-2.7577	<0.0001
5 waves	2.3242	1.7532-3.0811	<0.0001

[a]GEE model with binomial variation and logit link

In the base model with the full sample (Table 43), main effects were not significant for country, age, sex, ethnicity, education or income. Marital status was the only demographic variable that was significantly associated with being quit for 12 months; separated/divorced/widowed respondents were less likely and single respondents were also borderline less likely to be quit than married/common-law respondents. With the exception of HSI scores of 1 (vs. 0), heavier smokers were less likely to have been quit for at least 12 months, down to just one-quarter the odds of quitting for respondents with an HSI score of 6 compared to an HSI of 0. Respondents who remained in the sample for 4 or 5 waves had more than double the odds of having quit for 12 months, compared to those present for 3 waves. Wave was also significantly associated; respondents were more likely to be quit at Wave 5 compared to Wave 3, although there was no difference between Waves 3 and 4.

Table 44: Base GEE Model[a] 3C2: Odds ratios for having quit smoking for at least 12 months, among those who had made a quit attempt (n=7217, n clusters = 3823)

Variables	Odds Ratio	95% Confidence Interval	P value
Country			0.6451
Australia	1.0		
Canada	1.1225	0.8541-1.4753	0.4072
UK	1.1737	0.8978-1.5344	0.2415
US	1.1693	0.8598-1.5901	0.3187
Wave			<0.0001
3	1.0		
4	1.2835	0.9357-1.7606	0.1216
5	2.1365	1.5217-2.9997	<0.0001
Age	1.0097	1.0015-1.0179	0.0204
Sex			
Male vs. female (ref.)	1.1335	0.9266-1.3865	0.2229
Ethnicity			
Minority vs. not (ref.)	0.8952	0.6252-1.2819	0.5458

Marital status			0.0862
Married/common-law	1.0		
Separated/divorced/widowed	0.7836	0.6054-1.0143	0.0640
Single	0.7964	0.5970-1.0624	0.2428
Education			0.3268
Low (high school or less)	1.0		
Moderate (college/some university)	0.9463	0.7541-1.1876	0.6341
High (university or higher)	1.1817	0.8929-1.5640	0.2428
Income			0.4124
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	1.0042	0.7790-1.2945	0.9744
High (over $60K/£30K)	1.1532	0.8805-1.5106	0.3003
Not stated	1.2966	0.8523-1.9725	0.2249
HSI (at study entry)			<0.0001
0	1.0		
1	0.8693	0.5893-1.2823	0.4800
2	0.7236	0.5038-1.0394	0.0800
3	0.5577	0.3962-0.7850	0.0008
4	0.4698	0.3194-0.6912	0.001
5	0.4630	0.2907-0.7373	0.0012
6	0.3198	0.1539-0.6646	0.0023
Time in sample			<0.0001
3 waves	1.0		
4 waves	2.0114	1.5598-2.5938	<0.0001
5 waves	1.9653	1.4651-2.6362	<0.0001

[a]GEE model with binomial variation and logit link

In the base model with only those who had made a quit attempt (Table 44), main effects were again not significant for country, sex, ethnicity, education or income; marital status was also not significantly associated with being quit for 12 months. Age, however, was significantly associated, with older respondents slightly more likely to be quit. As in the model with the full sample, with the exception of HSI scores of 1 (vs. 0), heavier smokers were less likely to have been quit for at least 12 months. Also similar to the full sample model, respondents who remained in the sample for 4 or 5 waves had about double the odds of having quit for 12 months (compared to those present for 3 waves), and respondents had double the odds of having quit at Wave 5 compared to Wave 3, but there was no difference between Waves 3 and 4.

Models with Interactions

In the interactions model with the full sample (Table 45), only the interaction between age and education was significant. Age had a significant effect only for low education respondents, who were more likely to quit with increasing age. Main effects were very similar to the base model for all other variables.

Table 45: GEE Model[a] 3C1 with Interactions: Odds ratios for having quit smoking for at least 12 months (n=12 090, n clusters = 6051)

Variables	Odds Ratio	95% Confidence Interval	P value
Country			0.8918
Australia	1.0		
Canada	1.1118	0.8524-1.4502	0.4344
UK	1.0454	0.8062-1.3557	0.7375
US	1.0646	0.7919-1.4311	0.6786
Wave			<0.0001
3	1.0		
4	2.1825	0.9042-1.5789	0.2107
5	2.3329	1.3545-2.5315	0.0001
Age (by education)			
For low education	1.0145	1.0044-1.0247	0.0050
For moderate education	0.9913	0.9773-1.0054	0.2256
For high education	1.0012	0.9845-1.0182	0.8859
Sex			
Male vs. female (ref.)	1.0315	0.8481-1.2546	0.7561
Ethnicity			
Minority vs. not (ref.)	0.8643	0.6079-1.2287	0.4164
Marital status			0.0237
Married/common-law	1.0		
Separated/divorced/widowed	0.7509	0.5881-0.9587	0.0215
Single	0.7643	0.5784-1.0099	0.0587
Income			0.4266
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	1.0225	0.8043-1.3001	0.8556
High (over $60K/£30K)	1.1645	0.9020-1.5035	0.2426
Not stated	1.2736	0.8607-1.8846	0.2264
HSI (at study entry)			<0.0001
0	1.0		
1	0.8589	0.5898-1.2508	0.4276
2	0.6757	0.4759-0.9594	0.0284
3	0.5223	0.3753-0.7268	<0.0001
4	0.4215	0.2896-0.6134	<0.0001
5	0.4003	0.2547-0.6293	<0.0001
6	0.2435	0.1202-0.4932	<0.0001
Time in sample			<0.0001
3 waves	1.0		
4 waves	1.1948	1.7225-2.7652	<0.0001
5 waves	1.8517	1.7586-3.0947	<0.0001

[a]GEE model with binomial variation and logit link
Overall 1 df test for age: p=0.0050
Overall 2 df test for education: p=0.0213
2 df test for age x education interaction: p=0.0192

Similarly, in the interactions model with those who had made a quit attempt (Table 46), only the interaction between age and education was significant. As with the full sample model, age had a

significant effect only for low education respondents, who were more likely to quit with increasing age. Main effects were very similar to the base model for all other variables.

Table 46: GEE Model[a] 3C2 with Interactions: Odds ratios for having quit smoking for at least 12 months, among those who had made a quit attempt (n=7217, n clusters = 3823)

Variables	Odds Ratio	95% Confidence Interval	P value
Country			0.6951
Australia	1.0		
Canada	1.1112	0.8453-1.4607	0.4501
UK	1.1473	0.8778-1.4994	0.3144
US	1.1748	0.8646-1.5963	0.3031
Wave			<0.0001
3	1.0		
4	1.2816	0.9335-1.7594	0.1249
5	2.1371	1.5212-3.0025	<0.0001
Age (by education)			
For low education	1.0168	1.0066-1.0271	0.0012
For moderate education	0.9967	0.9830-1.0105	0.6370
For high education	1.0105	0.9927-1.0286	0.2515
Sex			
Male vs. female (ref.)	1.1345	0.9271-1.3883	0.2207
Ethnicity			
Minority vs. not (ref.)	0.9035	0.6298-1.2962	0.5815
Marital status			0.0938
Married/common-law	1.0		
Separated/divorced/widowed	0.7894	0.6096-1.0224	0.0732
Single	0.7965	0.5976-1.0615	0.1205
Income			0.4271
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	1.0205	0.7910-1.3166	0.8757
High (over $60K/£30K)	1.1688	0.8916-1.5322	0.2587
Not stated	1.2918	0.8492-1.9653	0.2316
HSI (at study entry)			<0.0001
0	1.0		
1	0.8741	0.5923-1.2899	0.4980
2	0.7335	0.5099-1.0551	0.0948
3	0.5677	0.4029-0.7998	0.0012
4	0.4777	0.3242-0.7039	0.0002
5	0.4667	0.2934-0.7426	0.0013
6	0.3310	0.1594-0.6873	0.0030
Time in sample			<0.0001
3 waves	1.0		
4 waves	2.0156	1.5611-2.6023	<0.0001
5 waves	1.9722	1.4688-2.6481	<0.0001

[a]GEE model with binomial variation and logit link
Overall 1 df test for age: p=0.0012
Overall 2 df test for education: p=0.0892
2 df test for age x education interaction: p=0.0501

5.6 Reduction in cigarette consumption

Descriptive Statistics

Table 47 and Table 48 below show the proportions of the full sample, and of current smokers, who reduced their daily cigarette consumption by at least 50% since entry into the study, by education and income level.

Table 47: Reduced consumption by ≥50% since entry into study, by education level

Education level	**Reduced CPD by ≥50% since entry into study**[a]	
	All eligible respondents (n=21 952)	**Current smokers** (n=18 958)
Low (high school or less)	22.6%	11.3%
Moderate (college/some university)	22.9%	11.2%
High (university or higher)	25.6%	10.5%
All levels	23.1%	11.2%

[a]Presented as weighted percentages

Table 48: Reduced consumption by ≥50% since entry into study, by income level

Income level	**Reduced CPD by ≥50% since entry into study**[a]	
	All eligible respondents (n=22 036)	**Current smokers** (n=19 033)
Low (under $30K/£15K)	22.4%	12.4%
Moderate ($30-60K/£15-30K)	22.2%	10.7%
High (over $60K/£30K)	24.6%	10.4%
Not stated	23.7%	11.9%
All levels	23.1%	11.2%

[a]Presented as weighted percentages

Overall, 23% of respondents in the overall sample had reduced their cigarette consumption by at least 50% since entry into the study. That proportion dropped to 11% when only current smokers were considered (i.e. when reductions due to quitting were excluded). Among all respondents, a slightly higher proportion of those in the high education and income groups had reduced their consumption, but the low and moderate groups did not differ. Among the sample of current smokers only, the low income group had the highest proportion of reducers.

Table 49: Reduced consumption by ≥50% since entry into study, by country

Country	Reduced CPD by ≥50% since entry into study[a]	
	All eligible respondents (n=22 074)	**Current smokers** (n=19 067)
Australia	24.2%	11.9%
Canada	22.6%	10.6%
UK	22.8%	9.7%
US	22.7%	12.7%

[a]Presented as weighted percentages

Comparing countries (Table 49), nearly identical proportions of respondents in the Canadian, UK, and US samples had reduced consumption by at least 50%, and a slightly higher proportion of the Australian sample had done so. When considering only those who were current smokers, a somewhat higher proportion of Australians and US respondents had reduced their consumption, compared to the UK and Canada.

Base Models

Table 50: Base GEE Model[a] 4A1: Odds ratios for having reduced cigarette consumption by at least 50% since entry into study (n=21 578, n clusters = 9889)

Variables	Odds Ratio	95% Confidence Interval	P value
Country			0.2948
Australia	1.0		
Canada	0.9254	0.8139-1.0522	0.2366
UK	1.0417	0.9175-1.1826	0.5286
US	1.0245	0.8955-1.1720	0.7248
Wave			0.0072
2	1.0		
3	1.1357	1.0005-1.2892	0.0491
4	1.2321	1.0797-1.4060	0.0019
5	1.2818	1.1041-1.4881	0.0011
Age	0.9962	0.9923-1.0001	0.0540
Sex			
Male vs. female (ref.)	1.0340	0.9427-1.1341	0.4780
Ethnicity			
Minority vs. not (ref.)	1.0384	0.8949-1.2050	0.6192
Marital status			0.7463
Married/common-law	1.0		
Separated/divorced/widowed	0.9645	0.8587-1.0834	0.5425
Single	1.0176	0.9050-1.1442	0.7708
Education			0.1998
Low (high school or less)	1.0		
Moderate (college/some university)	0.9291	0.8357-1.0330	0.1742
High (university or higher)	1.0453	0.9162-1.1926	0.5101

Income			0.1758
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	0.9241	0.8256-1.0343	0.1697
High (over $60K/£30K)	1.0128	0.8968-1.1438	0.8377
Not stated	1.0870	0.9029-1.3087	0.3783
HSI (at study entry)			<0.0001
0	1.0		
1	0.9490	0.7866-1.1448	0.5843
2	0.7414	0.6256-0.8787	0.0006
3	0.5688	0.4836-0.6690	<0.0001
4	0.5336	0.4457-0.6388	<0.0001
5	0.5696	0.4614-0.7033	<0.0001
6	0.8222	0.6327-1.0683	0.1427
Intent to quit (at study entry) vs. not (ref.)	1.8594	1.6573-2.0863	<0.0001
Time in sample			<0.0001
2 waves	1.0		
3 waves	1.4079	1.2653-1.5665	<0.0001
4 waves	1.7323	1.5232-1.9701	<0.0001
5 waves	2.1717	1.807-2.5483	<0.0001

[a]GEE model with binomial variation and logit link

The main effects of most demographic variables, including country, sex, ethnicity, marital status, income and education, were not significant. Wave was associated with reducing consumption, as was time in sample, with more recent waves and a longer time in sample associated with greater odds of having reduced consumption. Age was also significantly associated, with older respondents less likely (by less than 1% a year) to have reduced consumption. Considering HSI, scores of 1 and 6 (vs. 0) were not associated, but those with an HSI of 2 had lower odds, and those with scores of 3, 4 and 5 had just half the odds of having reduced consumption compared to those with HSI scores of 0. Quit intentions were also associated; those who intended to quit had nearly double the odds of having reduced consumption.

Table 51: Base GEE Model[a] 4A2: Odds ratios for having reduced cigarette consumption by at least 50% since entry into study, current smokers only (n=18 626, n clusters = 9249)

Variables	Odds Ratio	95% Confidence Interval	P value
Country			0.0846
Australia	1.0		
Canada	0.9133	0.7689-1.0848	0.3018
UK	0.8901	0.7442-1.0648	0.2029
US	1.1010	0.9199-1.3177	0.2939
Wave			0.4545
2	1.0		
3	1.1272	0.9467-1.3420	0.1787
4	1.0226	0.8491-1.2315	0.8139
5	1.0023	0.8082-1.2431	0.9830
Age	0.9910	0.9855-0.9966	0.0017

Sex			
Male vs. female (ref.)	1.0297	0.9088-1.1666	0.6460
Ethnicity			
Minority vs. not (ref.)	1.1871	0.9770-1.4423	0.0843
Marital status			0.0134
Married/common-law	1.0		
Separated/divorced/widowed	1.0726	0.9152-1.2572	0.3867
Single	1.2686	1.0824-1.4870	0.0033
Education			0.4273
Low (high school or less)	1.0		
Moderate (college/some university)	0.9391	0.8121-1.0859	0.3966
High (university or higher)	0.8922	0.7404-1.0751	0.2305
Income			0.0818
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	0.8681	0.7454-1.0108	0.0686
High (over $60K/£30K)	0.8309	0.7049-0.9806	0.0284
Not stated	1.0443	0.8095-1.3472	0.7388
HSI (at study entry)			<0.0001
0	1.0		
1	1.0020	0.7684-1.3067	0.9881
2	0.8513	0.6712-1.0798	0.1845
3	0.6639	0.5293-0.8329	0.0004
4	0.6608	0.5164-0.8455	0.0010
5	0.9275	0.7063-1.2180	0.5884
6	1.6252	1.1952-2.2099	0.0020
Intent to quit (at study entry) vs. not (ref.)	1.4469	1.2437-1.6833	<0.0001
Time in sample			<0.0001
2 waves	1.0		
3 waves	1.0849	0.9294-1.2664	0.3021
4 waves	1.4397	1.1895-1.7426	0.0002
5 waves	1.7089	1.3418-2.1765	<0.0001

[a]GEE model with binomial variation and logit link

When including only current smokers, country, sex, ethnicity, income and education were not significant, as in the model with all respondents, and wave also became non-significant. Time in sample was still associated with the outcome, although to a somewhat lesser degree; those in the sample for 4 or 5 waves had greater odds of having reduced consumption than those in the sample for 2 waves, although no differences were found between 3 waves and 2 waves in the sample. Age was again significantly associated, with older respondents less likely have reduced consumption. Unlike in the model with the full sample, marital status was significantly associated; no differences were observed between smokers who were married/common-law and those who were separated/divorced/widowed, but single smokers had about 25% greater odds of having reduced consumption compared to smokers who were married/common-law. As in the model with the full sample, the quit intentions of current smokers were associated with having reduced consumption:

those who intended to quit had 50% higher odds of having reduced consumption. HSI was significantly associated overall, although some particular levels were not: smokers with scores of 1,2 and 5 were not significantly different than those with an HSI score of 0, but smokers with an HSI of 3 or 4 had two-thirds the odds of reduced consumption as those with an HSI score of 0, while smokers with a score of 6 were actually more likely to have reduced consumption compared to those with an HSI score of 0.

Models with Interactions

The interaction of wave by income by education generated an error due to small numbers of participants in some of the possible combinations of variables and levels, and thus was dropped from the model selection process. The odds ratios for the models with interactions are shown in Table 52 and Table 53.

Table 52: GEE Model[a] with Interactions 4A1: Odds ratios for having reduced cigarette consumption by at least 50% since entry into study (n= 21 578, n clusters = 9889)

Variables	Odds Ratio	95% Confidence Interval	P value
Country (by wave)			
at Wave 2:			
CA vs. AU (ref.)	1.1539	0.9401-1.4163	0.1710
UK vs. AU	1.0214	0.8279-1.2602	0.8431
US vs. AU	1.1012	0.8818-1.3751	0.3951
at Wave 3:			
CA vs. AU	0.9426	0.7785-1.1413	0.5448
UK vs. AU	0.9743	0.8007-1.1854	0.7943
US vs. AU	0.9218	0.7506-1.1320	0.4370
at Wave 4:			
CA vs. AU	0.8597	0.7140-1.0350	0.1104
UK vs. AU	1.0443	0.8706-1.2526	0.6408
US vs. AU	1.1814	0.9708-1.4376	0.0961
at Wave 5:			
CA vs. AU	0.8348	0.6907-1.0089	0.0618
UK vs. AU	1.0644	0.8823-1.2842	0.5144
US vs. AU	1.0075	0.8231-1.2332	0.9421
Age (by education) [b]			
For low education	1.0071	1.0010-1.0132	0.0227
For moderate education	0.9972	0.9890-1.0054	0.4990
For high education	1.0047	0.9945-1.0151	0.3650
Age (by income)[c]			
For low income	1.0071	1.0010-1.0132	0.0227
For moderate income	0.9932	0.9863-1.0001	0.0546
For high income	0.9921	0.9842-1.0000	0.0502
For not stated income	1.0068	0.9950-1.0187	0.2590
Sex			
Male vs. female (ref.)	1.0328	0.9415-1.1329	0.4948

Ethnicity			
Minority vs. not (ref.)	1.0399	0.8968-1.2058	0.6049
Marital status			0.5456
Married/common-law	1.0		
Separated/divorced/widowed	0.9408	0.8358-1.0589	0.3117
Single	1.0094	0.8976-1.1352	0.8757
HSI (at study entry)			<0.0001
0	1.0		
1	0.9458	0.7840-1.1412	0.5610
2	0.7463	0.6298-0.8843	0.0007
3	0.5746	0.4887-0.6756	<0.0001
4	0.5428	0.4533-0.6499	<0.0001
5	0.5832	0.4725-0.7199	<0.0001
6	0.8471	0.6510-1.1023	0.2168
Intent to quit (at study entry) vs. not (ref.)	1.8733	1.6679-2.1041	<0.0001
Time in sample			<0.0001
2 waves	1.0		
3 waves	1.4028	1.2592-1.5627	<0.0001
4 waves	1.7644	1.5489-2.0098	<0.0001
5 waves	2.1833	1.8573-2.5665	<0.0001

[a]GEE model with binomial variation and logit link
[b]Age also interacts with income; results shown here are collapsed across levels of income
[c]Age also interacts with education; results shown here are collapsed across levels of education
Overall 3 df test for country: p=0.5048
Overall 3 df test for wave: p=0.0247
9 df test for country x wave interaction: p=0.0399
Overall 1 df test for age: p=0.0227
Overall 2 df test for education: p=0.1451
2 df test for age x education interaction: p=0.0481
Overall 3 df test for income: p=0.0029
3 df test for age x income interaction: p=0.0005

In the interactions model with the full sample (Table 52), the interactions between country and wave, age and education, and age and income were all significant. Although the overall country by wave effect was significant, none of the specific comparisons were. Age had a significant effect only for low education respondents, who were more likely to have reduced consumption with increasing age. Similarly, low income respondents were more likely to have reduced consumption with age, but conversely, moderate and high income respondents were less likely to have reduced consumption with increasing age. Main effects were very similar to the base model for all other variables.

Table 53: GEE Model[a] with Interactions 4A2: Odds ratios for having reduced cigarette consumption by at least 50% since entry into study, current smokers only (n= 18 626, n clusters = 9249)

Variables	Odds Ratio	95% Confidence Interval	P value
Country			0.0457
Australia	1.0		
Canada	0.9342	0.7870-1.1089	0.4364
UK	0.8854	0.7400-1.0593	0.1833
US	1.1362	0.9503-1.3584	0.1612

Wave			0.4389
2	1.0		
3	1.1256	0.9457-1.3399	0.1831
4	1.0183	0.8452-1.2268	0.8488
5	0.9955	0.8029-1.2344	0.9673
Age (by income)			
For low income	1.0021	0.9946-1.0098	0.5805
For moderate income	0.9810	0.9719-0.9902	<0.0001
For high income	0.9771	0.9659-0.9884	<0.0001
For not stated income	1.0039	0.9872-1.0209	0.6483
Sex			
Male vs. female (ref.)	1.0291	0.9082-1.1662	0.6527
Ethnicity			
Minority vs. not (ref.)	1.1866	0.9777-1.4402	0.0834
Education (by marital status)			
For married/common-law:			
Moderate vs. low education (ref.)	0.8870	0.7260-1.0836	0.2403
High vs. low education	0.9129	0.6965-1.1964	0.5089
For separated/divorced/widowed:			
Moderate vs. low education	0.8548	0.6375-1.1462	0.2946
High vs. low education	1.2961	0.8891-1.8893	0.1774
For single:			
Moderate vs. low education	1.1377	0.8759-1.4778	0.3336
High vs. low education	0.7415	0.5400-1.0183	0.0646
HSI (at study entry)			<0.0001
0	1.0		
1	0.9949	0.7627-1.2978	0.9700
2	0.8521	0.6715-1.0812	0.1876
3	0.6723	0.5355-0.8439	0.0006
4	0.6752	0.5274-0.8644	0.0018
5	0.9479	0.7212-1.2459	0.7014
6	1.6657	1.2225-2.2695	0.0012
Intent to quit (at study entry) vs. not (ref.)	1.4565	1.2504-1.6967	<0.0001
Time in sample			<0.0001
2 waves	1.0		
3 waves	1.0891	0.9332-1.2709	0.2790
4 waves	1.4500	1.1973-1.7560	0.0001
5 waves	1.7444	1.3701-2.2210	<0.0001

[a]GEE model with binomial variation and logit link
Overall 1 df test for age: p=0.5805
Overall 3 df test for income: p=0.0022
3 df test for age x income interaction: p<0.0001
Overall 2 df test for marital status: p=0.3042
Overall 2 df test for education: p=0.4720
4 df test for marital status x education interaction: p=0.0305

In the interactions model that included only current smokers (Table 53), the interactions between age and income, and marital status and education were significant. Age had a significant effect only for moderate and high income respondents, who were less likely to have reduced consumption with age. Although the overall marital status by education effect was significant, none of the specific

comparisons made between moderate/high and low education within each marital status grouping were significant. Main effects were very similar to the base model for all other variables, except that the overall effect of country reached significance in the interactions model, although none of the specific comparisons made to Australia were significant.

5.7 Reasons for quitting

In order to potentially provide some insight into socioeconomic patterns in smoking cessation, reasons for quitting or staying quit were examined in the Wave 5 cross-sectional sample.

Descriptive Statistics

Table 54 and Table 55 show the proportion of respondents who endorsed the various reasons for quitting or staying quit, by education and income level.

Table 54: Proportion[a] of respondents endorsing reasons for quitting/staying quit[b], by education, Wave 5

Reason for quitting/staying quit	**Education level**	**Current smokers** (n=7038)	**Recent quitters (<6 months)** (n=414)	**Former smokers (6+ months)** (n=791)
Concern for your personal health	Low	80.4%	92.9%	90.4%
	Moderate	82.6%	88.0%	88.4%
	High	85.3%	96.0%	97.4%
Concern about the effect of your cigarette smoke on non-smokers	Low	65.2%	63.9%	78.4%
	Moderate	62.3%	53.2%	74.6%
	High	59.0%	64.7%	81.3%
That society disapproves of smoking	Low	46.6%	47.6%	59.8%
	Moderate	43.2%	36.8%	50.1%
	High	46.0%	51.7%	55.5%
The price of cigarettes	Low	73.3%	69.6%	80.7%
	Moderate	73.4%	72.0%	75.0%
	High	64.7%	64.1%	71.8%
Smoking restrictions at work	Low	37.8%	34.6%	46.2%
	Moderate	36.7%	24.4%	34.5%
	High	30.8%	21.8%	41.0%
Smoking restrictions in public places like [restaurants or bars/ cafes or pubs]?	Low	49.5%	50.2%	59.0%
	Moderate	45.4%	38.0%	45.7%
	High	46.9%	39.5%	55.9%
Advice from a doctor, dentist, or other health professional to quit	Low	51.0%	46.5%	49.7%
	Moderate	50.0%	35.8%	45.7%
	High	47.9%	44.7%	40.8%
Free, or lower cost, stop-smoking medication	Low	44.5%	23.9%	31.8%
	Moderate	40.5%	13.8%	22.3%
	High	34.1%	11.2%	17.2%

Availability of telephone helpline/ quitline/ information line	Low	27.6%	16.2%	22.2%
	Moderate	22.7%	6.8%	14.6%
	High	19.4%	10.8%	13.7%
Advertisements or information about the health risks of smoking	Low	46.9%	41.3%	52.3%
	Moderate	45.1%	38.4%	47.6%
	High	45.7%	53.8%	56.5%
Warning labels on cigarette packages	Low	38.8%	38.9%	42.3%
	Moderate	31.1%	27.0%	28.1%
	High	33.1%	39.6%	40.2%
Setting an example for children	Low	73.8%	71.3%	80.4%
	Moderate	75.0%	66.7%	77.4%
	High	69.3%	72.4%	79.7%

[a]Presented as weighted estimates; percentage of respondents in each education group responding 'somewhat' or 'very much' to each reason

[b]Current smokers were asked, "In the past 6 months, have each of the following things led you to think about quitting -- not at all, somewhat, or very much?"; recent quitters (quit for <6 months) were asked, "To what extent, if at all, were each of the following things reasons for your quit attempt? -- not at all, somewhat, or very much?"; former smokers (quit for >6 months) "To what extent, if at all, have each of the following things helped you to stay quit -- not at all, somewhat, or very much?"

In each of the samples, concern for personal health was the most commonly endorsed reason for quitting/staying quit (cited by 83% of respondents overall), and the availability of a telephone helpline was the least common (cited by 24% of respondents overall). The sample of former smokers tended to endorse many of the reasons in higher proportions than the samples of current smokers and recent quitters (although not advice from a health professional, free/lower-cost stop-smoking medication, or availability of telephone helpline). For most reasons, the proportion of the current smoker sample endorsing the reasons decreased as education level increased. However, the most popular reason, concern for personal health, was more commonly endorsed by respondents with increasing education and income. Less consistent patterns emerged by income level. Those who did not state their income responded in lower proportions for most of the reasons.

Table 55: Proportion[a] of respondents endorsing reasons for quitting/staying quit[b], by income, Wave 5

Reason for quitting/staying quit	**Income level**	**Current smokers** (n=7038)	**Recent quitters (<6 months)** (n=414)	**Former smokers (6+ months)** (n=791)
Concern for your personal health	Low	78.1%	89.2%	89.1%
	Moderate	82.3%	90.4%	92.4%
	High	85.8%	95.6%	93.9%
	Not stated	76.0%	81.8%	79.6%
Concern about the effect of your cigarette smoke on non-smokers	Low	63.7%	57.6%	75.1%
	Moderate	65.7%	68.8%	77.9%
	High	61.2%	56.9%	79.9%
	Not stated	59.8%	53.1%	76.1%

That society disapproves of smoking	Low	46.6%	53.0%	50.3%
	Moderate	45.8%	37.5%	57.0%
	High	44.6%	47.9%	59.2%
	Not stated	42.9%	33.8%	47.3%
The price of cigarettes	Low	75.6%	78.2%	81.4%
	Moderate	74.2%	74.2%	78.6%
	High	66.3%	62.7%	72.2%
	Not stated	71.7%	53.3%	77.6%
Smoking restrictions at work	Low	36.4%	25.4%	41.0%
	Moderate	38.5%	28.9%	42.3%
	High	35.0%	32.4%	40.8%
	Not stated	32.1%	10.6%	38.2%
Smoking restrictions in public places like [restaurants or bars/ cafes or pubs]?	Low	48.7%	52.6%	52.8%
	Moderate	47.7%	40.4%	54.3%
	High	48.3%	44.2%	54.8%
	Not stated	43.0%	35.0%	52.5%
Advice from a doctor, dentist, or other health professional to quit	Low	53.5%	47.6%	52.9%
	Moderate	49.8%	39.7%	47.0%
	High	47.9%	42.3%	44.7%
	Not stated	48.5%	47.5%	30.2%
Free, or lower cost, stop-smoking medication	Low	45.1%	22.8%	34.0%
	Moderate	42.7%	21.1%	24.3%
	High	37.7%	13.7%	22.1%
	Not stated	40.0%	21.5%	18.7%
Availability of telephone helpline/ quitline/ information line	Low	29.4%	16.7%	25.0%
	Moderate	26.7%	11.6%	16.9%
	High	19.0%	10.5%	15.5%
	Not stated	22.6%	12.3%	11.2%
Advertisements or information about the health risks of smoking	Low	48.0%	39.8%	53.2%
	Moderate	47.2%	41.8%	50.2%
	High	44.7%	43.8%	55.1%
	Not stated	40.6%	55.7%	37.4%
Warning labels on cigarette packages	Low	38.4%	38.6%	40.0%
	Moderate	35.8%	34.8%	35.9%
	High	32.1%	33.8%	38.7%
	Not stated	37.5%	37.7%	25.2%
Setting an example for children	Low	71.8%	68.4%	84.7%
	Moderate	75.1%	72.0%	74.8%
	High	74.3%	70.4%	79.5%
	Not stated	68.2%	60.1%	83.6%

[a]Presented as weighted estimates; percentage of respondents in each income group responding 'somewhat' or 'very much' to each reason

[b]Current smokers were asked, "In the past 6 months, have each of the following things led you to think about quitting -- not at all, somewhat, or very much?"; recent quitters (quit for <6 months) were asked, "To what extent, if at all, were each of the following things reasons for your quit attempt? -- not at all, somewhat, or very much?"; former smokers (quit for >6 months) "To what extent, if at all, have each of the following things helped you to stay quit -- not at all, somewhat, or very much?"

Table 56 shows the proportions of the samples endorsing each reason by country. Fairly similar proportions across countries were seen for many of the reasons, although there was some variation by

reason and smoking status group. In each of the country samples, concern for personal health was the most common reason for thinking about quitting cited by current smokers, followed by setting an example for children and the price of cigarettes, and concern about the effect of cigarette smoke on non-smokers. These top four reasons were chosen by a majority of respondents in all countries, with little between-country variation.

The proportion of respondents citing the reason that society disapproves of smoking was particularly low in the US samples. Both items on smoking restrictions (at work, and in public places) were also lowest among US respondents, and highest in the Canadian and UK samples. The proportion of respondents citing warning labels followed a pattern that was generally consistent with the strength and novelty of warning labels in each country, the US again being particularly low, especially among quitters. Advertisements or information about the health risks of smoking followed the same pattern as warning labels, although with somewhat greater numbers.

On the other hand, the US sample reported receiving advice from a health professional the most, followed by the Canadian sample. The UK and Australian samples had greater proportions citing free or lower cost stop-smoking medication, and availability of a telephone helpline as reasons for quitting/staying quit. Among those who had quit, the UK sample had about double the proportion citing free or lower cost stop-smoking medication, and much greater numbers citing the helpline, compared to other countries.

Table 56: Proportion[a] of respondents endorsing reasons for quitting/staying quit, by country, Wave 5

Reason for quitting/staying quit	**Country**	**Current smokers** (n=7038)	**Recent quitters (<6 months)** (n=414)	**Former smokers (6+ months)** (n=791)
Concern for your personal health	Australia	83.1%	92.9%	90.2%
	Canada	81.6%	94.8%	92.1%
	UK	78.3%	89.4%	94.7%
	US	84.2%	89.8%	88.6%
Concern about the effect of your cigarette smoke on non-smokers	Australia	61.7%	59.9%	74.7%
	Canada	62.8%	62.9%	83.6%
	UK	64.4%	66.4%	81.5%
	US	64.4%	50.7%	71.8%
That society disapproves of smoking	Australia	48.9%	53.8%	57.3%
	Canada	47.7%	42.7%	60.4%
	UK	46.9%	45.7%	63.7%
	US	38.4%	30.4%	39.8%

The price of cigarettes	Australia	73.0%	70.2%	80.0%
	Canada	70.8%	71.2%	76.2%
	UK	71.5%	68.5%	79.1%
	US	72.6%	66.1%	70.8%
Smoking restrictions at work	Australia	32.7%	28.0%	40.5%
	Canada	39.9%	35.4%	44.3%
	UK	41.3%	28.3%	49.8%
	US	31.9%	22.7%	29.5%
Smoking restrictions in public places like [restaurants or bars/ cafes or pubs]?	Australia	46.6%	46.9%	53.2%
	Canada	49.2%	45.3%	62.0%
	UK	54.0%	49.3%	65.0%
	US	42.0%	30.5%	34.2%
Advice from a doctor, dentist, or other health professional to quit	Australia	44.3%	34.4%	39.6%
	Canada	50.9%	50.0%	45.9%
	UK	49.3%	37.5%	52.3%
	US	56.2%	56.9%	49.2%
Free, or lower cost, stop-smoking medication	Australia	44.1%	12.1%	22.1%
	Canada	36.7%	15.8%	22.2%
	UK	46.5%	32.7%	42.1%
	US	39.3%	12.1%	14.4%
Availability of telephone helpline/ quitline/ information line	Australia	28.4%	14.0%	18.1%
	Canada	21.0%	2.6%	16.6%
	UK	28.2%	20.2%	27.9%
	US	21.8%	10.6%	7.7%
Advertisements or information about the health risks of smoking	Australia	50.3%	52.8%	55.3%
	Canada	46.0%	42.9%	56.0%
	UK	44.5%	40.8%	53.4%
	US	43.8%	26.1%	41.0%
Warning labels on cigarette packages	Australia	45.9%	45.8%	45.2%
	Canada	34.2%	36.5%	42.2%
	UK	35.6%	30.8%	43.4%
	US	26.4%	19.8%	14.3%
Setting an example for children	Australia	72.2%	67.9%	81.2%
	Canada	73.5%	83.8%	75.2%
	UK	73.9%	70.6%	81.5%
	US	74.0%	53.9%	79.0%

[a]Presented as weighted estimates; percentage of respondents in each country responding 'somewhat' or 'very much' to each reason

Logistic Regression Models

Table 57 displays the odds ratios for income and education from the regression models conducted separately for each reason and smoking status group.

Table 57: Odds ratios[a] for education and income in the base regression models[b] for reasons for quitting/staying quit

Reason	Level	Current smokers (n=7038)		Recent quitters (<6 months quit) (n=414)		Former smokers (6+ months quit) (n=791)	
		Education	**Income**	**Education**	**Income**	**Education**	**Income**
Concern for your personal health	Overall[c]	p=0.33	**p=0.002**	**p=0.04**	p=0.26	**p=0.003**	p=0.06
	Low	1.0	1.0	1.0	1.0	1.0	1.0
	Moderate	1.01 (0.85-1.20)	1.21* (1.00-1.47)	0.37* (0.15-0.90)	0.88 (0.28-2.7)	0.85 (0.42-1.75)	1.65 (0.63-2.30)
	High	1.18 (0.95-1.47)	1.44** (1.15-1.79)	1.41 (0.36-5.52)	2.41 (0.64-9.15)	4.52**(1.64-2.42)	2.06 (0.73-5.86)
	Not stated	--	0.87 (0.66-1.16)	--	0.57 (0.11-2.98)	--	0.42 (0.13-1.32)
Concern about the effect of your cigarette smoke on non-smokers	Overall[c]	**p=0.02**	**p=0.05**	p=0.20	p=0.59	p=0.18	p=0.91
	Low	1.0	1.0	1.0	1.0	1.0	1.0
	Moderate	0.87 (0.76-1.00)	1.02 (0.87-1.20)	0.62 (0.35-1.08)	1.31 (0.64-2.69)	0.77 (0.46-1.28)	1.06 (0.59-1.92)
	High	0.80 (0.68-0.96)	0.85 (0.71-1.01)	0.97 (0.50-1.92)	0.88 (0.43-1.80)	1.36 (0.76-2.43)	1.05 (0.54-2.02)
	Not stated	--	0.82 (0.65-1.05)	--	0.62 (0.21-3.09)	--	0.78 (0.32-1.91)
That society disapproves of smoking	Overall[c]	p=0.35	**p=0.05**	p=0.20	p=0.11	p=0.34	p=0.06
	Low	1.0	1.0	1.0	1.0	1.0	1.0
	Moderate	0.91 (0.79-1.04)	1.00 (0.86-1.16)	0.71 (0.40-1.24)	0.48* (0.24-0.94)	0.74 (0.48-1.13)	1.52 (0.94-2.47)
	High	0.98 (0.83-1.16)	0.96 (0.82-1.14)	1.29 (0.70-2.36)	0.78 (0.39-1.56)	0.95 (0.58-1.55)	1.70 (0.98-2.94)
	Not stated	--	0.84 (0.66-1.07)	--	0.43 (0.12-1.54)	--	0.78 (0.39-1.55)
The price of cigarettes	Overall[c]	**p=0.006**	**p<0.0001**	p=0.53	**p=0.01**	p=0.43	p=0.19
	Low	1.0	1.0	1.0	1.0	1.0	1.0
	Moderate	1.07 (0.92-1.25)	0.91 (0.76-1.08)	1.36 (0.71-2.62)	0.60 (0.28-1.28)	0.83 (0.50-1.37)	0.78 (0.40-1.49)
	High	0.78** (0.65-0.94)	0.63** (0.52-0.76)	0.90 (0.46-1.79)	0.34** (0.16-0.72)	0.71 (0.43-1.20)	0.49* (0.24-1.00)
	Not stated	--	0.80 (0.61-1.04)	--	0.27* (0.08-0.90)	--	0.71 (0.29-1.76)
Smoking restrictions at work	Overall[c]	**p=0.004**	p=0.06	p=0.06	p=0.09	p=0.26	p=0.69
	Low	1.0	1.0	1.0	1.0	1.0	1.0
	Moderate	0.96 (0.83-1.11)	1.14 (0.97-1.34)	0.57 (0.31-1.05)	1.36 (0.63-2.92)	0.70 (0.45-1.09)	1.20 (0.74-1.96)
	High	0.74* (0.62-0.89)	1.04 (0.87-1.24)	0.47* (0.22-0.99)	1.89 (0.90-3.95)	0.97 (0.59-1.59)	1.14 (0.64-2.02)
	Not stated	--	0.81 (0.63-1.05)	--	0.32 (0.07-1.54)	--	0.81 (0.39-1.69)
Smoking restrictions in public places like [restaurants or bars/cafes or pubs]?	Overall[c]	p=0.08	**p=0.04**	p=0.35	p=0.34	p=0.11	p=0.68
	Low	1.0	1.0	1.0	1.0	1.0	1.0
	Moderate	0.86* (0.75-0.99)	1.03 (0.89-1.20)	0.70 (0.40-1.24)	0.61 (0.30-1.22)	0.67 (0.44-1.02)	1.22 (0.75-1.97)
	High	0.89 (0.75-1.06)	1.10 (0.93-1.30)	0.67 (0.34-1.33)	0.82 (0.40-1.68)	1.05 (0.64-1.70)	1.22 (0.72-2.09)
	Not stated	--	0.78* (0.61-0.98)	--	0.43 (0.13-1.39)	--	0.87 (0.43-1.75)

Advice from a doctor, dentist, or other health professional to quit	Overall[c]	p=0.30	p=0.53	p=0.16	p=0.93	p=0.48	**p=0.04**
	Low	1.0	1.0	1.0	1.0	1.0	1.0
	Moderate	0.95 (0.83-1.09)	0.94 (0.81-1.10)	0.60 (0.35-1.05)	0.87 (0.44-1.71)	0.90 (0.59-1.39)	0.91 (0.56-1.48)
	High	0.88 (0.74-1.04)	0.93 (0.79-1.09)	1.00 (0.52-1.91)	1.05 (0.53-2.10)	0.74 (0.46-1.20)	0.93 (0.53-1.62)
	Not stated	--	0.84 (0.66-1.07)	--	1.08 (0.37-3.15)	--	0.37** (0.18-0.76)
Free, or lower cost, stop-smoking medication	Overall[c]	**p=0.002**	**p=0.03**	p=0.07	p=0.92	p=0.16	p=0.15
	Low	1.0	1.0	1.0	1.0	1.0	1.0
	Moderate	0.95 (0.82-1.08)	0.95 (0.82-1.10)	0.53 (0.26-1.09)	1.10 (0.51-2.38)	0.89 (0.55-1.45)	0.71 (0.42-1.21)
	High	0.73** (0.61-0.87)	0.80** (0.68-0.95)	0.40* (0.16-0.97)	0.83 (0.37-1.86)	0.58 (0.33-1.02)	0.71 (0.39-1.30)
	Not stated	--	0.79* (0.62-1.00)	--	0.89 (0.21-3.78)	--	0.40* (0.18-0.89)
Availability of telephone helpline/ quitline/ information line	Overall[c]	**p=0.02**	**p<0.0001**	p=0.14	p=0.95	p=0.48	p=0.21
	Low	1.0	1.0	1.0	1.0	1.0	1.0
	Moderate	0.88 (0.75-1.03)	0.89 (0.76-1.05)	0.45 (0.19-1.07)	0.82 (0.33-2.05)	0.88 (0.53-1.48)	0.71 (0.40-1.24)
	High	0.76** (0.62-0.93)	0.57** (0.47-0.69)	0.58 (0.23-1.43)	1.03 (0.39-2.76)	0.68 (0.36-1.28)	0.74 (0.38-1.41)
	Not stated	--	0.66** (0.50-0.86)	--	0.80 (0.12-5.54)	--	0.31* (0.10-0.96)
Advertisements or information about the health risks of smoking	Overall[c]	p=0.66	**p=0.02**	p=0.13	p=0.78	p=0.35	p=0.20
	Low	1.0	1.0	1.0	1.0	1.0	1.0
	Moderate	0.94 (0.82-1.08)	0.95 (0.82-1.11)	0.93 (0.54-1.61)	1.00 (0.53-1.89)	0.86 (0.56-1.32)	0.81 (0.50-1.31)
	High	0.96 (0.81-1.14)	0.84* (0.71-0.99)	1.79 (0.94-3.41)	0.90 (0.46-1.77)	1.24 (0.77-1.99)	0.88 (0.51-1.52)
	Not stated	--	0.72** (0.56-0.91)	--	1.74 (0.51-5.87)	--	0.44* (0.21-0.95)
Warning labels on cigarette packages	Overall[c]	**p=0.0006**	**p=0.003**	p=0.12	p=0.71	p=0.09	p=0.30
	Low	1.0	1.0	1.0	1.0	1.0	1.0
	Moderate	0.76** (0.66-0.88)	0.88 (0.75-1.03)	0.55 (0.30-1.01)	0.69 (0.34-1.40)	0.62* (0.40-0.98)	0.88 (0.54-1.43)
	High	0.82* (0.68-0.98)	0.71** (0.60-0.85)	1.01 (0.52-1.96)	0.66 (0.32-1.40)	0.96 (0.60-1.54)	0.86 (0.50-1.46)
	Not stated	--	0.90 (0.70-1.14)	--	0.82 (0.29-2.36)	--	0.45 (0.20-1.02)
Setting an example for children	Overall[c]	**p=0.02**	p=0.16	p=0.45	p=0.83	p=0.93	p=0.09
	Low	1.0	1.0	1.0	1.0	1.0	1.0
	Moderate	1.01 (0.86-1.18)	1.06 (0.89-1.27)	0.69 (0.38-1.26)	1.03 (0.48-2.20)	0.91 (0.54-1.52)	0.49* (0.27-0.87)
	High	0.78** (0.65-0.94)	0.99 (0.82-1.20)	0.99 (0.46-2.16)	0.98 (0.46-2.09)	0.98 (0.53-1.82)	0.53 (0.27-1.05)
	Not stated	--	0.78 (0.60-1.02)	--	0.60 (0.19-1.91)	--	0.83 (0.33-2.09)

[a]Presented as odds ratios (95% confidence intervals)

[b]Separate logistic regression models for each reason included country, age, sex, ethnicity, marital status, income, education, time in sample, and HSI only for the current smokers group.

[c]Overall p value for 2 df test for education, 3 df test for income

* significant at p<0.05

** significant at p<0.01

The main effect of education was significant for: concern for personal health for recent quitters and former smokers, concern about the effect of smoke on non-smokers for current smokers, the price of cigarettes for current smokers, smoking restrictions at work for current smokers and recent quitters, smoking restrictions in public places for recent quitters), availability of a telephone helpline for current smokers, warning labels for current smokers, and setting an example for children for current smokers. The main effect of income was significant for: concern for personal health for current smokers (and borderline for former smokers), concern about the effect of smoke on non-smokers for current smokers, that society disapproved of smoking for current and former smokers, the price of cigarettes for current smokers and recent quitters, smoking restrictions at work for current smokers and recent quitters, smoking restrictions in public places for current smokers, advice from a health professional for former smokers, free/lower-cost stop-smoking medication for current smokers, availability of a telephone helpline for current smokers, advertisements/information about health risks for current smokers, and warning labels for current smokers.

Concern for personal health was the reason with the strongest associations with SES variables: current smokers with moderate and high income were more likely to endorse this reason than those with low income, and former smokers with high education had more than 4 times the odds of citing this reason compared to those with low education. However, recent quitters with moderate income were much less likely than those with low income to say they had quit over concern for personal health. The price of cigarettes also showed a strong relationship with SES: those with higher income in all three smoking status groups were less likely than those with low income to cite this reason for quitting, as were current smokers with high education compared to those with low education.

Among current smokers, those with high education were significantly less likely (and moderate education were borderline less likely) than those with low education to say that concern about the effect of smoke on non-smokers had led them to think about quitting. Recent quitters with moderate income were about half as likely as those with low income to say they had quit because society disapproves of smoking. Current smokers with high education and former smokers with moderate education were significantly less likely to cite setting an example for children as a reason for quitting, compared to those with low education.

Smoking restrictions at work was significantly less likely to be cited by current smokers and recent quitters with high education (vs. low education). Smoking restrictions in public places was less likely

to be cited by current smokers with moderate education (vs. low education) and those who did not state their income (vs. low income).

Advice from a health professional was significantly associated with SES only for former smokers with not stated income, who had less than half the odds of endorsing that reason, compared to those with low income. Those with high education in all three smoking status groups were less likely than those with low education to cite free/lower-cost stop-smoking medications, as were current smokers with high or not stated income, and former smokers with not stated income (vs. low income). Among current smokers, the availability of a telephone helpline was less likely to be cited by those with high education (vs. low education) and those with high or not stated income (vs. low income). Former smokers who did not provide income information were also less likely than those with low income to say they had quit because of availability of a helpline.

Advertisements/information about health risks was less likely to be cited by current smokers with moderate or high income, and former smokers with not stated income (vs. low income). Among current smokers, warning labels were less likely to be cited by those with moderate or high education (vs. low), and high income (vs. low). Recent quitters and former smokers with moderate education were also less likely to cite this reason than those with low education.

Table 58: Odds ratios[a] for country in the base regression models[b] for reasons for quitting/staying quit

Reason	**Country**	**Current smokers** (n=7038)	**Recent quitters (<6 months)** (n=414)	**Former smokers (6+ months)** (n=791)
Concern for your personal health	Overall[c]	**p=0.0006**	p=0.73	p=0.23
	Australia	1.0	1.0	1.0
	Canada	0.92 (0.75-1.13)	1.53 (0.46-5.09)	1.38 (0.51-3.70)
	UK	0.74** (0.66-0.90)	0.74 (0.28-1.98)	2.13 (0.93-4.88)
	US	1.12 (0.89-1.39)	1.00 (0.26-3.78)	0.88 (0.38-2.00)
Concern about the effect of your cigarette smoke on non-smokers	Overall[c]	p=0.36	p=0.46	p=0.08
	Australia	1.0	1.0	1.0
	Canada	1.09 (0.92-1.29)	1.20 (0.62-2.31)	1.82* (1.00-3.32)
	UK	1.16 (0.98-1.37)	1.28 (0.67-2.41)	1.59 (0.93-2.71)
	US	1.12 (0.95-1.33)	0.71 (0.34-1.47)	0.93 (0.50-1.76)
That society disapproves of smoking	Overall[c]	**p<0.0001**	**p=0.05**	**p=0.02**
	Australia	1.0	1.0	1.0
	Canada	0.95 (0.81-1.12)	0.65 (0.34-1.24)	1.17 (0.72-1.92)
	UK	0.90 (0.76-1.07)	0.76 (0.42-1.41)	1.31 (0.82-2.09)
	US	0.63** (0.53-0.75)	0.34** (0.16-0.73)	0.55* (0.32-0.96)
The price of cigarettes	Overall[c]	p=0.40	p=0.74	p=0.37
	Australia	1.0	1.0	1.0
	Canada	0.86 (0.72-1.03)	1.00 (0.50-2.00)	0.83 (0.47-1.49)
	UK	0.89 (0.74-1.07)	0.92 (0.47-1.82)	0.97 (0.56-1.68)
	US	0.91 (0.75-1.09)	0.66 (0.31-1.41)	0.58 (0.31-1.11)

Smoking restrictions at work	Overall[c]	**p<0.0001**	p=0.36	**p=0.05**
	Australia	1.0	1.0	1.0
	Canada	1.38** (1.16-1.63)	1.72 (0.86-3.46)	1.23 (0.75-2.01)
	UK	1.51** (1.27-1.80)	1.19 (0.60-2.35)	1.52 (0.93-2.47)
	US	0.90 (0.75-1.08)	0.89 (0.36-2.19)	0.63 (0.33-1.20)
Smoking restrictions in public places like [restaurants or bars/ cafes or pubs]?	Overall[c]	**p<0.0001**	p=0.07	**p=0.0001**
	Australia	1.0	1.0	1.0
	Canada	1.13 (0.96-1.32)	1.03 (0.54-1.96)	1.57 (0.97-2.56)
	UK	1.36** (1.15-1.61)	1.20 (0.64-2.25)	1.61* (1.01-2.58)
	US	0.80** (0.68-0.94)	0.39* (0.17-0.90)	0.48** (0.27-0.84)
Advice from a doctor, dentist, or other health professional to quit	Overall[c]	**p<0.0001**	p=0.06	p=0.19
	Australia	1.0	1.0	1.0
	Canada	1.30** (1.10-1.52)	2.04* (1.05-3.98)	1.30 (0.81-2.11)
	UK	1.23* (1.04-1.45)	1.14 (0.62-2.08)	1.68* (1.04-2.72)
	US	1.53** (1.29-1.81)	2.25* (1.07-4.71)	1.43 (0.81-2.52)
Free, or lower cost, stop-smoking medication	Overall[c]	**p<0.0001**	**p=0.003**	**p<0.0001**
	Australia	1.0	1.0	1.0
	Canada	0.72** (0.61-0.85)	1.71 (0.73-4.02)	0.98 (0.57-1.68)
	UK	1.10 (0.93-1.31)	3.67** (1.71-7.86)	2.46** (1.47-4.13)
	US	0.76** (0.64-0.90)	0.98 (0.39-2.47)	0.52 (0.26-1.04)
Availability of telephone helpline/ quitline/ information line	Overall[c]	**p<0.0001**	**p=0.006**	**p=0.0005**
	Australia	1.0	1.0	1.0
	Canada	0.67** (0.56-0.81)	0.19** (0.06-0.63)	0.97 (0.54-1.76)
	UK	1.00 (0.83-1.20)	1.62 (0.71-3.74)	1.80* (1.03-3.14)
	US	0.61** (0.51-0.74)	0.63 (0.23-1.78)	0.32* (0.13-0.80)
Advertisements or information about the health risks of smoking	Overall[c]	**p=0.001**	**p=0.005**	p=0.18
	Australia	1.0	1.0	1.0
	Canada	0.86 (0.73-1.01)	0.76 (0.40-1.45)	1.11 (0.68-1.82)
	UK	0.78** (0.66-0.93)	0.52* (0.29-0.95)	0.96 (0.60-1.51)
	US	0.72** (0.61-0.86)	0.30** (0.15-0.60)	0.60 (0.35-1.03)
Warning labels on cigarette packages	Overall[c]	**p<0.0001**	**p=0.02**	**p<0.0001**
	Australia	1.0	1.0	1.0
	Canada	0.63** (0.53-0.74)	0.84 (0.43-1.65)	1.08 (0.67-1.75)
	UK	0.63** (0.53-0.75)	0.48* (0.25-0.93)	0.99 (0.62-1.58)
	US	0.39** (0.32-0.46)	0.32** (0.14-0.73)	0.19** (0.10-0.36)
Setting an example for children	Overall[c]	p=0.52	**p=0.01**	p=0.54
	Australia	1.0	1.0	1.0
	Canada	1.12 (0.93-1.35)	2.82** (1.26-6.31)	0.73 (0.39-1.35)
	UK	1.14 (0.95-1.38)	1.08 (0.56-2.08)	1.12 (0.62-2.02)
	US	1.10 (0.91-1.33)	0.60 (0.28-1.29)	0.87 (0.45-1.66)

[a]Presented as odds ratios (95% confidence intervals)
[b]Separate logistic regression models for each reason included country, age, sex, ethnicity, marital status, income, education, time in sample, and HSI only for the current smokers group.
[c]Overall p value for 3 df test for country
* significant at p<0.05
** significant at p<0.01

Reasons for quitting/staying quit also varied by country (Table 58), and with smoking status. Current smokers in the UK had 25% lower odds of citing concern for personal health than current smokers in Australia. In Canada, former smokers were more likely to cite concern about the effect of

cigarette smoke on non-smokers, and recent quitters were much more likely to cite setting an example for children, compared to Australia. In the US, all three smoking status groups were much less likely to say that society disapproves of smoking. All groups in the US were also less likely than Australians to cite restrictions on smoking in public. Conversely, current and former smokers in the UK were more likely to cite public smoking restrictions than in Australia. UK and Canadian current smokers were also more likely to cite smoking restrictions at work, compared to Australians.

Compared to in Australia, advice from a health professional was cited more often by current smokers in all countries, as well as recent quitters in the US and Canada, and former smokers in the UK. While current smokers in the US and Canada (as well as recent quitters in Canada, and former smokers in the US) had considerably lower odds of citing a telephone helpline than Australians, former smokers in the UK were more likely to cite this reason. Recent quitters and former smokers in the UK also had several times greater odds of citing free/low-cost stop-smoking medications, while former smokers in the US and Canada were less likely than Australians. Advertisements or information about the health risks of smoking was less likely to be cited by current smokers and recent quitters in the US and UK than in Australia. Warning labels were cited considerably less often by current smokers in all other countries, recent quitters in the UK and US, and former smokers in the US, compared to Australia; for all comparisons, the US was particularly low.

5.8 Cessation assistance

Resources for quitting were also examined, as they of potentially use in explaining some of the differences in cessation measures observed between socioeconomic groups and between countries.

5.8.1 Use of cessation aids

Descriptive Statistics

Overall, over half of the Wave 5 cross-sectional sample had used some form of cessation assistance since the last survey date/in the past year (Table 59). Assistance from a health professional was the most common type of assistance used, cited by just under half of respondents overall, and 4 out of 5 of those who had used some form of assistance. Nicotine replacement therapy (NRT) was also fairly frequently used, by 15% of respondents. Other forms of cessation assistance, including telephone helpline, the internet, local services, and prescription stop-smoking medications, were used by less than 10% of the sample.

Use of any cessation assistance varied by country (Table 59), and was highest overall in the US sample, and lowest in the UK sample. Over half of US respondents had received assistance from a health professional, while fewer than 2 out of 5 Australian and UK respondents had. Of those who had visited a health professional, only half received assistance in Australia, compared to about two-thirds of Canadian and UK respondents, and three-quarters of the US sample. NRT use was highest in the UK sample, although UK respondents had only half the proportion of prescription SSM users. Use of local services varied widely, and was particularly high in the UK sample and low in the Australian sample. Canadian and US respondents had double the proportion of respondents using the internet for cessation assistance, compared to the UK and Australia. Telephone helpline usage was highest in the Australia sample.

Table 59: Use of cessation assistance, overall and by country, Wave 5

Type of Cessation Assistance	**Reported use since LSD/past year**[a]				
	Overall (n=8243)	**Australia** (n=2022)	**Canada** (n=2034)	**UK** (n=2019)	**US** (n=2168)
Any type of assistance (composite)	54.5%	51.1%	57.4%	49.8%	59.9%
Any assistance from a health professional (excluding those who had not visited a HP)	44.3% (64.2%)	40.1% (53.7%)	47.3% (63.3%)	37.2% (67.2%)	53.0% (74.7%)
Telephone helpline	4.3%	6.4%	3.2%	3.1%	4.5%
Internet	3.9%	2.2%	5.6%	2.5%	5.5%
Local services	9.0%	3.4%	10.4%	13.7%	8.9%
Nicotine replacement therapy (NRT)	14.9%	16.2%	14.7%	17.8%	10.8%
Prescription SSM	3.2%	3.6%	3.4%	1.5%	4.2%

[a]Presented as weighted percentages

When examining use of cessation assistance by level of education (Table 60), a slightly lower proportion of respondents with low education used any type of assistance, or assistance from a health professional. In addition, fewer low education respondents used the internet, compared to moderate or highly educated respondents. Otherwise, patterns were fairly similar across educational groups.

Table 60: Proportions of respondents using cessation assistance, by education, Wave 5 (n=8243)

Type of Cessation Assistance	Reported use since LSD/past year[a]		
	Low Education	Moderate Education	High Education
Any type of assistance (composite)	52.4%	57.1%	56.4%
Any assistance from a health professional (excluding those who had not visited a HP)	41.7% (63.6%)	48.2% (66.9%)	45.7% (61.1%)
Telephone helpline	4.7%	4.1%	3.5%
Internet	2.5%	5.0%	6.7%
Local services	8.2%	10.0%	9.6%
Nicotine replacement therapy (NRT)	15.0%	14.9%	14.7%
Prescription stop-smoking medication (SSM)	3.3%	3.0%	3.2%

[a]Presented as weighted percentages

When examining use of cessation assistance by income level (Table 61), all groups accessed some form of assistance in similar proportions. Respondents who did not state their income had slightly lower use of assistance in general, assistance from a health professional, and the internet, compared to other income groups. In this sample, use of a telephone helpline and use of local services decreased with increasing income, while use of the internet, NRT, and prescription SSMs followed the opposite pattern.

Table 61: Proportions of respondents using cessation assistance, by income, Wave 5 (n=8243)

Type of Cessation Assistance	Reported use since LSD/past year[a]			
	Low Income	Moderate Income	High Income	Income not stated
Any type of assistance (composite)	54.6%	54.5%	55.0%	51.7%
Any assistance from a health professional (excluding those who had not visited a HP)	45.8% (67.6%)	43.8% (64.4%)	44.6% (62.2%)	39.3% (59.7%)
Telephone helpline	5.3%	4.1%	3.7%	4.2%
Internet	3.1%	4.4%	4.5%	2.4%
Local services	9.3%	9.4%	8.1%	10.0%
Nicotine replacement therapy (NRT)	13.2%	14.3%	17.4%	13.2%
Prescription stop-smoking medication (SSM)	2.4%	3.2%	4.1%	2.1%

[a]Presented as weighted percentages

Logistic Regression Models

Each of the types of cessation assistance was examined in a multivariate model for differences in use by education level, income level, and country (Table 62). The main effect of education was significant for using any type of assistance, assistance from a health professional, and the internet. Those with moderate or high education were more likely to have accessed these forms of assistance,

particularly the internet, compared to those with low education. The main effect of income was significant for using NRT and prescription SSMs, and borderline significant for assistance from a health professional. High income respondents were more likely to have used NRT, while both moderate and high income respondents were more likely to have used prescription SSMs (vs. low income respondents). Those who did not state their income were less likely than low income respondents to have received assistance from a health professional, even if they had visited one. Although the main effect was not significant, those with moderate income were more likely to have used the internet than those with low income.

The main effect of country was significant for all types of cessation assistance. Smokers in Canada and the US were more likely to have used any form of assistance, compared to Australians. UK respondents overall were also less likely to have received assistance from a health professional, while Canadian and US respondents were more likely; however, once those who did not visit a health professional were excluded, respondents in all three countries had greater odds (by 42 to 135%) of having received assistance from a health professional than Australians. Respondents in Canada, the US and the UK also had greater odds (from 2.4 to 4.5 times) of having used local services, compared to respondents in Australia. Conversely, respondents in all three countries had only about half the odds of having used a telephone helpline compared to Australians. Respondents in Canada and the US had more than twice the odds of having used the internet for cessation assistance as those in Australia. Regarding pharmacotherapies, US respondents had a third lower odds of having used NRT, and UK respondents had less than half the odds of using a prescription stop-smoking medication, compared to respondents in Australia.

Table 62: Odds ratios[a] for education, income, and country in the base regression models[b] for use of cessation assistance

Type of Cessation Assistance	Level	Education	Income	Country	
Any type of assistance (n=8199)	Overall[c]	**p=0.005**	p=0.45	Overall[d]	**p<0.0001**
	Low	1.0	1.0	Australia	1.0
	Moderate	1.21** (1.06-1.37)	1.02 (0.89-1.18)	Canada	1.24** (1.07-1.45)
	High	1.20* (1.03-1.41)	1.06 (0.91-1.24)	UK	0.91 (0.78-1.06)
	Not stated	--	0.88 (0.71-1.10)	US	1.37** (1.17-1.61)
Any assistance from a health professional, full sample (n=8199)	Overall[c]	**p=0.0005**	p=0.06	Overall[d]	**p<0.0001**
	Low	1.0	1.0	Australia	1.0
	Moderate	1.28** (1.13-1.45)	0.96 (0.83-1.10)	Canada	1.28** (1.10-1.49)
	High	1.19* (1.02-1.40)	1.03 (0.88-1.20)	UK	0.84* (0.72-0.98)
	Not stated	--	0.76* (0.61-0.95)	US	1.65** (1.41-1.93)
Any assistance from a health professional, among those who visited a HP (n=5783)	Overall[c]	p=0.16	p=0.16	Overall[d]	**p<0.0001**
	Low	1.0	1.0	Australia	1.0
	Moderate	1.13 (0.96-1.32)	0.92 (0.77-1.10)	Canada	1.42** (1.19-1.69)
	High	0.94 (0.78-1.14)	0.91 (0.75-1.11)	UK	1.71** (1.41-2.08)
	Not stated	--	0.73* (0.56-0.96)	US	2.35** (1.93-2.86)
Telephone helpline (n=8197)	Overall[c]	p=0.35	p=0.52	Overall[d]	**p<0.0001**
	Low	1.0	1.0	Australia	1.0
	Moderate	0.96 (0.72-1.27)	0.80 (0.59-1.08)	Canada	0.50** (0.36-0.69)
	High	0.80 (0.54-1.18)	0.73 (0.50-1.06)	UK	0.46** (0.32-0.65)
	Not stated	--	0.82 (0.49-1.37)	US	0.61** (0.43-0.85)
Internet (n=8169)	Overall[c]	**p<0.0001**	p=0.19	Overall[d]	**p<0.0001**
	Low	1.0	1.0	Australia	1.0
	Moderate	1.78** (1.28-2.47)	1.45* (1.00-2.11)	Canada	2.61** (1.69-4.03)
	High	2.50** (1.73-3.63)	1.34 (0.89-2.04)	UK	1.14 (0.67-1.95)
	Not stated	--	0.82 (0.37-1.82)	US	2.34** (1.47-3.73)
Local services (n=8195)	Overall[c]	p=0.15	p=0.76	Overall[d]	**p<0.0001**
	Low	1.0	1.0	Australia	1.0
	Moderate	1.22 (0.98-1.52)	1.09 (0.86-1.39)	Canada	3.24** (2.41-4.36)
	High	1.21 (0.92-1.59)	0.96 (0.73-1.27)	UK	4.52** (3.30-6.18)
	Not stated	--	1.07 (0.74-1.55)	US	2.39** (1.74-3.29)

Nicotine replacement therapy (NRT) (n=8199)	Overall[c]	p=0.81	**p=0.01**	Overall[d]	**p<0.0001**
	Low	1.0	1.0	Australia	1.0
	Moderate	1.03 (0.87-1.22)	1.11 (0.91-1.34)	Canada	0.92 (0.76-1.12)
	High	0.95 (0.77-1.18)	1.39** (1.12-1.72)	UK	1.12 (0.92-1.38)
	Not stated	--	0.98 (0.71-1.34)	US	0.67** (0.54-0.85)
Prescription stop-smoking medication (SSM) (n=8199)	Overall[c]	p=0.49	**p=0.001**	Overall[d]	**p<0.0001**
	Low	1.0	1.0	Australia	1.0
	Moderate	0.83 (0.60-1.15)	1.47* (1.02)	Canada	0.96 (0.66-1.38)
	High	0.86 (0.56-1.30)	2.18** (1.45-3.28)	UK	0.41** (0.26-0.66)
	Not stated	--	0.91 (0.45-1.84)	US	1.29 (0.89-1.87)

[a] Presented as odds ratios (95% confidence intervals)
[b]Separate logistic regression models for each reason included country, age, sex, ethnicity, marital status, income, education, time in sample, and smoking status.
[c]Overall p value for 2 df test for education, 3 df test for income
[d]Overall p value for 3 df test for country
* significant at p<0.05
** significant at p<0.01

5.8.2 Access to stop-smoking medications

5.8.2.1 Obtaining and paying for stop-smoking medications

Since differences in use of cessation aids may reflect differential access to assistance such as stop-smoking medications (SSMs), the sources of SSMs and payment arrangements were examined in the cross-sectional Wave 5 sample. Due to small cell sizes, prescription SSM analyses by SES variables were limited to paying full price. Most of the planned analyses for NRT were conducted, although the analysis of social sources ('Got last NRT from a friend') was not, due to small cell sizes.

Descriptive Statistics

Table 63 shows the proportion of SSM/NRT users who reported having accessed their SSM/NRT through the various sources and payment arrangements, overall and by country. Overall, half of respondents had paid full price for their last prescription stop-smoking medication, and about 70% had paid full price for their last NRT. The remaining 30% of the sample of NRT users were approximately evenly split between receiving a discount and getting their NRT for free. A quarter of the sample of NRT users accessed their last NRT by prescription, but the majority (65%) obtained their last NRT over-the-counter/off-the-shelf. Only 7% got their last NRT free from a doctor.

Table 63: Proportion of SSM/NRT users reporting various payment/sources[a], by country, Wave 5

Payment/source	Overall	Australia	Canada	UK	US
Paid full price for last prescription SSM (n=269)	49.6%	43.1%	62.6%	51.5%	43.2%
Paid full price for last NRT (n=1120)	69.4%	90.3%	72.5%	44.8%	67.4%
Got last NRT at a discount (n=1120)	14.5%	7.2%	18.1%	16.0%	19.7%
Got last NRT for free (n=1120)	16.6%	3.4%	9.9%	39.5%	12.9%
Got last NRT by prescription (n=1209)	26.0%	2.7%	31.4%	46.3%	22.2%
Got last NRT OTC/off the shelf (n=1209)	64.8%	94.2%	60.6%	34.4%	73.7%
Got last NRT free from a doctor (n=1209)	7.2%	1.3%	5.4%	15.6%	4.9%

[a]Presented as weighted percentages

In the Wave 5 sample, considerable variation was observed by country in both payment and sources of prescription SSMs and NRT. More Canadian respondents, and fewer Australian and American respondents had paid full price for their last prescription SSM. With respect to NRT, a different pattern emerged: almost all Australian respondents had paid full price, followed by approximately 7 out of ten Canadian and American respondents, and just 45% of UK respondents.

Four in ten NRT users in the UK sample got their last NRT for free, about 4 times as many as in the other countries. Nearly all of the Australian sample got their last NRT over-the-counter/off-the shelf, compared to three quarters of American, 60% of Canadian, and a third of the UK samples. Instead, almost half of UK respondents got their last NRT by prescription, and 16% got it free from a doctor, higher proportions of the sample than in any other country.

Table 64 and Table 65 show the proportions of SSM/NRT users in the sample reporting various payment/sources, by education and income level. The general patterns in responses were similar between the two SES measures, although of greater magnitude for income.

Table 64: Proportion of SSM/NRT users reporting various payment/sources[a], by education, Wave 5

Payment/Source	**Low Education**	**Moderate Education**	**High Education**
Paid full price for last prescription SSM (n=269)	44.2%	59.9%	47.9%
Paid full price for last NRT (n=1120)	66.9%	69.4%	78.2%
Got last NRT at a discount (n=1120)	14.4%	15.2%	13.5%
Got last NRT for free (n=1120)	19.3%	15.8%	8.8%
Got last NRT by prescription (n=1209)	28.2%	26.5%%	17.9%
Got last NRT OTC/off the shelf (n=1209)	62.3%	65.1%	72.3%
Got last NRT free from a doctor (n=1209)	7.1%	6.6%	8.6%

[a]Presented as weighted percentages

Table 65: Proportion of SSM/NRT users reporting various payment/sources[a], by income, Wave 5

Payment/Source	**Low Income**	**Moderate Income**	**High Income**	**Income not stated**
Paid full price for last prescription SSM (n=269)	46.3%	46.2%	59.3%	16.8%
Paid full price for last NRT (n=1120)	60.2%	67.5%	77.5%	64.6%
Got last NRT at a discount (n=1120)	14.1%	17.5%	12.7%	11.8%
Got last NRT for free (n=1120)	26.2%	14.9%	10.8%	23.6%
Got last NRT by prescription (n=1209)	34.8%	25.9%	19.4%	32.4%
Got last NRT OTC/off the shelf (n=1209)	56.9%	63.0%	72.9%	54.9%
Got last NRT free from a doctor (n=1209)	8.3%	8.3%	5.4%	7.6%

[a]Presented as weighted percentages

Respondents with moderate education and with high income had substantially higher rates ofpaying full price for their last prescription SSM (near 60%), while respondents who did not provide income information had very low rates (17%). A gradient was observed by education and income in the proportion of the sample who had paid full price for their last NRT. Conversely, a reverse gradient

was observed for the proportion of respondents who got their last NRT for free. The proportion of respondents reporting getting their last NRT at a discount varied somewhat by education and income.

The proportion of the sample who accessed their last NRT by prescription decreased with increasing education and especially income. The pattern by education and income for obtaining last NRT over-the-counter/off-the-shelf mirrored that of prescription access. There was no pattern by education level in getting last NRT from a doctor, although a lower proportion of high income respondents had accessed their NRT this way. With the exception of paying full price for last prescription stop-smoking medication, the estimates for respondents who did not state their income were similar to the low income group.

Logistic Regression Models

Each of the payment/source items was examined in a multivariate model for differences in use by education level, income level, and country (Table 66). Interactions between income and education, country and income, and country and education were not conducted due to small cell sizes.

The main effect of education was not significant in any of the models. However, a couple of specific comparisons were significant: high education respondents had nearly 80% greater odds of having paid full price for their last NRT, and only about half the odds of having gotten it for free, compared to those with low education. The main effect of income was significant for getting NRT for free, by prescription, and over-the-counter/off-the-shelf, and borderline significant for paying full price for last NRT. High income respondents had almost double the odds of having paid full price for NRT or obtained NRT over-the-counter/off-the-shelf, compared to low income respondents. Those with moderate and high incomes had about half the odds of having obtained their last NRT by prescription and only about a third the odds of having gotten it for free, compared to low income.

The main effect of country was significant for paying full price for last NRT, getting last NRT at a discount, and getting last NRT for free: NRT users in Canada, the US, and particularly the UK were all more likely to have received some kind of assistance with payment. Country was also significantly associated with obtaining last NRT by prescription or over-the-counter/off-the-shelf, with NRT users in Canada, the US, and the UK much more likely to have obtained NRT by prescription and much less likely to have accessed it over-the-counter/off-the-shelf. In addition, although the main effect was not significant, UK smokers were more likely to have gotten their NRT free from a doctor, compared to Australian smokers.

Table 66: Odds ratios [a] for education, income, and country in the base regression models[b] for payment/sources of SSMs

Statement	Level	Education	Income	Country	
Paid full price for last prescription SSM (n=269)	Overall[c]	p=0.23	p=0.13	Overall[d]	p=0.23
	Low	1.0	1.0	Australia	1.0
	Moderate	1.64 (0.79-3.40)	0.73 (0.30-1.78)	Canada	1.82 (0.81-4.09)
	High	1.97 (0.72-5.38)	1.34 (0.53-3.41)	UK	1.48 (0.50-4.37)
	Not stated	--	0.24 (0.05-1.28)	US	0.81 (0.32-2.01)
Paid full price for last NRT (n=1114)	Overall[c]	p=0.10	p=0.06	Overall[d]	**p<0.0001**
	Low	1.0	1.0	Australia	1.0
	Moderate	1.24 (0.83-1.85)	1.39 (0.90-2.16)	Canada	0.25** (0.15-0.44)
	High	1.77* (1.04-3.02)	1.92** (1.21-3.05)	UK	0.08** (0.05-0.14)
	Not stated	--	1.30 (0.63-2.69)	US	0.20** (0.11-0.36)
Got last NRT at a discount (n=1114)	Overall[c]	p=0.73	p=0.37	Overall[d]	**p=0.006**
	Low	1.0	1.0	Australia	1.0
	Moderate	0.88 (0.56-1.38)	1.55 (0.89-2.71)	Canada	2.68** (1.43-5.00)
	High	0.80 (0.43-1.48)	1.14 (0.64-2.01)	UK	2.46** (1.33-4.57)
	Not stated	--	0.95 (0.36-2.52)	US	3.04** (1.53-6.04)
Got last NRT for free (n=1114)	Overall[c]	p=0.14	**p=0.0006**	Overall[d]	**p<0.0001**
	Low	1.0	1.0	Australia	1.0
	Moderate	0.80 (0.47-1.35)	0.39** (0.23-0.66)	Canada	3.70** (1.56-8.74)
	High	0.49* (0.24-0.99)	0.35** (0.19-0.64)	UK	20.37** (9.27-44.74)
	Not stated	--	0.66 (0.27-1.66)	US	5.03** (2.00-12.66)
Got last NRT by prescription (n=1203)	Overall[c]	p=0.26	**p=0.03**	Overall[d]	**p<0.0001**
	Low	1.0	1.0	Australia	1.0
	Moderate	0.90 (0.61-1.34)	0.59* (0.38-0.92)	Canada	17.42** (8.28-36.66)
	High	0.65 (0.39-1.09)	0.49** (0.30-0.81)	UK	34.04** (16.35-70.86)
	Not stated	--	0.74 (0.38-1.44)	US	10.38** (4.68-23.04)
Got last NRT OTC/off the shelf (n=1203)	Overall[c]	p=0.45	**p=0.03**	Overall[d]	**p<0.0001**
	Low	1.0	1.0	Australia	1.0
	Moderate	1.19 (0.81-1.76)	1.44 (0.94-2.19)	Canada	0.08** (0.05-0.15)
	High	1.34 (0.81-2.20)	1.99** (1.26-3.13)	UK	0.03** (0.02-0.05)
	Not stated	--	1.16 (0.57-2.38)	US	0.15** (0.08-0.28)

Got last NRT free from a doctor (n=1203)	Overall[c]	p=0.53	p=0.89	Overall[d]	p=0.10
	Low	1.0	1.0	Australia	1.0
	Moderate	0.56 (0.20-1.56)	0.70 (0.26-1.91)	Canada	2.79 (0.82-9.57)
	High	0.69 (0.22-2.13)	0.89 (0.32-2.48)	UK	4.15* (1.27-13.63)
	Not stated	--	1.19 (0.26-5.50)	US	1.95 (0.43-8.88)

[a] Presented as odds ratios (95% confidence intervals)

[b]Separate logistic regression models for each reason included country, age, sex, ethnicity, marital status, income, education, and time in sample.

[c]Overall p value for 2 df test for education, 3 df test for income

[d]Overall p value for 3 df test for country

* significant at $p<0.05$

** significant at $p<0.01$

5.8.2.2 Opinions about access to stop-smoking medications

In addition to the sources and payment arrangements for SSMs, opinions about access to stop-smoking medications were examined for differences by SES and by country.

Descriptive Statistics

Overall, few respondents (11%) thought that SSMs were too hard to get, although the majority (70%) thought they were too expensive. Over a third of the sample said they did not know enough about how to use SSMs properly. Respondents from the US had almost double the proportion of respondents that agreed that SSMs were too hard to get, compared to other countries. The proportion of respondents that said SSMs were too expensive was about 15% lower in Canada than in other countries.

Table 67: Agreement with statements about stop-smoking medications, by country, Wave 5

Statement	**Agree/strongly agree**[a]				
	Overall (n=8243)	**Australia** (n=2022)	**Canada** (n=2034)	**UK** (n=2019)	**US** (n=2168)
Stop-smoking medications are too expensive.	70.3%	72.9%	58.1%	73.1%	76.7%
You don't know enough about how to use stop-smoking medications properly.	36.7%	37.5%	34.5%	35.0%	39.7%
Stop-smoking medications are too hard to get.	11.2%	8.8%	9.3%	9.6%	17.2%

[a]Presented as weighted percentages

Table 68 and Table 69 show the proportion of respondents who agreed with the statements about access to stop-smoking medications, by education and income level. In this sample, a gradient was observed by education level in the proportion of respondents that agreed with the statements regarding barriers to use of stop-smoking medications, with greater agreement as education level decreased.

Table 68: Agreement with statements about stop-smoking medications, by education level, Wave 5 (n=8243)

Statement	Agree/strongly agree[a]		
	Low Education	**Moderate Education**	**High Education**
Stop-smoking medications are too expensive.	73.2%	69.5%	62.3%
You don't know enough about how to use stop-smoking medications properly.	40.8%	32.9%	30.8%
Stop-smoking medications are too hard to get.	12.8%	10.4%	7.5%

[a]Presented as weighted percentages

The same trend was observed by income level, with greater proportions of respondents agreeing with the statements as income level decreased. Respondents who did not state income level were similar to the low income group.

Table 69: Agreement with statements about stop-smoking medications, by income level, Wave 5 (n=8243)

Statement	Agree/strongly agree[a]			
	Low Income	**Moderate Income**	**High Income**	**Income not stated**
Stop-smoking medications are too expensive.	76.6%	71.2%	63.1%	74.0%
You don't know enough about how to use stop-smoking medications properly.	42.2%	35.0%	32.1%	44.7%
Stop-smoking medications are too hard to get.	16.9%	9.5%	7.3%	15.0%

[a]Presented as weighted percentages

Logistic Regression Models

Table 70 shows the odds ratios for education, income, and country in the regression models for each statement about barriers to SSM use. The main effect of education was significant for all three barriers to access. Those with high education had about two-thirds the odds of agreeing that SSMs were too expensive, that they didn't know enough about how to use SSMs properly, and that SSMs were too hard to get, compared to those with low education. Respondents with moderate education were also less likely to say that they didn't know enough about how to use SSMs properly. The main effect of income was also significant for all three statements about barriers to access: respondents with moderate and high income were less likely to agree with the statements. The main effect of country was significant for SSMs being too expensive and too hard to get: Canadians had half the odds of Australians for saying that SSMs were too expensive, and US respondents had almost double the odds of Australians for saying that SSMs were too hard to get. No other significant effects of country were found.

Table 70: Odds ratios for education, income, and country in the base regression models[a] for agreement with statements about barriers to SSM use

Statement	Level	Education	Income	Country	
Stop-smoking medications are too expensive. (n = 7653)	Overall[b]	**p<0.0001**	**p<0.0001**	Overall[c]	**p<0.0001**
	Low	1.0	1.0	Australia	1.0
	Moderate	0.92 (0.80-1.07)	0.80** (0.68-0.95)	Canada	0.52** (0.44-0.61)
	High	0.69** (0.58-0.81)	0.57** (0.48-0.68)	UK	1.00 (0.83-1.19)
	Not stated	--	0.91 (0.70-1.18)	US	1.15 (0.95-1.38)
You don't know enough about how to use stop-smoking medications properly. (n = 7931)	Overall[b]	**p<0.0001**	**p=0.0001**	Overall[c]	p=0.22
	Low	1.0	1.0	Australia	1.0
	Moderate	0.75** (0.66-0.85)	0.81** (0.70-0.93)	Canada	0.90 (0.77-1.06)
	High	0.68** (0.58-0.80)	0.75** (0.64-0.88)	UK	0.91 (0.78-1.06)
	Not stated	--	1.14 (0.90-1.43)	US	1.04 (0.88-1.22)
Stop-smoking medications are too hard to get. (n = 7941)	Overall[b]	**p=0.005**	**p<0.0001**	Overall[c]	**p<0.0001**
	Low	1.0	1.0	Australia	1.0
	Moderate	0.86 (0.70-1.05)	0.60** (0.48-0.75)	Canada	1.08 (0.82-1.41)
	High	0.63** (0.48-0.84)	0.50** (0.39-0.64)	UK	1.05 (0.82-1.36)
	Not stated	--	0.97 (0.70-1.34)	US	1.88** (1.45-2.42)

[a]Separate logistic regression models for each reason included country, age, sex, ethnicity, marital status, income, education, and time in sample.
[b]Overall p value for 2 df test for education, 3 df test for income
[c]Overall p value for 3 df test for country
* significant at p<0.05
** significant at p<0.01

6.0 Discussion

6.1 Longitudinal analyses of cessation-related outcomes

This study is among the first to examine a spectrum of quitting outcomes, from quit intentions and attempts to abstinence from smoking for varying periods of time, longitudinally and across countries (Australia, Canada, the UK, and the US). It is also the first analysis of ITC Four Country Survey data that looks at a continuum of quitting measures over time. The longitudinal analyses revealed socioeconomic patterns in a number of cessation-related outcomes, as well as variations by country.

Quit intentions

The findings indicate that although the majority of smokers in the four countries intended to quit, only a third were planning on doing so in the next six months. Similar results were found in a previous ITC Four Country analysis (Siahpush et al., 2006), and in a European study which found that although over 80% of smokers in the UK intended to quit at some point in the future, only a third were intending to quit within the next six months (Thyrian et al., 2008). The same pattern, but with lower proportions was observed in another UK study which found 56% of smokers intended to quit within the next 12 months, with just 11% in next month (Lader, 2007), and in Canada, where although half of smokers planned to quit, only 16% were seriously considering doing so in next month (Statistics Canada, 2003). There appears to be a substantial gap between intending to quit at all and committing to doing so in the near future. Smokers who say that they would like to quit sometime in the future may not be willing or ready to make a firm commitment to quitting, or they may be waiting for the right time or support (Thyrian et al., 2008).

Smokers with low education and income were about a third less likely to report any intentions to quit, although income had a somewhat weaker effect than education. For intentions to quit in the next six months, SES variables had similar but somewhat weaker effects than for any intentions. When interactions were considered for any quit intentions, the effect of age depended on education (with a greater effect of age for high education), and the effect of income depended on ethnicity (where intentions increased with income only for minorities). In the interactions model for six-month quit intentions, country interacted with wave, the effect of education depended on age and HSI (high education had twice the odds of quitting for all but the highest and lowest HSI scores, and

age had stronger effects for high education), and the effect of income depended on country (where higher income increased intentions only in Canada and the UK).

These results are similar in both direction and magnitude to an earlier analysis of data from Wave 1 of the ITC Four Country Survey which indicated that smokers with low education and income were less likely to intend to quit: smokers with less than a high school education had 40% greater odds of having no intention to quit smoking (vs. some university), and those with low income had 23% greater odds of having no intention to quit than smokers with high income (Siahpush et al., 2006). It is also consistent with studies documenting a relationship between intentions to quit and level of education (Dotinga et al., 2005) and income (Fagan et al., 2007), although other studies have not found educational differences in intentions to quit (Droomers et al., 2004; Reid et al., 2008). This inconsistency may be due to differences in the samples, variable definitions, or study methods.

Less intention to quit among lower socioeconomic groups may be due to lower levels of knowledge (Siahpush et al., 2006) or less concern about the harms of smoking (as identified in the reasons for quitting analysis), different attitudes and social norms around smoking and cessation (Dotinga et al., 2005; Manfredi, Cho, Crittenden, & Dolecek, 2007; Rise, Kovac, Kraft, & Moan, 2008; Sorensen et al., 2002), greater stress (Manfredi et al., 2007; Stronks et al., 1997) and dependence on smoking to cope, lower self-efficacy for quitting (Dotinga et al., 2005; Droomers et al., 2004; Siahpush et al., 2006), less social support (Sorensen et al., 2002), or some other factors.

Intentions to quit (any, and within the next six months) differed by country: Canadians were the most likely to intend to quit, followed by Australians, the US and the UK, which were both significantly lower than Australia and Canada. **Although time (wave) was not associated with any intentions, intentions to quit within the next 6 months were greater in the two most recent waves**; this finding indicates that smokers' commitments to quit strengthened in the last few years, potentially due to increased tobacco control activity. For both any intentions and six-month intentions, country and wave interacted such that Canadians were more likely to intend to quit only in the first two waves, US smokers were less likely to quit only in Waves 3 and 4 (Waves 3 and 5 for six-month), and UK smokers were much less likely to intend to quit in all five waves (except Wave 4 for six-month).

Quit attempts

More than a third (37%) of the full sample had made a quit attempt since the last survey, which is nearly identical to the finding from an earlier analysis of the ITC Four Country Survey that 36% of respondents made a quit attempt between Waves 1 and 2 (Hyland et al., 2006). This proportion is somewhat lower than the 40-50% quit attempt rates previously documented among US smokers (Barbeau et al., 2004; CDC, 2007a; Shiffman et al., 2008b) and Canadian smokers (Reid et al., 2008) smokers, and between the 31% and 43% observed in two UK studies (West, 2008; West, McEwen, Bolling, & Owen, 2001). When considering only those who intended to quit at the previous wave, the proportion of smokers making a quit attempt increased somewhat to 45%.

Quit attempts differed by education, with high education smokers 20% more likely to have made an attempt than low education smokers. However, quit attempts did not differ by income level. The effects of income and education were the same for both the full sample and only those who intended to quit, suggesting that fewer attempts to quit among lower SES groups is not simply due to lower intentions to quit, and that SES differences exist independently for both intentions and attempts. The same factors discussed above for quit intentions (e.g. knowledge, attitudes and beliefs, norms, stress, dependence, self-efficacy, social support) may also affect attempts to quit. In addition, the availability of cessation assistance and perceptions its effectiveness (Hammond et al., 2004; Roddy et al., 2006) may also vary by SES and contribute to whether a smoker moves from intending to quit to making a quit attempt.

These results support US studies that have reported decreased likelihood of attempting to quit among lower education smokers, and inconsistent effects of income (Gilman et al., 2008; Hatziandreu et al., 1990; Levy et al., 2005; Lillard et al., 2007; Shiffman et al., 2006b). However, other studies in the US, the UK, and Canada have found no SES differences in quit attempts (Barbeau et al., 2004; Reid et al., 2008; West, 2008; West et al., 2001), and analysis of data from the first two waves of the ITC Four Country Survey also did not find an association between education or income and making a serious quit attempt since the last survey (Hyland et al., 2006; Siahpush et al., 2006). The additional waves of data included in this analysis may be responsible for this difference, by providing additional sample size and power, and because of respondents' increased odds of having made a quit attempt in more recent waves.

With respect to time, respondents were less likely to have made a quit attempt in Wave 2 compared to all subsequent waves. This is likely due to the shorter time period between Waves 1 and 2,

compared to between the other waves. **By country, quit attempts followed the same pattern as quit intentions**, although the trend was not significant except for UK smokers being less likely to attempt to quit in the full sample analysis.

When interactions were considered, the full sample model was stratified by country due to the number of significant interactions (country with wave, income with age, sex, country, and wave), and the models by country differed substantially. The Australian model had no significant main effects, indicating that demographic factors (including SES) were not important in predicting quit attempts, although age and education interacted (with lower odds of attempting to quit with age as education increased). The Canadian model had no significant interactions, and SES variables were not related to quit attempts. In the UK, education and income were associated with quit attempts, but there were interactions of income with sex and ethnicity (income effects were significant for minority ethnicity only, and were slightly stronger for males), and quit attempts were more likely in the two most recent waves. In the US, education and income were associated with quit attempts, but income interacted with age (odds of a quit attempt decreased with age for higher income groups), and wave interacted with education (odds of a quit attempt increased with education for the two most recent waves). In the interactions model with only those who intended to quit, country and wave interacted with no consistent pattern, the effect of age depended on income (only significant for high income), and the effect of income depended on sex (with stronger effects seen for males).

Abstinence

Overall, nearly 12% of respondents (at each wave, pooled across waves) were quit for at least one month at the time they were surveyed; this proportion increased to 24% when considering only those who had attempted to quit since entry into the study. For the outcome of at least six months abstinence, 8% of all eligible respondents (15% of those who attempted) had quit, and for at least 12 months abstinence, 7% of all eligible respondents (12% of those who attempted) had quit. These figures are similar to the earlier analysis of Waves 1 and 2 of the ITC Four Country Survey, which found that 9% of smokers overall, and 25% of those who made an attempt were successful quitters at Wave 2 (Hyland et al., 2006). Although direct comparisons with other studies are difficult due to varying study situations and definitions, abstinence rates in this study are high when compared to background unaided quit rates, which are estimated at 3 to 5% for 6-12 month abstinence after a given quit attempt (Hughes, Keely, & Naud, 2004).

Success in remaining abstinent from smoking varied by education and income for one-month abstinence, and by education for six-month abstinence, although 12-month abstinence was not related to either socioeconomic measure. More specifically, respondents with high education and income were 25% more likely to quit for at least one month than those with low education and income. In addition, respondents with high education were a third more likely to quit for at least six months compared to those with low education. As with the progression from intentions to quit attempts, the effects of income and education differed very little between the full sample and only those who had made a quit attempt, suggesting that lower quitting success among lower SES groups is not simply due to fewer smokers attempting to quit. In the models including interactions, for all of the abstinence outcomes the effects of age and education depended on one another, with varying effects: for one- and six month-abstinence in the full sample, odds of quitting decreased with age, and effects were stronger with higher education; for 12-month abstinence and for one- and six-month abstinence in attempters, odds of quitting increased with age, but only among those with low education.

Previous findings regarding SES and cessation are mixed (see Section 2.2.3), with more studies showing a relationship with education and/or income than not, but with considerable variation in the significance and magnitude of such associations. This creates some difficulty for comparing the current study with existing literature. However, the findings for one- and six-month abstinence are consistent with studies showing an association of higher income and/or education with greater cessation success in the countries studied (Agrawal et al., 2008; Barbeau et al., 2004; Fagan et al., 2007; Flint & Novotny, 1997; Gilman et al., 2003, 2008; Graham & Der, 1999; Hymowitz et al., 1997; Lillard et al., 2007; West et al., 2001, Wetter et al., 2005).

Socioeconomic variation in one- and six-month abstinence may be affected by factors similar to those discussed for quit intentions and attempts (e.g. knowledge, attitudes and norms, stress, dependence, self-efficacy, and social support). In a study that also measured demographics, tobacco dependence, environmental and job-related characteristics, and transtheoretical model-based variables, there was an effect of education on smoking cessation regardless of the inclusion of any of these factors (Wetter et al., 2005), suggesting that relationship of education and cessation may be through some other variables. Cessation differences may also be due to variation in social support (Cohen & Lichtenstein, 1990; Droomers et al., 2002; Rice et al., 1996), quit methods, use of cessation assistance and access to such assistance (Bobak et al., 2000; Browning et al., 2008; Moolchan et al.,

2007). Additional analyses were conducted with the most recent cross-sectional sample in order to gain insight into the latter factors; these are discussed in Section 6.3.

The finding that SES variables were important for the shorter time periods but not 12-month abstinence may be due to the smaller and more select population eligible to be quit for two consecutive survey waves; lower SES respondents and those who had quit were both more likely to be lost to follow-up (see Section 4.2.3 and Appendix D), so the relationships observed between SES measures and longer-term quitting may have been distorted. However, greater attrition among low SES respondents alone would not likely result in the pattern of results observed unless a disproportionate number of those lost were continuing smokers (e.g. unless more low SES quitters stayed in the sample), if in fact there were underlying differences by SES in smoking abstinence. The remaining sample may also be subject to some other selection bias. Alternately, SES differences in abstinence may diminish over time after a quit attempt, and short periods of abstinence may be considered as quit attempts (which differ by SES in this analysis) rather than more permanent cessation (which 12-month abstinence is closer to). However, given the amount of existing research indicating that smokers of lower SES are less likely to quit (see Section 2.2.3), this is unlikely.

No country differences were found for any of the abstinence measures in the overall sample, and there were no significant interactions between country and the SES variables. This suggests that cessation is occurring at a similar rate between countries, which is somewhat surprising, given that smoking prevalence varies between the countries (ranging from 14% daily smoking in Canada (Statistics Canada, 2006) to 22% prevalence in the UK (Office for National Statistics, 2008), in 2006). However, **in the samples with only those who had attempted to quit, respondents in the UK were over 30% more likely to be quit for at least one month and at least six months**. So, although fewer UK smokers attempted to quit, those that did attempt were more successful; this may be due to the use of effective cessation services (see Sections 5.8 and 6.3) or other tobacco control efforts. **Respondents in both samples were more likely to quit over time**: odds of quitting increased with recency of wave, and were particularly high for six-month abstinence. This may be due to the greater length of time between surveys after Wave 2 and/or an actual increase in quitting over time in the population of smokers, potentially due to tobacco control activity.

Reducing consumption

Nearly a quarter of respondents had reduced cigarette consumption by at least fifty percent since entry into the study, although that dropped to 11% when quitters were excluded, indicating that over half of the reductions in consumption were due to quitting (i.e. complete reduction). Regardless, one in ten smokers had reduced their cigarette consumption by half since being recruited into the study. Although there is debate about whether reduction in consumption leads to meaningful reduction in heath risks (Hatsukami, Henningfield, & Kotlyar, 2004; Hughes & Carpenter, 2006; Stead & Lancaster, 2007), if there were some benefit, there could be a substantial public health impact to reductions of this magnitude in the population. In addition, there is some question as to whether reduction is a significant step on the way to quitting smoking or simply a way to postpone or avoid quitting completely (Hatsukami et al., 2004; Hughes & Carpenter, 2006). Indeed, quit intentions emerged as an important predictor of reducing consumption, with intent to quit associated with almost double the odds of reducing in the full sample, and almost 50% greater odds among current smokers. However, it is not known whether respondents who intended to quit were reducing consumption as an alternative to quitting, or if they are more or less likely to quit in the future – this presents an important question for future study. It is worth noting though, that a review of reduction among smokers who were not interested in quitting concluded that reducing smoking did not undermine, and may in fact increase future cessation (Hughes & Carpenter, 2006).

Income and education were not significantly associated with reducing consumption in the main effects models for the full sample or only current smokers. This is consistent with results from a UK study which found that social class was not related to cutting down on cigarettes (West, 2008). In the interactions model with the full sample, both income and education interacted with age: odds of reducing consumption increased with age among those with low education and income, but decreased with age among those with higher income. For current smokers, the effect of age depended on income (odds of reducing consumption decreased with age for higher income), and although marital status interacted with education, none of the specific comparisons were significant.

Time was associated with reducing consumption, with increased odds of reducing consumption with recency of wave for the full sample, but not when only current smokers are considered and quitters excluded. Since the effects of time disappear when quitters are excluded, this suggests that it is the behaviour of quitting and not reduction itself that is related to time (as noted in the previous section). Unlike some of the other outcomes, **country was not related to reductions in cigarette**

consumption. Although country and wave interacted in the full sample, and the main effect of country was significant in the interactions model with current smokers only, none of the specific comparisons were significant, suggesting weak relationships.

Also unique to this outcome, the highest HSI scores had either no association or were associated with greater odds of reduction in consumption, whereas the highest HSI scores were associated with the lowest odds of the other cessation-related outcomes. This could be due to more very heavy smokers reducing rather than quitting smoking, or the difference in starting point for CPD (i.e. 50% reduction in CPD for someone who smokes 30 cigarettes a day is much different than for someone who smokes 10 cigarettes per day).

Summary of longitudinal trends

The longitudinal analyses indicate that SES plays an important role in smoking cessation and related constructs. Smokers with lower education were less likely to intend to quit, make a quit attempt, or be abstinent from smoking for at least one month or six months. Smokers with lower income were also less likely to intend to quit or be abstinent from smoking for at least one month. Of the two socioeconomic measures tested, level of education had a stronger relationship to the outcomes, which is consistent with previous research (Chaix, Guilbert, & Chauvin, 2004; Schaap, van Agt, & Kunst, 2008; USDHHS, 1989). The findings also indicate that SES differences in quit attempts extend beyond differences in intentions to quit, and differences in quit success extend beyond differences in quit attempts, suggesting that there are barriers related to socioeconomic status at several stages along the spectrum of smoking cessation. However, there was no variation by SES in abstinence from smoking for at least 12 months, or reduction in cigarette consumption by at least half.

The lack of interactions between wave and SES variables suggests that the relationships between SES and the outcomes have been relatively stable over the time period under study, although this length of time (four years) may not have been enough to observe changes, particularly if they were small and/or gradual. Similarly, there were few instances of significant interactions between country and SES variables, showing consistency in the relationships between SES and the outcomes across countries. However, substantial country differences were identified for several outcomes (quit intentions, attempts, one- and six-month abstinence among attempters): Canadian respondents were the most likely to intend or attempt to quit, followed by Australians, then US respondents (who were considerably lower), and UK respondents were the least likely to intend or attempt to quit, although

those who did attempt to quit were more likely to be abstinent for at least one and six months. No country differences were found for the other outcomes (abstinence measures for the full sample, 12-month abstinence, reduction in consumption). The observed country differences may be due to varying policy environments, or to differences in social, cultural, or individual-level factors. In addition, interactions were observed between country and wave for quit intentions and attempts, suggesting that the relationships between country and these outcomes varied over time. Intentions and attempts, being the most distal on the quitting continuum, may be the most sensitive to immediate changes, which could potentially explain why it was these outcomes that varied as a function of time within countries (or by country at a given time). It is not yet known how or if changes to these more distal outcomes will translate to increased smoking cessation in the future, or how this progression may vary by country and/or socioeconomic status; this presents an important question for future work in this area.

Tobacco dependence, as measured by HSI, was one of the strongest predictors in all models for cessation-related outcomes. Analysis of Wave 1 and 2 ITC Four Country Survey data also found that dependence was the most consistent predictor of quitting (Hyland et al., 2006), in accordance with existing literature identifying dependence as a major predictor of quitting, even more so than socioeconomic factors (Agrawal et al., 2008; Chandola, Head, & Bartley, 2004; Fagan et al., 2007; West et al., 2001). Previous research, including an analysis of Wave 1 ITC data, has identified higher levels of dependence among lower SES smokers (Bobak et al., 2000; Jarvis & Wardle, 2006; Siahpush et al., 2006). Given this increased dependence, one would expect the relationship of SES to the quitting outcomes to be even greater in the "real world" where the effects of dependence would act alongside (in addition to) those of SES, rather than being controlled for as in this study.

Age was also a significant predictor in many of the models, although the direction of its effect varied by outcome: increasing age was associated with *lower* likelihood of intending to quit, attempting to quit (in the full sample only), or having reduced consumption by 50% (among current smokers), but *greater* likelihood of abstinence (one-, six- and 12-month) among attempters. Other studies have also observed increased cessation success with age (Ferguson, Bauld, Chesterman, & Judge, 2005; Hatziandreu et al., 1990; Hyland et al., 2004; Monso, Campbell, Tonnesen, Gustavsson, & Morera, 2001), and greater likelihood of quit attempts among young adults (Hatziandreu et al., 1990). The reasons for this difference are not clear, but speculatively, younger smokers may intend or attempt to quit more often because smoking is a less established behaviour, and older smokers may be

more likely to actually quit due to greater experience with quitting or stronger motivation to quit (potentially because of the motivating effects of seeing the harms of smoking on themselves or others at older ages). In addition, age interacted with education for quit intentions, quit attempts in the full Australian sample, all of the abstinence outcomes, and reduction in consumption in the full sample; age also interacted with income for quit attempts among those who intended to quit and the full UK and US samples, and for reducing consumption. For quit intentions, quit attempts, one-month abstinence in the full sample, and reduction in consumption, age effects were stronger in higher SES groups, and the likelihood of outcomes decreased with age. However, for most abstinence measures, age effects were only seen at the lowest level of education, and strengthened with age. There may be age effects or cohort effects in the cessation outcomes studied, and the influence of income and education on the outcomes appears to vary with age/cohort as well. Previous findings that educational differences are greater among younger age groups (Cavelaars et al., 2000; Fernandez et al., 2001; Hatziandreu et al., 1990; Huisman et al., 2005b) support the notion of cohort effects in the relationship of SES to smoking and cessation.

Due to its relationship with socioeconomic status (Braveman et al., 2005) and a body of literature showing racial/ethnic differences in smoking-related variables (USDHHS, 1998), ethnicity was expected to emerge as a significant predictor in the models. However, in most analyses, ethnicity was not significantly associated with the outcomes. Thus, either ethnicity is not related to the outcomes studied beyond its relationship with SES (which is unlikely, given the literature in this area), or the effects of ethnicity as measured were not strong enough to make a difference in this analysis. The dichotomous measure (minority vs. not) used in this study may have obscured differences between particular ethnic groups, and similarly, considering ethnicity across all countries may have masked between-country differences in the effect of ethnicity.

6.2 Cross-sectional analysis of reasons for quitting

Reasons for quitting smoking or staying quit were examined in the cross-sectional Wave 5 sample, revealing differences by smoking status, SES, and country. **Former smokers tended to endorse many of the reasons in higher proportions than current smokers and recent quitters** (although not advice from a health professional, free or lower-cost stop-smoking medication, or availability of telephone helpline). These results suggest that direct service provision may be less important for staying quit, and that quitting may be reinforced by many other environmental/policy factors. This

finding is also contrary to previous research on reasons for quitting, which indicated that former smokers were *less* likely than current smokers to cite most reasons (Halpern & Warner, 1993); reasons for this difference are unclear, but may have to do with differences in the sample or the time that the study took place.

The results indicate that concern for health was the most popular reason for quitting, cited by over 80% of respondents. This agrees with previous findings that health reasons were the most common reason for quitting, cited by 60-80% of American current smokers and recent quitters (Halpern & Warner, 1993) and 85% of UK smokers who wanted to quit (Lader, 2007), and also mentioned (unaided) by half of former smokers in Canada (Statistics Canada, 2003) and 62% of current smokers and recent quitters in the US (Gilpin, Pierce, Goodman, Burns, & Shopland, 1992). Many of the other reasons included in this analysis were cited in much higher proportions than other studies have found. For example, 26% of UK smokers (Lader, 2007) and 36% of current and 25% of former smokers in the US cited cost (Halpern & Warner, 1993), and 12% of former smokers in Canada (Statistics Canada, 2003) and 9% of US current smokers and recent quitters (Gilpin et al., 1992) mentioned (unaided) cost as their reason for quitting, compared to over 70% in this analysis. This may be due to recent tax increases, or the inclusion of countries with higher cigarette prices.

Lower SES respondents were more likely than higher SES respondents to endorse most reasons, except concern for personal health (which was much *less* likely to be endorsed, potentially because of lower knowledge about the harms of smoking (Siahpush et al., 2006) or less concern about future consequences (Bobak et al., 2000; Lund, Lund, & Rise, 2005)). Previous research has documented an association between health concern as a reason for quitting and greater odds of cessation (Halpern & Warner, 1993); if this still holds true, it is of concern that fewer lower SES respondents endorsed concern for health as a reason for quitting. On the other hand, lower SES respondents were more likely to cite cigarette package warning labels and advertisements/information on health risks of smoking as a reason for quitting, even though messages from these sources are often related to health. Lower SES respondents were also more likely to cite services like telephone helplines and free or lower-cost stop-smoking medications as reasons for quitting/staying quit; this points to the value of these programs for helping lower SES smokers to quit, and the importance of continued efforts in these areas. Respondents with high education were *less* likely than low education respondents to cite smoking restrictions at work as a reason for quitting, potentially because many jobs requiring high education are in settings with long-established smoking restrictions, so anti-

smoking pressures at work are not new. The price of cigarettes was strongly associated with income, in the expected direction, suggesting that taxation remains an effective policy strategy for reducing smoking in lower income groups. Previous research in the US found that citing cost as a reason for quitting was associated with lower odds of cessation, but also that the effect of citing cost on smoking cessation was consistent across education and income groups (Halpern & Warner, 1993); however, cigarette prices have increased substantially since that time, potentially increasing the impact of cost overall and particularly for those with more limited financial resources. Overall, the findings regarding reasons for quitting were generally as expected, given the existing research on policy effects by SES (Section 2.3.3).

Country differences were also observed in reasons for quitting. Across countries, similar proportions were seen among the top reasons: concern for personal health, setting an example for children, the price of cigarettes, and concern about the effect of your cigarette smoke on non-smokers. Other, **more policy-relevant reasons were much more variable by country**. The US, which generally has weaker tobacco control policies than the other countries, was lowest for smoking restrictions, warning labels, advertisements or information about the health risks of smoking, and that society disapproves of smoking (which can be seen as a proxy for denormalization). The proportion of those citing warning labels and advertisements or information about the health risks of smoking roughly followed the strength and novelty of warning labels in each country. When considering support for cessation, the UK and Australia had more smokers, and in the UK especially more quitters, who cited assistance such as a telephone helpline and free or lower cost stop-smoking medication as a reason for quitting. Advice from a health professional was greater in the US and Canada, potentially due to the promotion of clinical practice guidelines on treating tobacco use (Fiore et al., 2000). The UK also has such guidelines, although respondents appear less likely to receive assistance from a health professional (Section 6.3), which may explain this difference.

6.3 Cross-sectional analysis of cessation assistance

Use of cessation assistance

Over half of the Wave 5 cross-sectional sample had used some form of cessation assistance since the last survey date/in the past year. This estimate is high compared to previous findings that only one-fifth to one-third of smokers who attempt to quit use some form of assistance (Cokkinides et al., 2005; Fiore et al., 1990; Shiffman et al., 2008b, Zhu et al., 2000). However, these studies did not

generally include health care provider advice as cessation assistance, as this analysis did. Assistance from a health professional, reported by nearly half of respondents, was the most commonly used type of assistance, followed by NRT, which was used by 15% of respondents. Estimates for use of specific types of assistance were somewhat lower than those reported in national surveys in the countries studied. For example, other recent studies have found that the majority of smokers received advice to quit from a health professional (Cokkinides et al., 2005; Lader, 2007; Statistics Canada, 2003), and that 22-32% of smokers reported NRT use (Cokkinides et al., 2005; Lader, 2007; Shiffman et al., 2008b; Statistics Canada, 2003). These differences may be due to the samples studied (e.g. some others include only former smokers, or are representative of the whole population rather than of smokers) or variations in survey methodology (e.g. unaided recall in this study, but some others chose from a list).

Higher educated respondents were more likely to use any type of assistance, assistance from a health professional, and particularly the internet, compared to those with low education. Higher income respondents were more likely to use NRT and prescription SSMs, and those with moderate income also had greater odds of using the internet. There was also a non-significant trend toward decreased use with higher income for both telephone helpline and local services, showing that these types of free services may be accessed more often by those of lower SES. Otherwise, patterns of cessation assistance were fairly similar across educational and income groups.

These results are consistent with previous studies in the US which found that higher education and income were associated with using resources for quitting (Fiore et al., 1990; Honjo et al., 2006; Shiffman et al., 2008a), and using a program or product compared to a no-cost quit method (Lillard et al., 2005). They are also consistent with US findings that lower income smokers are less likely to use NRT (Cummings et al., 1997; Shiffman et al., 2005; Thorndike et al., 2002), but that education does not make a difference to NRT use (Cummings et al., 1997). Although existing literature on provision of assistance by health professionals is mixed, this research supports the assertion that socioeconomically disadvantaged smokers are less likely to receive such assistance (Browning et al., 2008; Goldstein et al., 1997; Houston et al., 2005).

Use of any cessation assistance varied by country, and was significantly higher in the US and Canada than in Australia or the UK. Use of NRT was highest in Australia and the UK and lowest in the US, although UK respondents were less likely to have used a prescription stop-smoking medication. North Americans were more likely to use the internet for cessation assistance.

Australians were more likely to have used a telephone helpline, which speaks to the utility of their Quitline. In the full sample, UK respondents were less likely to have received assistance from a health professional. However, when considering only those who had visited a health professional, UK respondents were *more* likely to have received assistance, whereas Australians were less likely. Use of local services varied widely, and was particularly high in the UK and particularly low in Australia. Some of this variation may be due to respondents' interpretation of what constitutes "local stop-smoking services (such as clinics or specialists)" versus being asked about specific forms of assistance (advice/support, prescription, referral, pamphlet) from a doctor or other health professional; respondents in the UK may not consider services from stop-smoking clinics to be assistance from a health professional, or they may just receive less assistance from their regular physician and instead be accessing stop-smoking clinics. Indeed, a recent study found that 5% of quit attempts in the UK involved the use of National Health Service (NHS) stop-smoking services (West, 2008), so the estimates obtained in this study are likely accurate.

Opinions about access to SSMs

As noted in Section 2.3.2, barriers to the use of cessation assistance are potentially more common in lower SES populations. It is possible that lower SES smokers are less informed about quit aids than their more advantaged peers, so there may be lower awareness of what is available and how to access and use assistance, and they may also doubt the efficacy and safety of quit aids more (Roddy et al., 2006). Lower SES populations may also face greater structural barriers such as cost that affect access to effective cessation assistance like pharmacotherapies.

When opinions about access to stop-smoking medications were examined in this study, although few respondents thought that SSMs were too hard to get, the majority thought they were too expensive, and over a third said they did not know enough about how to use SSMs properly. A gradient was observed by education and income in the proportion of respondents that agreed with the statements regarding barriers to use of stop-smoking medications, with greater agreement as education and income level decreased. These findings are not surprising, given the financial limitations and lower level of health knowledge (Viswanath et al., 2006) experienced to a greater extent among lower SES populations. Few differences were observed by country: respondents from the US were much more likely to say that SSMs were too hard to get, and Canadians were less likely to say that SSMs were too expensive.

Access to stop-smoking medications

The majority of NRT users obtained their last NRT over-the-counter/off-the-shelf, while a quarter had accessed it through prescription. Higher income respondents were more likely to have obtained NRT over-the-counter/off-the-shelf, and less likely to have obtained their last NRT by prescription. The same pattern was observed by education, although effects were not significant. This is consistent with recent research from the UK that found smokers of lower social grade were more likely to access prescription NRT (West, 2008). Higher income respondents may be able to afford to pay out-of-pocket for OTC NRT, while lower income respondents may be more reliant on obtaining NRT through prescription in order to access subsidization. However, an American study found that smokers with higher incomes (>$60 000) were more likely than low income smokers to use prescription rather than OTC medications (Shiffman et al., 2008a). This analysis included all pharmacological treatments (both NRT and prescription SSMs) though, so this result may have been at least partially due to increased use of prescription SSMs rather than accessing NRT by prescription more often; it may also be due in part to insurance subsidizing only SSMs accessed through prescription, and greater private insurance coverage among those with higher income.

Overall, half of respondents had paid full price for their last prescription stop-smoking medication, and about 70% had paid full price for their last NRT. The same patterns were observed for the two SES measures, although effects of income were stronger, as expected. A socioeconomic gradient was observed in the proportion of users who had paid full price for their last NRT, and a reverse gradient was observed for the proportion of respondents who got their last NRT for free. High education and high income respondents had almost double the odds of having paid full price for their last NRT compared to those with low education and income. In addition, high education respondents were half as likely and those with moderate and high incomes had only about a third the odds of having gotten their last NRT for free. Although not statistically significant (due to low numbers), those with moderate education and those with high income had substantially higher rates of paying full price for their last prescription SSM. These results are encouraging from the perspective of increasing access for lower SES respondents – although fewer used NRT, those that did were able to receive a discount or get it free more often.

Considerable variation was observed by country in both payment and sources of prescription SSMs and NRT, the most striking examples being Australia and the UK. Although both had high use of NRT, access to NRT was through different mechanisms. Nearly all Australians got their last NRT

over-the-counter/off-the shelf, compared to only a third of users in the UK. Instead, almost half of UK respondents got their last NRT by prescription, and 16% got it free from a doctor, the highest proportions of any country. Less than half of NRT users in the UK had paid full price for their last NRT, while nearly all Australians had.

Overall, Australians seem to be getting assistance from non-health professional sources more often, such as accessing NRT over-the-counter rather than by prescription (and paying full price for it) and using telephone helplines. Respondents in the UK, on the other hand, seem to be accessing subsidized services through health professionals: they were more likely to have received assistance from a health professional (if they had visited one) or used local services for cessation, and were much more likely to have gotten their NRT free or at a discount.

UK smokers were less likely to intend to quit or attempt to quit, but were more likely to be successful if they did make an attempt, compared to other countries. In addition, although UK respondents had the lowest rate of using any form of cessation assistance, their quit success was high. Collectively, these findings point to the utility and effectiveness of the UK's national cessation programs (NHS stop-smoking services). Research from the UK has found that those who used the services were three times as likely to quit smoking (West, 2008). In addition, although lower SES smokers were less likely to successfully quit (Ferguson et al., 2005), these services were used more often by disadvantaged smokers, leading to a net effect of greater cessation rates among lower SES smokers (Bauld et al., 2007; Chesterman et al., 2005).

Summary of cessation assistance

The use of some types of cessation assistance varied by SES: respondents with higher education were more likely to use any assistance, assistance from a health professional, and the internet, and respondents with higher income were more likely to use stop smoking medications (SSMs) and the internet. Cessation assistance also varied by country. Respondents in the UK were more likely to have used nicotine replacement therapy (NRT) or local services, but less likely to have used prescription SSMs or to have received assistance from a health professional overall (but more likely if they had visited one). Australians had the highest use of NRT and telephone helpline, but were less likely to have used local services or have received assistance from a health professional if they had visited one. Canadians and Americans were more likely to use the internet for cessation assistance.

Among users of SSMs, higher income respondents were more likely to have obtained NRT over the counter (OTC) rather than by prescription. An inverse relationship was found between SES and paying full price for NRT (with the reverse for getting NRT for free), indicating that subsidization of NRT is reaching those who need it more often. However, lower SES respondents perceived greater barriers to use of SSMs, including access, cost, and knowledge of proper use. Countries also varied considerably in both payment and sources of prescription SSMs and NRT, notably that NRT users in Australia were more likely to access NRT OTC and pay for it themselves, while UK NRT users were more likely to get NRT by prescription or from a doctor, and to get it free or at a discount.

6.4 Strengths and limitations

Although this study has a number of strengths, including its large, representative samples of smokers from multiple countries and the ability to examine multiple outcomes and covariates over time, this analysis is subject to some general limitations which are common to survey research, such as attrition and potential biases in the sample, reliance on self-report, and the use of secondary data. Some of these issues may be of particular note given that the research focused on socioeconomic status.

Sample

The longitudinal nature of the survey presented some challenges with regards to obtaining complete data from respondents over the course of the study. In terms of sample retention, although attrition rates were comparable to other such surveys, a substantial number of respondents were still lost to follow-up, and this attrition was not completely at random. Respondents were more likely to be retained between waves if they had higher income, or moderate (between Waves1/2 and 2/3) or high (between Waves 3/4) education (Appendix D). Respondents who were younger, male, or had quit smoking for more than 6 months were more likely to be lost to follow up between waves (Appendix D); this means that the estimates for longer-term abstinence may be underestimates, although this is not likely given the higher than expected estimates obtained for this measure. The patterns of attrition observed in this study are similar to other studies using telephone surveys (Bull et al., 1988; Droomers et al., 2002; Psaty et al., 1994), so results should be comparable to other studies, if not completely representative of the whole population. Also, as a methodological strength in dealing with attrition, the use of generalised estimating equations modeling allowed the inclusion of more respondents in making appropriate comparisons, because subjects did not need to be present at all time points or for the full length of the study; this is of particular importance for socioeconomic

analyses, since attrition rates are traditionally higher among the groups of greatest interest (lower SES) (Bull et al., 1988; Psaty et al., 1994) leading to less data for low SES respondents available for analysis. Replenishment of the sample also replaced those lost to follow-up, allowing power and population representativeness to be maintained. However, the sample was replenished only with current smokers, so the number of quitters available made some analyses unreliable due to low numbers. Particularly for the analyses of cessation aid use (specific types of SSMs, access/payment analysis for prescription SSMs), some power issues emerged due to low sample size, and analyses by SES could not be completed for all measures.

Further complicating retention issues, the time between surveys was not exactly the same for all respondents or between all waves, due to survey implementation changes and the practical limitations of interview scheduling and progress. It is expected that this variation was approximately at random between respondents of all socio-demographic profiles, although French Canadian respondents were surveyed somewhat later than English Canadians in all waves. In addition, time between waves varied, ranging from a mean of 6.7 months between Waves 1 and 2 to 12.8 months between Waves 2 and 3 (Thompson et al., 2006). However, this was partially controlled for by including Wave as a covariate.

Measurement

This study included a range of outcomes, with a continuum of cessation-related measures from intending to quit smoking (at all, and in the next 6 months) to making a quit attempt to being abstinent for varying lengths of time (one, six and 12 months); reducing consumption to less than half was also included, as it has been viewed as a step on the way to quitting (Hughes & Carpenter, 2006). In addition, two SES measures (education and income) were tested concurrently, allowing estimation of the effects of each in the other's presence, and strengthening conclusions by including multiple aspects of SES. However, the variables available for analysis were limited to the data collected on the ITC surveys, and the particular questions asked, and the outcome measures used all have some limitations, which should be considered when interpreting the results.

Data are based on self-report, introducing the possibility of inaccurate reporting of smoking status (potentially under-reported due to social desirability) or other variables. However, previous research has indicated that self-report of smoking behaviour is generally accurate when compared to biochemical validation, particularly for observational studies (Patrick et al., 1994). For quit intentions, there is potential for social desirability to affect responses so that more respondents say

that they are intending to quit; however, the six-month intentions measure may reduce this limitation by getting at more serious intentions to quit, since it involves commitment to a time dimension. There may also be some inaccuracies and potential for bias to due to recall for measures such as quit attempts and use of cessation aids, since these survey items asked about events since the last survey/in the last year. Respondents may be more likely to recall more recent attempts or aid use, and may also have better recall for successful quit attempts. This could lead to an overestimation of the success of quit attempts among those who attempted, but is not a serious concern since cessation estimates are also reported for the full sample, and the success rate of quit attempts was not itself a central result as much as its relationship to SES measures. In addition, there was variability in the timing between survey waves (from 6 months to more than 12) which then varied the length of time available to have made an attempt and thus could have caused some of the differences observed between waves. Similarly, the timing between surveys may have affected the abstinence measures. Further, for the longer-term measures, the population that remained in the study long enough to be eligible to have quit for that length of time likely does not represent the full sample of smokers and may lead to selection bias.

The way that some questions were asked, or the way variables were defined in this analysis, could also impact the results. For quit attempts, the question wording ("Have you made any attempts to stop smoking since we last talked with you, that is since [last survey date]?") relies on each respondents' definition of a quit attempt since it does not specify a particular length of time off cigarettes in order to count as an attempt; this could be important given the greatest likelihood of relapse is shortly after quitting and through the first week (Hughes et al., 2004). Concerning reduction in cigarette consumption, the outcome used was the 50% of baseline consumption measure that has been tested in other studies for its association with reduced risk of harm and with cessation, but this cut-off is arbitrary and does not account for the varying baseline consumption levels of respondents. With regards to reasons for quitting, the "somewhat" and "very much" categories were collapsed; however, previous research has found importance of a reason (strength of agreement) to be associated with quitting success (Halpern & Warner, 1993), and the socioeconomic patterns revealed may have been different if a more nuanced measure had been used. Lastly, for the use of cessation assistance, all respondents and not just those who had attempted to quit were included, in an attempt to deal with the possibility of reports being affected by quit success, or the use of assistance before actual quit attempts; however, this may lead to over-estimates of use, since some of the aids may have been used for reasons other than quitting smoking. Use of some cessation aids was also measured by unaided

recall, which could lead to an underestimation of usage rates. However, there is no reason to believe that recall would vary across SES groups, so although estimates may be less exact for some variables, their relationships with SES would not be affected.

The socioeconomic status measures used in the analyses were education and income. These variables are not interchangeable as SES measures, as both are thought to measure unique aspects of socioeconomic status (Braveman et al., 2005; Liberatos et al., 1988). This idea is supported by the low correlation between the two: 0.22 in this study, compared to slightly higher correlations of between 0.33 and 0.50 found in other studies (Braveman et al., 2005; Laaksonen, Rahkonen, Karvonen, & Lahelma, 2005; Liberatos et al., 1988). Using two SES measures also lessens the impact of the limitations of each (Laaksonen et al., 2005). Education, while relatively stable in adulthood and reliable over time (Liberatos et al., 1988), may not be an ideal indicator of SES for younger people prior to completion of their schooling (Liberatos et al., 1988); however, only 12% of sample was under 25, so this is not likely to have impacted the findings. Similarly, although it generally provides a good estimate of immediate material conditions (Geyer & Peter, 2000), income is sensitive to changes in circumstances and also may not be an ideal indicator for older adults who may be retired (Liberatos et al., 1988); however, age was controlled for in the models. The income measure used has other limitations: the 4-category measure was not that precise, and did not take into account size of household or local cost of living (beyond using different cut-points for UK currency, and including marital status as a covariate). The sensitivity of income led to missing data for over 7% of respondents; the inclusion of 'not stated' income as a fourth group prevented loss of data for analysis, although it is difficult to make conclusions about socioeconomic status and the outcomes within this group. Similarly, education was categorised into three groups, which may obscure important educational patterns in smoking and cessation (Zhu, Giovino, Mowery, & Eriksen, 1996).

It may also have been advantageous to include some additional variables that were not available in all waves or were not consistently asked, such as changes to demographics, financial stress, and employment status. Changes to socioeconomic variables, if measured accurately, may provide insight into the impact of change to income and/or education on smoking and cessation, distinct from the actual income or education level. Financial stress is another measure that has shown a relationship with smoking and related constructs (Siahpush, Borland, & Yong, 2007; Siahpush, Yong, Borland, Reid, & Hammond, unpublished data) and may capture components of SES separate from those of income and education. In future work, the current analysis could be repeated with financial stress as

the SES predictor variable, in order to examine what socioeconomic patterns are observed when this measure is used, rather than (or in addition to) education and income. In addition, measures of occupational status and of accumulated wealth may have been useful in representing other important dimensions of socioeconomic status (Braveman et al., 2005; Geyer & Peter, 2000; Laaksonen et al., 2005). For example, a European analysis testing multiple SES measures together found that education, occupational class, accumulated wealth, and housing tenure all had independent effects on smoking status (although income did not) and different socioeconomic variables emerged as stronger predictors depending on the age group, gender, and geography of the population considered (Schaap et al., 2008), which points to the importance of the measure(s) used for SES analysis. Future studies may also consider sequential models with one SES indicator at a time as well as the combined effect of multiple measures, in order to quantify the relative effects of each (Laaksonen et al., 2005; Schaap et al., 2008).

The intention of this analysis was to examine whether there was an association of socio-demographic characteristics with cessation-related outcomes, not to build comprehensive predictive models for these outcomes. However, the inclusion of some psychosocial variables postulated to be related to SES and quitting outcomes may have provided additional insight into some of the mechanisms behind the relationships observed.

6.5 Implications

Tobacco use is the single largest behavioural contributor to overall socioeconomic disparities in health, making tobacco control a key strategy for reducing such disparities. This research contributes to a better understanding of the relationship between socioeconomic status and smoking/quitting, in four Western countries that include tobacco control leaders. An understanding of such relationships is foundational for future policies and interventions aimed at reducing tobacco use equitably across all SES groups.

Although the results show fairly modest differences by socioeconomic status, when applied to whole populations, these differences translate to substantial numbers of smokers. Given that current smoking rates are higher in lower socioeconomic groups, cessation rates among lower SES smokers would need to be not only equal, but greater than those seen in higher SES groups in order to decrease existing disparities. Socioeconomic disparities in tobacco use are not likely to be diminished if current trends continue.

Widely available cessation programs such as the stop smoking services in the UK appear to be effective at increasing the success of smokers who attempt to quit and at reaching low SES smokers. Such programs may be helpful in increasing cessation across all SES groups. However, motivation to quit and usage rates of cessation services will need to be increased in addition to the provision of such services for there to be a substantial population impact. Further, additional assistance targeted to low SES smokers may be necessary to increase cessation in these groups, and increasing motivation to quit among lower SES smokers is necessary if such additional assistance is to be effectively utilized.

Future work

Given the effect of socioeconomic variables on cessation-related measures, and the consistency of this relationship between countries and over time, the issue of socioeconomic disparities in smoking warrants continued attention. In particular, close attention should be given to the effects of specific policies on smoking, cessation and tobacco-related disparities.

Since the ITC policy evaluation project currently includes 12 additional countries where the same data is collected, this analysis could be replicated using data from other countries. This study could provide the basis for other similar analyses, which may explore whether the same patterns hold in less developed countries where the tobacco epidemic is at an earlier stage, and in countries with different tobacco control policy environments.

In addition, although this analysis focused only on cessation, there may also be important socioeconomic and country differences in smoking initiation. While increasing cessation would have a more immediate impact on reducing socioeconomic disparities in smoking, such disparities will also be impacted through decreasing smoking initiation among lower socioeconomic groups. Additional research into the impact of tobacco control policies and socioeconomic status on smoking initiation is also warranted.

This analysis also focused mainly on socio-demographic variables in order to identify the existence of disparities. However, the relationships of these variables to the outcomes may be complex, and act through specific (and potentially multiple) pathways to influence the outcomes. While beyond the scope of the current study, research is needed to understand and identify these pathways and other variables (psychosocial, environmental and otherwise) that may be related to both socio-demographics and the outcomes. Identification of these factors may provide insight into targets for intervention.

Further, research and subsequent interventions aimed at reducing smoking will be limited in their ability to do so unless they also alter the aspects of socioeconomic status that are related to smoking and cessation; underlying issues that lead to inequity will need to be addressed in order for tobacco-related health disparities to be eliminated. Tobacco control activities will be more likely to decrease inequalities in smoking and health when supported by public policies that reduce inequality, material deprivation, social exclusion, and other detrimental social conditions, and that promote the equitable distribution of resources, opportunities, support and security for citizens of all socioeconomic backgrounds.

Appendix A

List of Variables

Table A1: SURVEY VARIABLES

VarName	Description	Coding	Surveys	Source (item or varname)	Original Question
uniqid	Respondent ID	Numeric	Assigned, W1-W5	'uniqid'	N/A
country	Country	1 Canada (CA) 2 US 3 UK 4 Australia (AU)	Assigned, W1-W5	'country'	N/A
wave	Survey wave	1 Wave 1 2 Wave 2 3 Wave 3 4 Wave 4 5 Wave 5	Assigned, W1-W5	'wave'	N/A
cohort	Recruitment cohort	1 Wave 1 recruits 2 Wave 2 recruits 3 Wave 3 recruits 4 Wave 4 recruits 5 Wave 5 recruits	Assigned, W1-W5	'cohort'	N/A
smplwave	Number of waves in survey	1 1st wave 2 2nd wave 3 3rd wave 4 4th wave 5 5th wave	Assigned, W1-W5	Derived from 'wave' and 'cohort'	N/A
wtxcr1 wtxcm1 wtxcm1r	Cross-sectional weights	Numeric	Assigned, W1-W5	For R1: DE911v For M1: DE915v Rescaled M1: DE919v	N/A
weight	Cross-sectional weight at entry	Numeric	Assigned, W1-W5	DE919v, carried through to all subsequent waves	N/A
wtlm12 wtlm23 wtlm34 wtlm45	Longitudinal weights	Numeric	Assigned, W1-W5	M1-M2 : DE921v M2/P2-M3 : DE923v M3/P3-M4 : DE925v M4/P4-M5 : DE927v	N/A
wavelost	Wave lost to follow-up	2 Wave 2 3 Wave 3	Assigned, W1-W5	'lost'	N/A

		4 Wave 4 5 Wave 5			
firstwave	First wave in sample	0 Not first wave present 1 Frist wave present	Assigned, W1-W5	Derived from 'wave' and 'cohort'	N/A
lastwave	Last wave in sample	0 Not most recent wave present 1 Most recent wave present	Assigned, W1-W5	Derived from 'wave' and 'cohort'	N/A

Table A2: DEMOGRAPHICS

VarName	Description	Coding	Surveys	Source	Original Question
age	Age, continuous	Numeric, 18+	W1-W5	'age'	Calculated from "What year were you born?" and "What month were you born?"
agegrp	Age, categorical	1 18-24 2 25-39 3 40-54 4 55+	W1-W5	'agegrp'	Categorised based on "age"
sex	Sex	1 Female 2 Male	W1-W5	'sex'	Coded by interviewer
ethnicyn	Ethinicity (minority/not)	0 Not a minority [AU- English] 1 Minority [AU- Other language]	W1-W5	Recoded from 'ethnic'	Derived variable: "ethnic"=white/English ethnicity vs. all others. **Ask if country=CA.** *Read out response options. Select all that apply.* People in Canada come from many racial and cultural groups. I am going to read you a list. Are you . . . ? White? (DE511) Chinese? South Asian (for example, East Indian, Pakistani, Sri Lankan, etc.)? Black? Filipino? Latin American? Southeast Asian (for example, Cambodian, Indonesian, Laotian, Vietnamese, etc.)? Arab? West Asian (for example, Afghan, Iranian, etc.)? Japanese? Korean? Aboriginal (for example, North American Indian, Metis, or Inuit)?

					Other racial or cultural group? What other racial or cultural group? **Ask if country=US.** People in the United States come from many racial and cultural groups. I am going to read you a list. Are you . . ? White? Black or African-American? Hispanic or Latino? Asian or Pacific Islander? Native American Indian? Another group? (Specify) What other racial or cultural group? **Ask if country=CA or US:** Ethnic group: non-response code (CA & US) 7 NA 8 Refused 9 DK **Ask if country=UK. (DE611)** Which of the following best describes your ethnic or racial background? 1 White 2 Asian, Asian British 3 Black, black British 4 Chinese 5 Mixed 6 Other What other racial or cultural group? **Ask if DE611=1-5.** Would that be . . .? 01 British 02 Other white (specify) 03 Indian 04 Pakistani 05 Bangladeshi 06 Other Asian (specify) 07 Caribbean 08 African 09 Other African (specify) 10 Chinese 11 White & black Caribbean

					12 White & black African 13 White and Asian 14 Other mixed ethnicity (specify) 15 Other ethnic group (specify) What other specific racial group? (UK) **Ask if country=AU.** Do you speak a language other than English in the home? **If yes:** What language is that? 1 English only 2 Italian 3 Greek 4 Cantonese 5 Mandarin 6 Arabic 7 Vietnamese 8 Other
educate	Education level, 3 categories	1 low – secondary or less 2 moderate – college/some uni 3 high – university degree or more	W1-W5	Derived from 'educna/uk/au': 1 = 1,2 2 = 3,4 3 = 5,6 . = 8,9	Derived from DE311wx/y/z
educna	Education level – North America	1 Grade school/ some high school 2 Completed high school 3 Technical/ trade school or community college 4 Some university, no degree 5 Completed university degree 6 Post-graduate degree	W1, W3-5; Wave 2 values imputed from W1	DE311wx	"What is the highest level of formal education that you have completed?" **Ask if country=CA / US:** 1 Grade school/ some high school 2 Completed high school 3 Technical/ trade school or community college 4 Some university, no degree 5 Completed university degree 6 Post-graduate degree 7 NA 8 Refused 9 Don't know
educuk	Education level – United Kingdom	1 Primary or secondary school/vocational level 1 & 2/ trade apprenticeship 2 Sec school advanced/vocational level 3 3 Further education/ training	W1, W3-5; Wave 2 values imputed from W1	DE311y	**Ask if country=UK:** 1 Primary or secondary school/vocational level 1 & 2/ trade apprenticeship 2 Sec school advanced/vocational level 3 3 Further education/ training college below degree level

		college below degree level 4 Some university 5 Completed university degree 6 Post-graduate degree			4 Some university 5 Completed university degree 6 Post-graduate degree 7 NA 8 Refused
educau	Education level – Australia	1 Primary school or some high school 2 Completed high school 3 Technical or Tafe 4 Some university 5 Completed university degree 6 Post-graduate degree	W1, W3-5; Wave 2 values imputed from W1	DE311z	**Ask if country=AU:** 1 Primary school or some high school 2 Completed high school 3 Technical or Tafe 4 Some university 5 Completed university degree 6 Post-graduate degree 7 NA 8 Refused 9 Don't know
inc	Income level, 3 (4) categories	1 Low - Under $30K/£15K 2 Moderate - $30-60K/£15-30K 3 High - Over $60K/£30K 4 Not stated		Derived from 'incna/uk/au': 1 = 1,2 (na/uk/au) 2 = 3,4 (na/au); 3 (uk) 3 = 5-8 (na/au); 4-8 (uk) 4 = 88,99	Derived from DE211wx/y/z
incna	Income – North america	1 Under $10,000 2 $10,000-29,999 3 $30,000-44,999 4 $45,000-59,999 5 $60,000-74,999 6 $75,000-99,999 7 $100,000-149,999 8 $150,000 and over	W1, W3-5; Wave 2 values imputed from W1	DE211wx	"Which of the following categories best describes your ANNUAL household income, that is the total income before taxes, or gross income, of all persons in your household combined, for one year?" **Ask if country=CA / US / AU:** 1 Under $10,000 2 $10,000-29,999 3 $30,000-44,999 4 $45,000-59,999 5 $60,000-74,999 6 $75,000-99,999 7 $100,000-149,999 8 $150,000 and over 77 NA 88 Refused 99 Don't Know
incuk	Income – United Kingdom	01 Under £6,500 02 £6,500-15,000	W1, W3-5; Wave 2	DE211y	**Ask if country=UK:** 01 Under £6,500

		03 £15,001-30,000 04 £30,001-40,000 05 £40,001-50,000 06 £50,001-65,000 07 £65, 001-95,000 08 £95,001 and over	values imputed from W1		02 £6,500-15,000 03 £15,001-30,000 04 £30,001-40,000 05 £40,001-50,000 06 £50,001-65,000 07 £65, 001-95,000 08 £95,001 and over 77 NA 88 Refused 99 Don't Know
incau	Income - Australia	1 Under $10,000 2 $10,000-29,999 3 $30,000-44,999 4 $45,000-59,999 5 $60,000-74,999 6 $75,000-99,999 7 $100,000-149,999 8 $150,000 and over	W1, W3-5; Wave 2 values imputed from W1	DE211z	**Ask if country=AU:** 1 Under $10,000 2 $10,000-29,999 3 $30,000-44,999 4 $45,000-59,999 5 $60,000-74,999 6 $75,000-99,999 7 $100,000-149,999 8 $150,000 and over 77 NA 88 Refused 99 Don't Know
SES	SES composite measure	1 Low 2 Moderate 3 High	W1-W5	Derived from 'inc' and 'educate': 1 = inc 1 and educate 1 3 = inc (2,3) and educate (2,3) 2 = all other combos . if inc or educate = .	Derived from income ('inc') and education ('educate') according to coding from Hyland et al.
hardship	Financial hardship	0 No 1 Yes	Only in W4 & W5, *NA if smpl-wave=1	Recoded from DE220; missing dropped	"In the last month, because of a shortage of money, were you unable to pay any important bills on time, such as electricity, telephone or rent bills?" 1 Yes 2 No 7 NA 8 Refused 9 Don't know
marital	Marital status	"Are you married, separated,	W1-W5	DE111	"Are you married, separated, divorced, widowed,

		divorced, widowed, living common-law, or single?" 1 Married 2 Separated 3 Divorced 4 Widowed 5 Common Law [Australia: Defacto] 6 Single			living common-law, or single?" 1 Married 2 Separated 3 Divorced 4 Widowed 5 Common Law [Australia: Defacto] 6 Single 7 NA 8 Refused 9 Don't know
maritcat	Marital status - categories	1 Married/Common-law 2 Divorced/separated/widowed 3 Single	W1-W5	Grouped from 'marital' 1 = in (1,5) 2 = in (2,3,4) 3 = 6 . = 7,8,9	Derived from 'marital'
demochng	Changes to demographics	0 No (no changes) 1 Yes (changes)	W3-W5, NA if smpl-wave=1	Recoded from DE121	In the last 2 years – that is, since [24M anchor: month, year] -- have there been any major changes to your income, education level, marital status, or the number of children living in the home? 1 Yes 2 No 7 NA 8 Refused 9 Don't know
incchng	Changes to income	0 No (no change) 1 Yes (change)	W3-W5, NA if smpl-wave=1	Recoded from DE123: 1= 1 0= 2,7,8,9	Would that be changes to income, education level, marital status, or number of children living in the home? Your household income? 1 Mentioned 2 Not mentioned 7 NA 8 Refused 9 Don't know
educchng	Changes to education	0 No (no change) 1 Yes (change)	W3-W5, NA if smpl-wave=1	Recoded from DE125: 1= 1 0= 2,7,8,9	Your education level? 1 Mentioned 2 Not mentioned 7 NA 8 Refused 9 Don't know

Table A3: SMOKING AND CESSATION BEHAVIOUR

VarName	Description	Coding	Surveys	Source	Original Question
status	Current smoking status	1 Daily smoker 2 Weekly smoker 3 Monthly smoker 4 Quit in the last month 5 Quit 1-6 mo. ago 6 Quit > 6 mo. ago	W1-W5	'status' (FR309v): smoking status in current wave	Derived variable 'status' (FR309v): If FR301=1 then FR309v = LSD smoking status. Otherwise: 01 – Daily smoker (if QA711 OR FR306 OR FR307=1). 02 – Weekly smoker (if QA711 OR FR306 OR FR307=2). 03 – Monthly (if QA711 OR FR306=3-4 OR FR307=3). If QA701=2 OR QA706=1 OR QA711=4 OR FR306=5: 04 – Quit in the last month (if QA442v<=30). 05 – Quit 1-6 months ago (if QA442v>30 and<=180). 06 – Quit more than 6 months ago (if QA442v>180). **FR301:** **Ask if LSD smoking status=1-3 AND (QA331=2-9 OR (QA331=1 AND QA336=1)).** The last time we spoke to you in [LSD], you said that you smoked [smoking status at LSD]. Do you still smoke [LSD status]? 1 Yes 2 No 7 NA 8 Refused 9 Don't know **QA711:** **Ask if QA706=2.** How often have you allowed yourself a cigarette? Would it be . . . 1 Daily 2 Less than daily, but at least once a week 3 Less than weekly, but at least once a

					month 4 Less than monthly 7 NA 8 Refused 9 Don't know **FR306:** **Ask if LSD smoking status=1-3 AND (QA331=2 OR (QA331=1 AND QA336=1)) AND FR301 NE 1.** **Smoking status at [LSD]=1:** Are you now smoking at least once a week, or are you smoking less than once a week but at least once a month? **Smoking status at [LSD]=2:** Are you now smoking daily, or are you smoking less than once a week but at least once a month? **Smoking status at [LSD]=3:** Are you now smoking daily, or are you smoking less than daily but at least once a week? 1 Daily 2 Weekly 3 Monthly 4 Less than monthly and self-described as smoker 5 Less than monthly and self-described as quitter 7 NA 8 Refused 9 Don't know **FR307:** **Ask if QA337=1.** Do you currently smoke daily, weekly, or monthly? 1 Daily smoker 2 Weekly smoker 3 Monthly smoker 7 NA 8 Refused 9 Don't know

					QA701: **Ask if QA336 <> 1 AND QA337 <> 1.** **QA442v<=30 days:** Have you had any cigarettes, even a puff, since you quit smoking? **QA442v>30 days:** Have you had any cigarettes, even a puff, in the last month? 1 Yes 2 No 7 NA 8 Refused 9 Don't know **QA706:** **Ask if QA701=1.** Was this a slip-up or are you still allowing yourself the occasional cigarette? 1 Slip up 2 Allowing an occasional cigarette 7 NA 8 Refused 9 Don't know **QA442v:** (Derived variable: Number of days since start of most recent quit attempt.)
pstatus	Smoking status at last wave	1 Daily smoker 2 Weekly smoker 3 Monthly smoker 4 Quit in the last month 5 Quit 1-6 mo. ago 6 Quit > 6 mo. ago	W2-W5, NA if smplwave=1	Created with 'status' (FR309v) in previous wave and lag function in SAS	'status'
cpdcon	Cigarettes per day, continuous	Numeric	W1-W5	Renamed from FR245v	Derived variable: cigarettes per day (continuous) number

					"On average, how many cigarettes do you smoke each [day/week/month], including both [factory-made/ packet] and roll-your-own cigarettes?"
cpd_na	Cigarettes per day, continuous, NAs recoded to 0	Numeric	W1-W5	Same as cpdcon, but NAs recoded to 0 if smoking status in (4,5,6)	'cpd'
cpdcat	Cigarettes per day, categories	0 1-10 cigarettes 1 11-20 cigarettes 2 21-30 cigarettes 3 More than 31 cigarettes	W1-W5	Renamed from FR250v	Derived variable: cigarettes per day (categories), calculated from FR245v [FR211, FR216, FR221, FR226, FR231, FR236, FR306, FR307 all captured in FR250v] 0 1-10 cigarettes 1 11-20 cigarettes 2 21-30 cigarettes 3 More than 31 cigarettes 7 NA 8 Refused 9 Don't know
diffcpd_last	Change in consumption since last wave	Numeric	W2-W5, NA if smplwave=1	Derived from continuous cpd measure, by subtracting last wave value for cpd from current cpd, NA given value of 0	'cpd'
cpdf50last	50% decrease since last wave	0 Not 1 Decreased by >=50% since last wave	W2-W5, NA if smplwave=1	Derived from cpd_last and current cpd_na	'cpd'
diffcpd_entr	Change in consumption since wave of entry	Numeric	W2-W5, NA if smplwave=1	Derived from continuous cpd measure, by subtracting wave of entry value for cpd from current cpd, NA given value of 0	'cpd'
cpdf50entr	50% decrease since entry	0 Not 1 Decreased by >=50% since entry	W2-W5, NA if smplwave=1	Derived from cpd_first and current cpd_na	'cpd'
ttfcon	Time to first cigarette, continuous	Numeric	W1-W5	Renamed from SB012v	Derived variable -- composite: total min to first cig, continuous W1: based on SB011a & SB011b. W2: based on SB021a, SB021b, SB026a, SB026b (incl. non-daily). "[On days that you smoke], how soon after

					waking do you usually have your first smoke?"
ttfcat	Time to first cigarette, categories	0 More than 60 min 1 31-60 min 2 6 to 30 min 3 Less than 5 min	W1-W5	Renamed from SB013v	Derived variable -- composite: total min to first cig, category 0 More than 60 min 1 31-60 min 2 6 to 30 min 3 Less than 5 min 7 NA 8 Refused 9 Don't know
hsi	Heaviness of smoking index	Numeric, 0-6	W1-W5	HSI	Derived from SB012v and SB013v: sum of score for SB012v (0 for 0-10 cpd, 1 for 11-20 cpd, 2 if 21-30 cpd, 3 for >30 cod) and score for SB013v (0-3)
phsi	HSI at previous wave	Numeric, 0-6	W2-W5, . if smplwave=1	HSI at previous wave, . if smplwave=1	'hsi'
ehsi	HSI at entry	Numeric, 0-6	W1-W5	HSI at entry wave	'hsi'
hsi_na	HSI with quitters recoded	Numeric, 0-6	W1-W5	HSI, quitters=0	'hsi'
phsi_na	HSI with quitters recoded, at previous wave	Numeric, 0-6	W2-W5, . if smplwave=1	HSI at previous wave, quitters=0	'hsi'
quitplan	Plan to quit smoking	1 Within the next month 2 Within the next 6 months 3 Beyond 6 months 4 Not planning to quit	W1-W5, 'status' 1-3 only	Recoded from BQ141: . = 7,8,9	**Ask if smoking status=1-3.** *Read out response options.* "Are you planning to quit smoking . . ." 1 Within the next month 2 Within the next 6 mos. 3 Sometime in the future, beyond 6 mos. 4 Or are you not planning to quit? 7 NA 8 Refused 9 Don't know
intent	Intentions, dichotomous	0 No intentions to quit 1 Any intentions	W1-W5, 'status' 1-3 only	Derived from BQ141: 1 = 1, 2, 3 2 = 4	BQ141
pintent	Intentions at previous wave	0 No intentions to quit 1 Any intentions	W2-W5, . if smplwave=1	'intent' at previous wave	BQ141

eintent	Intentions at entry	0 No intentions to quit 1 Any intentions	W1-W5	'intent' at wave of entry	BQ141
intent6	Intentions, within 6 months	0 Not intending to quit within 6 mos. 1 Intend to quit within 6 mos.	W1-W5, 'status' 1-3 only	Derived from BQ 141: 0 = 3,4 1 = 1,2	BQ141
qaever	Ever tried to quit	0 No 1 Yes	W1-W5	Composite of QA101 and QA331 for subsequent waves	QA101: "Have you ever tried to quit smoking?" 1 – Yes 2 – No
qalsd	Made quit attempt since LSD	0 No 1 Yes	W2-W5, NA if smplwave=1	Recoded from QA331	**QA331:** **Ask if LSD smoking status=1-3.** "Have you made any attempts to stop smoking since we last talked with you, that is since [LSD]?" 1 Yes 2 No 7 NA 8 Refused 9 Don't know
qarecr	Ever tried to quit, at recruitment	0 No 1 Yes	Wave of recruitment only	Recoded from QA101	QA101
qaentr	Tried to quit since study entry	0 No 1 Yes	Calculated for W2-W5, NA if smplwave=1	Derived from QA101 and QA331: 1=Yes on either	QA101 and QA331
quit1m	Quit for at least 1 month at time of survey	0 No 1 Yes (quit)	NA if smplwave=1	Derived from 'status': 0 1-4 1 5, 6	'status'
quit6m	Quit for at least 6 months at time of survey	0 No 1 Yes (quit)	NA if smplwave=1	Derived from 'status': 0 1-5 1 6	'status'
quit12m	Quit for at least 12 months at time of survey	0 No 1 Yes (quit)	W3-W5, NA if smplwave = (1,2)	Derived from 'pstatus' and QA341/QA337	**QA341** (Not asked in Wave 1): **Ask if QA337=2.** "So you have been quit the entire time since [Quit Date] -- is that correct?" 1 Yes 2 No 7 NA

					8 Refused 9 Don't know **QA337** (Not asked in Wave 1 or 2): **Ask if LSD smoking status=4-6.** "The last time we spoke to you in [LSD], you were not smoking. Are you back smoking or are you still stopped?" 1 Back smoking 2 Still stopped 7 NA 8 Refused 9 Don't know

Table A4: CESSATION – WAVE 5 ONLY

VarName	Description	Coding	Source	Original Question
REASONS FOR THINKING ABOUT QUITTING				
Reasons for thinking about quitting		0 Not at all 1 Somewhat/ Very much	Derived for each reason (BQ201-229): 0= 1 1= 2, 3	BQ210-229 **Smoking status=1-3 & BQ141=4:** "Even though you mentioned that you are not currently planning to quit, in the past 6 months, have each of the following things led you to think about quitting? -- not at all, somewhat, or very much?" **Smoking status=1-3 & BQ141 NE 4:** "In the past 6 months, have each of the following things led you to think about quitting? -- not at all, somewhat, or very much?" **Smoking status=4-5:** "To what extent, if at all, were each of the following things reasons for your quit attempt? -- not at all, somewhat, or very much?" **Smoking status=6:** "To what extent, if at all, have each of the following things helped you to stay quit -- not at all, somewhat, or very much?" 1 Not at all 2 Somewhat 3 Very much 7 NA 8 Refused 9 Don't know
REAS201	Concern for your personal health		BQ201	

REAS203	Concern about the effect of your cigarette smoke on non-smokers?		BQ203	
REAS207	That society disapproves of smoking?		BQ207	
REAS209	The price of cigarettes?		BQ209	
REAS211	Smoking restrictions at work?		BQ211	
REAS213	Smoking restrictions in public places like [restaurants or bars/ cafes or pubs]?		BQ213	
REAS217	Advice from a doctor, dentist, or other health professional to quit		BQ217	
REAS221	Free, or lower cost, stop-smoking medication		BQ221	
REAS223	Availability of telephone helpline/ quitline/ information line		BQ223	
REAS225	Advertisements or information about the health risks of smoking		BQ225	
REAS227	Warning labels on cigarette packages		BQ227	
REAS229	Setting an example for children		BQ229	
HP801	visited doctor since LSD		Recoded from CH801	**Ask all.** "Since [LSD], have you visited a doctor or other health professional?" 1 Yes 2 No 7 NA 8 Refused 9 Don't know
HP811	received advice from doctor to quit, overall		Recoded from CH811v	Derived Variable: received advice from doctor to quit, overall (incl those who did not visit the doctor) **CH811** **Ask if smoking status=1-3 and CH801=1.** "During ANY visit to the doctor or other health professional, since [LSD], did you receive…

				Advice to quit smoking?" 1 Yes 2 No 7 NA 8 Refused 9 Don't know
HP813	referral from doctor to quit, overall		Recoded from CH813v	Derived Variable: referral from doctor to help stay quit, overall (incl those who did not visit the doctor) **CH813** **Ask if smoking status=1-3 and CH801=1.** "During ANY visit to the doctor or other health professional, since [LSD], did you receive… Additional help or a referral to another service to help you quit?" 1 Yes 2 No 7 NA 8 Refused 9 Don't know
HP815	quitting Rx from doctor, overall		Recoded from CH815v	Derived Variable: quitting RX from doctor, overall (incl those who did not visit the doctor) **CH815** **Ask if smoking status=1-3 and CH801=1.** "During ANY visit to the doctor or other health professional, since [LSD], did you receive…A prescription for stop-smoking medication?" 1 Yes 2 No 7 NA 8 Refused 9 Don't know
HP817	quitting pamphlet from doctor, overall		Recoded from CH817v	Derived Variable: pamphlet on quitting, from doctor, overall (incl those who did not visit the doctor) **CH817** "During ANY visit to the doctor or other health professional, since [LSD], did you receive…Pamphlets or brochures on how to quit?" 1 Yes 2 No 7 NA 8 Refused 9 Don't know
HP821	support for having quit, overall		Recoded from CH821v	Derived Variable: received support from doctor for having quit, overall (incl those who did not visit the doctor)

				CH821 **Ask if smoking status=4-6 and CH801=1.** "During ANY visit to the doctor or other health professional, since [LSD], did you receive…Encouragement or support for quitting smoking?" 1 Yes 2 No 7 NA 8 Refused 9 Don't know
HP823	referral to help stay quit, overall		CH823v	Derived Variable: referral from doctor to help stay quit, overall (incl those who did not visit the doctor) **CH823:** **Ask if smoking status=4-6 and CH801=1.** "During ANY visit to the doctor or other health professional, since [LSD], did you receive…Additional help or a referral to another service to help you stay quit?" 1 Yes 2 No 7 NA 8 Refused 9 Don't know
HP825	Rx from doctor (for quitters), overall		CH825v	Derived Variable: quitting RX from doctor, overall (incl those who did not visit the doctor) **CH825**: **Ask if smoking status=4-6 and CH801=1.** "During ANY visit to the doctor or other health professional, since [LSD], did you receive…A prescription for stop-smoking medication?" 1 Yes 2 No 7 NA 8 Refused 9 Don't know
HP827	pamphlet on staying quit, overall		CH827v	Derived Variable: pamphlet on staying quit, from doctor, overall (incl those who did not visit the doctor) **CH827:** "During ANY visit to the doctor or other health professional, since [LSD], did you receive…Pamphlets or brochures on how to quit?" 1 Yes 2 No 7 NA 8 Refused

				9 Don't know
HPANY	Used any assistance from a doctor or health professional	0 None 1 Any	Derived from CH811v, CH813v, CH815v, CH817v, CH821v, CH823v, CH825v, CH827v: yes to any (1), none (0)	Derived from CH811v, CH813v, CH815v, CH817v, CH821v, CH823v, CH825v, CH827v:
CA861	Used assistance: Quitline	0 No 1 Yes	Recoded from CH861: 0 = 2 1 = 1 . = 7,8,9	**Ask all.** "Since [LSD], have you received advice or information about quitting smoking from… Telephone or quit line services?" 1 Yes 2 No 7 NA 8 Refused 9 Don't know
CA865	Used assistance: Internet	0 No 1 Yes	Recoded from CH865	**Ask all.** "…The Internet."
CA869	Used assistance: Local services	0 No 1 Yes	Recoded from CH869	**Ask all.** "…Local stop-smoking services (such as clinics or specialists)?"
ssmuse	in 12M/ since LSD, used any quitting meds	0 No 1 Yes	Derived from SM111: 0 = 2,3,4 1= 1 . = 7,8,9	"Since [LSD], have you used any stop-smoking medications, such as nicotine replacement therapies like nicotine gum or the patch, or other medications that require a prescription, such as Zyban?" 1 Yes 2 No 3 Can't remember 4 Never heard of stop-smoking medications 7 NA 8 Refused 9 Don't know
ssmquit	SSM used for purpose of quitting	0 No 1 Yes	Recoded from SM161	**Ask if SM111=1.** *Read out reasons. Select all that apply.* "Which of the following were reasons you used [products mentioned]? To stop smoking completely." 1 Yes 2 No 7 NA 8 Refused 9 Don't know
ssmoth	in 12M/ since LSD, used other SSMs	0 No 1 Yes	Recoded from SM120	**Ask if SM111=1.** "Since [LSD], have you used any OTHER stop-smoking medications TO QUIT?"

				1 Yes 2 No 7 NA 8 Refused 9 Don't know
NRT121	Nic gum	0 No 1 Yes	Recoded from SM121	**<u>Use of other SSMs – in last year:</u>** **Ask if SM120=1.** **Response options should not include products mentioned in SM201-SM250.** *Do not read out products, unless necessary. Select ALL that apply.* "Since [LSD], which other medications did you use?" 1 Mentioned 2 Not mentioned 7 NA 8 Refused 9 Don't know NRT: nicotine gum
NRT122	Nic patch	0 No 1 Yes	Recoded from SM122	NRT: Nicotine patch
NRT123	Nic lozenge	0 No 1 Yes	Recoded from SM123	NRT: Nicotine lozenges.
NRT124	Nic tablet	0 No 1 Yes	Recoded from SM124	Nicotine (sub-lingual) tablets.
NRT125	Nic inhaler	0 No 1 Yes	Recoded from SM125	NRT: Nicotine inhaler.
NRT126	Nic nasal spray	0 No 1 Yes	Recoded from SM126	NRT: Nicotine nasal spray.
NRT127	Nic water	0 No 1 Yes	Recoded from SM127	NRT: Nicotine water.
NRT130	Other NRT	0 No 1 Yes	Recoded from SM130	NRT: Other nicotine replacement product (specify).
SSM131	Zyban/ buproprion/ Wellbutrin	0 No 1 Yes	Recoded from SM131	Prescription: Zyban (or Bupropion, or Wellbutrin).
SSM132	Chantix/ Varenicline	0 No 1 Yes	Recoded from SM132	Prescription: Champix (UK)/ Chantix (US)/ Varenicline
SSM133	Accomplia/ Rimonabant	0 No 1 Yes	Recoded from SM133	Prescription: Accomplia (or Rimonabant).
SSM134	Nortriptyline	0 No	Recoded from SM134	Nortriptyline.

		1 Yes		
SSM135	other Rx med	0 No 1 Yes	Recoded from SM135	Other prescription medication (specify)
SSM140	other SSM (gen)	0 No 1 Yes	Recoded from SM140	Other: Unknown or generic medicine; specify
NRT201	used gum for last QA	0 No 1 Yes	Recoded from SM201	**<u>Use of SSMs - most recent attempt:</u>** **Ask if SM111=1 and SM161=1:** *Do not read out products, unless necessary. Select all that apply.* "The last time you used medications TO QUIT SMOKING, which product or combination of products did you use? This includes both NRTs and prescription medications." 1 Mentioned 2 Not mentioned 7 NA 8 Refused 9 Don't know NRT: nicotine gum
NRT202	used patch for last QA	0 No 1 Yes	Recoded from SM202	NRT: Nicotine patch
NRT203	used lozenges for last QA	0 No 1 Yes	Recoded from SM203	NRT: Nicotine lozenges.
NRT204	used tablets for last QA	0 No 1 Yes	Recoded from SM204	Nicotine (sub-lingual) tablets.
NRT205	used inhaler for last QA	0 No 1 Yes	Recoded from SM205	NRT: Nicotine inhaler.
NRT206	used nasal spray for last QA	0 No 1 Yes	Recoded from SM206	NRT: Nicotine nasal spray.
NRT207	used nicotine water for last QA	0 No 1 Yes	Recoded from SM207	NRT: Nicotine water.
NRT210	used other NRT for last QA	0 No 1 Yes	Recoded from SM210	NRT: Other nicotine replacement product (specify).
SSM211	used Zyban/ Bupropion/ Wellb for last QA	0 No 1 Yes	Recoded from SM211	Prescription: Zyban (or Bupropion, or Wellbutrin).
SSM212	used Chantix/ Varenicline for last QA	0 No 1 Yes	Recoded from SM212	Prescription: Champix (UK)/ Chantix (US)/ Varenicline
SSM213	used Accomplia for last QA	0 No 1 Yes	Recoded from SM213	Prescription: Accomplia (or Rimonabant).
SSM214	used Nortriptyline for last QA	0 No 1 Yes	Recoded from SM214	Nortriptyline.
SSM215	used other Rx med for	0 No	Recoded from SM215	Other prescription medication (specify)

	last QA	1 Yes		
SSM220	used other SSM (gen) for last QA	0 No 1 Yes	Recoded from SM220	Other: Unknown or generic medicine; specify
NRTLQA	Used any NRT on last quit attempt	0 No 1 Yes	Derived from SM201-210 (yes to any = 1)	
NRTLSD	Used any NRT in last 12m/ since LSD	0 No 1 Yes	Derived from SM121-130 (yes to any = 1)	
NRTANY	Any use of NRT	0 No 1 Yes	Derived from NRTLQA and NRTLSD (yes to any=1)	
SSMLQA	Used any Rx SSM on last quit attempt	0 No 1 Yes	Derived from SM211-220 (yes to any = 1)	
SSMLSD	Used any Rx SSM in last 12m/ since LSD	0 No 1 Yes	Derived from SM131-140 (yes to any = 1)	
SSMANY	Any use of Rx SSM	0 No 1 Yes	Derived from SSMLQA and SSMLSD (yes to any=1)	
SSM260	got last Rx SSM by prescription	0 No 1 Yes	Recoded from SM260	**Ask if any of SM211-SM220 / SM241-SM245 = 1.** *Read out list. Select all that apply.* "How did you get [referent prescription medication(s)]?" "By prescription." 1 Mentioned 2 Not mentioned 7 NA 8 Refused 9 Don't know
SSM261	got last Rx SSM over the counter	0 No 1 Yes	Recoded from SM261	"Over-the-counter / off the shelf."
SSM262	got last Rx SSM from a friend	0 No 1 Yes	Recoded from SM262	"From a friend."
SSM263	got last Rx SSM free from a doctor	0 No 1 Yes	Recoded from SM263	"Free, from a doctor."
SSM265	paid full price for last Rx SSM	0 No 1 Yes	Recoded from SM265	**Ask if SM260=1, SM261=1 or SM262=1:** *Read out list. Select all that apply.* "When you bought or got [referent prescription medication(s)], did you pay full price, get a discount, or did you get it free?" "Paid full price." 1 Mentioned 2 Not mentioned 7 NA

				8 Refused 9 Don't know
SSM266	got last Rx SSM at a discount	0 No 1 Yes	Recoded from SM266	"Got it at a discount."
SSM267	got last Rx SSM free	0 No 1 Yes	Recoded from SM267	"Got it free"
SSM310	got last NRT by prescription	0 No 1 Yes	Recoded from SM310	**Ask if SM161=1 AND any of SM201-SM210 / SM231-SM240 = 1.** *Read out list. Select all that apply.* "How did you get [referent NRT medication(s)]?" "By prescription." 1 Mentioned 2 Not mentioned 7 NA 8 Refused 9 Don't know
SSM311	got last NRT over the counter	0 No 1 Yes	Recoded from SM311	"Over-the-counter / off the shelf."
SSM312	got last NRT from a friend	0 No 1 Yes	Recoded from SM312	"From a friend."
SSM313	got last NRT free from a doctor	0 No 1 Yes	Recoded from SM313	"Free, from a doctor."
SSM315	paid full price for last NRT	0 No 1 Yes	Recoded from SM315	**Ask if SM161=1 and (SM310=1, SM311=1 or SM312=1):** *Read out list. Select all that apply.* "When you bought or got [referent NRT medication(s)], did you pay full price, get a discount, or did you get it free?" "Paid full price." 1 Yes 2 No 7 NA 8 Refused 9 Don't know
SSM316	got last NRT at a discount	0 No 1 Yes	Recoded from SM316	"Got it at a discount."
SSM317	got last NRT free	0 No 1 Yes	Recoded from SM317	"Got it free."
SSM363	meds too expensive	0 Neutral/Disagree 1 Agree/Strongly Agree	Recoded from SM363	**Ask if SM111 ne 4.** "Now I'm going to read out a list of statements about stop-smoking medications. In these statements we are referring to BOTH nicotine replacement medications and prescription medications. Please tell me if you strongly agree, agree, neither agree nor disagree, disagree, or

				strongly disagree with each of the following statements." "Stop-smoking medications are too expensive." 1 Strongly agree 2 Agree 3 Neither agree nor disagree 4 Disagree 5 Strongly disagree 7 NA 8 Refused 9 Don't know
SSM364	Don't know how to use meds	0 Neutral/Disagree 1 Agree/Strongly Agree	Recoded from SM364	"You don't know enough about how to use stop-smoking medications properly."
SSM365	meds too hard to get	0 Neutral/Disagree 1 Agree/Strongly Agree	Recoded from SM365	"Stop-smoking medications are too hard to get."

Note: Shaded variables were available only in the longitudinal dataset

Appendix B

Samples for Analyses

Table B1: Samples for Analyses

Models	Conditions	Total n	Exclusions
1A/B	status in (1,2,3)	n=35 525	3007 status in (4,5,6)
2A1	W≠1 and smplwave≠1 and pstatus in (1,2,3)	n=20 651	16 458 are W=1 (8167) and/or smplwave=1 (8291); 1423 pstatus in (4,5,6)
2A2	W≠1 and smplwave≠1 and pstatus in (1,2,3) and pintent=1	n=14 524	16 458 are W=1 (8167) and/or smplwave=1 (8291); 5860 pintent=0; 1690 missing pintent
3A/B1, 4A/B1	W≠1 and smplwave≠1	n=22 074	16 458 are W=1 (8167) and/or smplwave=1 (8291)
3A/B2	W≠1 and smplwave≠1 and qaentr=1	n=10 894	16 458 are W=1 (8167) and/or smplwave=1 (8291); 11 176 qaentr=0 4 missing
3C1	W≠1,2 and smplwave≠1,2	n=12 186	16 458 W=1 & smplwave=1; additional 6116 W=2; additional 3772 smplwave=2
3C2	W≠1,2 and smplwave≠1,2 and qaentr=1	n=7269	16 458 W=1 &/or smplwave=1; additional 6116 W=2; additional 3772 smplwave=2; 4913 qaentr=0 4 missing
4A/B2	W≠1 and smplwave≠1 and status in (1,2,3)	n=19 067	16 458 are W=1 (8167) and/or smplwave=1 (8291); 3007 status in (4,5,6)
5A-L	W=5	n=8243	Stratified by smoking status (1-3, 4-5, 6)
6A-G	W=5	n=8243	None
6H-J	W=5	n=8243	None
6K-Q	W=5 and used SSM (K) or NRT (L-Q)	K: n=269 L-N:n=1120 O-Q:n=1209	Did not use SSM/NRT

Abbreviations: 'W' = wave; 'smplwave' is the variable name for time in sample; 'qaentr' is the variable name for having attempted to quit since entry into the study; 'p' as a prefix denotes the value from the previous wave was used

Appendix C

Model Details

Table C1: Model Details

Model	Outcome	Eligible Sample	Covariates	Technique
1A	Any intention to quit ('intent')	estatus=1; status in (1,2,3) n=35 525	Core[a], HSI, country*wave, age*education, ethnicity*income	GEE (proc genmod)
1B	Intending to quit in next 6 months ('intent6')	estatus=1; status in (1,2,3) n=35 525	Core[a], HSI, country*wave, age*education, country*income, HSI*education	GEE (proc genmod)
2A1	Made quit attempt since last survey ('qalsd')	estatus=1; pstatus in (1,2,3); wave ≠1; smplwave ≠1 n=20 651	Core[a], pHSI, country*wave, country*income, wave*income, sex*income, age*income	GEE (proc genmod)
2A2	Made quit attempt since last survey ('qalsd')	estatus=1; pstatus in (1,2,3); pintent=1; wave ≠1; smplwave ≠1 n=14 524	Core[a], pHSI, country*wave, sex*income, age*income	GEE (proc genmod)
3A1	Abstinent for at least 1 month ('quit1m')	estatus=1; wave ≠1; smplwave ≠1 n=22 074	Core[a], eHSI, age*education	GEE (proc genmod)
3A2	Abstinent for at least 1 month ('quit1m')	estatus=1; qaentr=1; wave ≠1; smplwave ≠1 n=10 894	Core[a], eHSI, age*education	GEE (proc genmod)
3B1	Abstinent for at least 6 months ('quit6m')	estatus=1; wave ≠1; smplwave ≠1 n=22 074	Core[a], eHSI, age*education	GEE (proc genmod)
3B2	Abstinent for at least 6 months ('quit6m')	estatus=1; qaentr=1; wave ≠1; smplwave ≠1 n=10 894	Core[a], eHSI, age*education	GEE (proc genmod)
3C1	Abstinent for at least 12 months ('quit12m')	estatus=1; wave ≠1,2; smplwave ≠1,2 n=12 186	Core[a], eHSI, age*education	GEE (proc genmod)
3C2	Abstinent for at least 12 months ('quit12m')	estatus=1; qaentr=1; wave ≠1,2; smplwave ≠1,2	Core[a], eHSI, age*education	GEE (proc genmod)

		n=7269		
4A1	Reduced consumption by >=50% since entry into study ('cpdf50entr')	estatus=1; wave ≠1; smplwave ≠1 n=22 074	Core[a], eHSI, eintent, country*wave, age*education, age*income	GEE (proc genmod)
4A2	Reduced consumption by >=50% since entry into study ('cpdf50entr')	estatus=1; status in (1,2,3); wave ≠1; smplwave ≠1 n=19 067	Core[a], eHSI, eintent, age*income, marital status*education	GEE (proc genmod)
5A-L1	A: Concern for your personal health B: Concern about the effect of your cigarette smoke on non-smokers C: That society disapproves of smoking D: The price of cigarettes E: Smoking restrictions at work F: Smoking restrictions in public places like [restaurants or bars/ cafes or pubs] G: Advice from a doctor, dentist, or other health professional to quit H: Free, or lower cost, stop-smoking medication I: Availability of telephone helpline/ quitline/ information line J: Advertisements or information about the health risks of smoking K: Warning labels on cigarette packages L: Setting an example for children ('reas201'-'reas229')	Wave 5 smokers (status 1-3) (n=7038)	Core[a] (except wave), HSI	Logistic regression (proc surveylogistic)
5A-L2	'reas201'-'reas229'	Wave 5 recent quitters (status 4-5) (n=414)	Core[a] (except wave)	Logistic regression (proc surveylogistic)
5A-L3	'reas201'-'reas229'	Wave 5 long-term quitters (status 6) (n=791)	Core[a] (except wave)	Logistic regression (proc surveylogistic)
6A-G	A: Any cessation assistance ('ca_any') B: Any NRT ('nrt_any') C: Any medications ('ssm_any')	Wave 5, all (n=8243)	Core[a] (except wave), status	Logistic regression (proc surveylogistic)

	D: Health professional ('hp_any') E: Quitline ('ca861') F: Internet ('ca865') G: Local services ('ca869')			
6H-J	H: "Stop-smoking medications are too expensive." I: "You don't know enough about how to use stop-smoking medications properly." J: "Stop-smoking medications are too hard to get."	Wave 5, all (n=8243)	Core[a] (except wave)	Logistic regression (proc surveylogistic)
6K-Q	K: Paid full price for last Rx SSM L: Paid full price for last NRT M: Got last NRT for full price N: Got last NRT for free O: Got last NRT by prescription P: Got last NRT OTC Q: Got last NRT free from a doctor	K: SSM users (n=269) L-N: NRT users (n=1120) O-Q: NRT users (n=1209)	Core[a] (except wave)	Logistic regression (proc surveylogistic)

[a]Core covariates include: country, age, sex, ethnicity, marital status, wave, time in sample ('smplwave'), income, education

Abbreviations: smplwave = number of waves in sample; estatus = smoking status at entry; pstatus = smoking status at previous wave; qaentr = made a quit attempt since study entry; pintent = intended to quit at previous wave

Appendix D

Attrition Analyses

Table D1: Variables related to between-wave attrition

Variable	Wave 1/2	Wave 2/3	Wave 3/4
Country	Overall: p<.0001 US: p<0.0001 AU: p<0.0001	Overall: p<.0001 US: p<0.0001 UK: p=0.0136	Overall: n/a US: p<0.0001 AU: p<0.0001
Ethnic	ns	ns	Non-white/non-English: p=0.0086
Country* Ethnic	ns	ns	ns
Age	Overall: p<.0001 25-39 (vs. 18-24): p<0.0001 40-54: p<0.0001 55+: p<0.0001	Overall: p<.0001 25-39 (vs. 18-24): p<0.0001 40-54: p<0.0001 55+: p<0.0001	Overall: p<.0001 25-39 (vs. 18-24): p=0.0006 40-54: p<0.0001 55+: p<0.0001
Sex	Overall: p=0.0022 Male: p=0.0022	Overall: p<0.0001 Male: p<0.0001	Overall: p=0.0079 Male: p<0.0001
Income	Overall: p=0.0001 Moderate (vs. no answer): p=0.0020 High: p<0.0001	Overall: p=0.0018 Moderate (vs. no answer): p=0.0226 High: p=0.0243	Overall: p=0.0096
Education	Overall: p=0.0042 Moderate (vs. low): p=0.0010	Overall: p=0.0031 Moderate (vs. low): p=0.009	Overall: p=0.0266 High (vs. low): p=0.0120
Cohort	N/A	ns	Overall: p<.0001 W2 recruits (vs. 1): p=0.0032 W3 recruits (vs. 1): p<0.0001
Marital Status	Separated (vs. married): OR:1.47 (95CI:1.15 - 0.87) Commonlaw: OR: 1.24 (95CI: 1.03-1.51)	Separated (vs. married): OR:1.30 (95CI: 1.02-1.66) Commonlaw: OR: 1.31 (95CI: 1.09-1.59) Widowed: OR: 1.33 (95CI: 1.01-1.74) Single: OR: 1.30 (95CI: 1.12-1.52)	Separated (vs. married): OR:1.56 (95CI: 1.22-1.98) Single: OR: 1.32 (95CI: 1.12-1.55)
Intent to quit (BQ150v)	Intend to quit (vs. not): OR:0.87 (95CI: 0.76-0.99)	Quitter (vs. no intention): OR:1.25 (95CI: 1.00-1.55)	ns
HSI (FR260v)	5 (vs. 0): OR: 1.39 (95CI: 1.05-1.69)	Long time quitter (vs. 0): OR:1.37 (95CI: 1.06-1.77)	ns
Smoking status (FR309v)	ns	Quit > 6 mos. (vs. daily): OR:2.56 (95CI: 1.58-4.16)	Monthly (vs. daily): OR:1.92 (95CI: 1.15-3.21) Quit > 6 mos.: OR:1.34 (95CI: 1.04-1.73)

Abbreviations: ns = not significant; N/A = not applicable; n/a = not available
- probability modeled is "absent/excluded"
- ORs >1 (more likely to drop out) are underlined, ORs <1 (less likely to drop out) are highlighted
- for bolded variables, all other bolded socio-demographic variables are controlled in the model
- for non-bolded variables: demographics (country, age, ethnicity, sex) and cohort (where applicable) controlled

Appendix E

Model 2A1 Tables (by country)

Table E1: GEE Model[a] 2A1 with Interactions for Australia: Odds ratios for predictors of attempting to quit smoking since last survey date, full sample (n=5279, n clusters = 2506)

Variables	Odds Ratio	95% Confidence Interval	P value
Wave			0.4947
2	1.0		
3	0.9775	0.8083-1.1821	0.8147
4	0.8700	0.6973-1.0855	0.2174
5	0.8660	0.6833-1.0975	0.2339
Age (by education)			
For low education	1.0027	0.9950-1.0105	0.4930
For moderate education	0.9910	0.9822-0.9999	0.0481
For high education	0.9730	0.9584-0.9881	0.0005
Sex			
Male vs. female	1.0218	0.8795-1.1871	0.7783
Ethnicity			
Minority vs. minority	1.2596	0.9782-1.6220	0.0736
Marital status			0.1383
Married/common-law	1.0		
Separated/divorced/widowed	0.9739	0.8002-1.1853	0.7919
Single	0.8231	0.6786-0.9982	0.0479
Income			0.3292
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	1.1674	0.9674-1.4087	0.1064
High (over $60K/£30K)	1.0973	0.8883-1.3554	0.3891
Not stated	0.9529	0.6984-1.3001	0.7068
HSI (at previous wave)			0.0003
0	1.0		
1	1.1791	0.8916-1.5592	0.2480
2	0.8006	0.6247-1.0260	0.0789
3	0.7813	0.6109-0.9992	0.0492
4	0.7254	0.5574-0.9439	0.0169
5	0.6692	0.4969-0.9012	0.0082
6	0.5607	0.3671-0.8564	0.0074
Time in sample			0.5497
2 waves	1.0		
3 waves	1.0912	0.9227-1.2905	0.3078
4 waves	0.9942	0.7887-1.2534	0.9611
5 waves	0.9198	0.688401.2289	0.5718

[a]GEE model with binomial variation and logit link
Overall 1 df test for age: p=0.4930
Overall 2 df test for education: p=0.0012
2 df test for age x education interaction: p=0.0013

Table E2: GEE Model[a] 2A1 with Interactions for Canada: Odds ratios for predictors of attempting to quit smoking since last survey date, full sample (n=4395, n clusters = 2415)

Variables	Odds Ratio	95% Confidence Interval	P value
Wave			0.0145
2	1.0		
3	1.1057	0.9064-1.3488	0.3217
4	1.3745	1.1100-1.7020	0.0035
5	1.1311	0.8875-1.4415	0.3195
Age	0.9920	0.9859-0.9982	0.0118
Sex			
Male vs. female	0.8363	0.7090-0.9865	0.0339
Ethnicity			
Minority vs. not	1.2033	0.9542-1.5175	0.1178
Marital status			0.0062
Married/common-law	1.0		
Separated/divorced/widowed	1.2939	1.0563-1.5850	0.0128
Single	1.3531	1.0812-1.6933	0.0082
Education			0.8464
Low (high school or less)	1.0		
Moderate (college/some university)	0.9773	0.8180-1.1677	0.8005
High (university or higher)	1.0475	0.8159-1.3449	0.7156
Income			0.0950
Low (under $30K/£15K)	1.0		
Moderate ($30-60K/£15-30K)	0.9064	0.7476-1.0989	0.3172
High (over $60K/£30K)	0.8918	0.7091-1.1216	0.3277
Not stated	0.6592	0.4744-0.9161	0.0131
HSI (at previous wave)			<0.0001
0	1.0		
1	0.8614	0.6327-1.1729	0.3436
2	0.6624	0.4974-0.8823	0.0049
3	0.5743	0.4360-0.7566	<0.0001
4	0.5369	0.3988-0.7228	<0.0001
5	0.5334	0.3794-0.7499	0.0003
6	0.5386	0.3601-0.8055	0.0026
Time in sample			0.2425
2 waves	1.0		
3 waves	1.0991	0.9286-1.3010	0.2719
4 waves	0.9013	0.7154-1.1355	0.3779
5 waves	1.0991	0.7916-1.5261	0.5726

[a]GEE model with binomial variation and logit link

Table E3: GEE Model[a] 2A1 with Interactions for the UK: Odds ratios for predictors of attempting to quit smoking since last survey date, full sample (n=5342, n clusters = 2545)

Variables	Odds Ratio	95% Confidence Interval	P value
Wave			<0.0001
2	1.0		
3	1.1108	0.8661-1.4245	0.4078
4	1.7382	1.3908-2.1724	<0.0001
5	1.3408	1.0495-1.7130	0.0190
Age	0.9908	0.9845-0.9970	0.0039
Income (by sex and ethnicity)			
For females:			
Non-minority ethnicity:			
Moderate vs. low income	0.8620	0.6773-1.0972	0.2276
High vs. low income	0.9437	0.7107-1.2531	0.6886
Not stated vs. low income	1.1249	0.7867-1.6084	0.5189
Minority ethnicity:			
Moderate vs. low income	4.2271	1.6128-11.0792	0.0034
High vs. low income	3.9735	1.4978-10.5411	0.0056
Not stated vs. low income	3.8899	0.9090-16.6466	0.0671
For males:			
Non-minority ethnicity:			
Moderate vs. low income	0.9646	0.7194-1.2933	0.8094
High vs. low income	1.1670	0.8583-1.5867	0.3244
Not stated vs. low income	0.4927	0.2972-0.8166	0.0060
Minority ethnicity:			
Moderate vs. low income	4.7299	1.7588-12.7201	0.0021
High vs. low income	4.9140	1.8357-13.1541	0.0015
Not stated vs. low income	1.7038	0.4040-7.1850	0.4680
Marital status			0.7291
Married/common-law	1.0		
Separated/divorced/widowed	0.9283	0.7644-1.1274	0.4531
Single	1.0090	0.8193-1.2426	0.9330
Education			0.0257
Low (high school or less)	1.0		
Moderate (college/some university)	0.9886	0.8270-1.1817	0.8996
High (university or higher)	1.3882	1.0810-1.7826	0.0102
HSI (at previous wave)			<0.0001
0	1.0		
1	0.9000	0.6731-1.2034	0.4772
2	0.8556	0.6581-1.1124	0.2443
3	0.6566	0.5096-0.8462	0.0012
4	0.6321	0.4770-0.8377	0.0014
5	0.5640	0.3972-0.8006	0.0014
6	0.3993	0.2353-0.6778	0.0007
Time in sample			0.1785
2 waves	1.0		
3 waves	1.2324	0.9926-1.5302	0.0585
4 waves	1.0913	0.8632-1.3797	0.4653
5 waves	0.9619	0.7184-1.2880	0.7945

[a]GEE model with binomial variation and logit link

Overall 1 df test for sex: p=0.1526

Overall 3 df test for income: p=0.4544
3 df test for sex x income interaction: p=0.0078
Overall 1 df test for ethnicity: p=0.0011
3 df test for ethnicity x income interaction: p=0.0110

Table E4: GEE Model[a] 2A1 with Interactions for the US: Odds ratios for predictors of attempting to quit smoking since last survey date, full sample (n=5470, n clusters = 2423)

Variables	Odds Ratio	95% Confidence Interval	P value
Wave (by education)			
at Wave 2:			
Moderate vs. low education	0.9660	0.7233-1.2901	0.8147
High vs. low education	1.2136	0.8569-1.7186	0.2756
at Wave 3:			
Moderate vs. low education	1.1830	0.8779-1.5941	0.2694
High vs. low education	0.8714	0.6074-1.2500	0.4545
at Wave 4:			
Moderate vs. low education	1.4065	1.0523-1.8800	0.0212
High vs. low education	1.7403	1.2466-2.4295	0.0011
at Wave 5:			
Moderate vs. low education	1.3430	0.9853-1.8305	0.0620
High vs. low education	1.4318	0.9878-2.0752	0.0580
Age (by income)			
For low income	0.9967	0.9878-1.0056	0.4636
For moderate income	0.9794	0.9686-0.9903	0.0002
For high income	0.9740	0.9627-0.9855	<0.0001
For not stated income	0.9968	0.9780-1.0159	0.7378
Sex			
Male vs. female	0.9953	0.8548-1.1589	0.9517
Ethnicity			
Minority vs. not	0.7721	0.6044-0.9864	0.0385
Marital status			0.0645
Married/common-law	1.0		
Separated/divorced/widowed	1.1481	0.9436-1.3969	0.1676
Single	0.8644	0.7114-1.0503	0.1425
HSI (at previous wave)			<0.0001
0	1.0		
1	0.8485	0.6683-1.0773	0.1773
2	0.7029	0.5580-0.8854	0.0028
3	0.6311	0.5043-0.7896	<0.0001
4	0.5771	0.4542-0.7332	<0.0001
5	0.6148	0.4656-0.8118	0.0006
6	0.4797	0.3125-0.7362	0.0008
Time in sample			0.5194
2 waves	1.0		
3 waves	1.1217	0.9175-1.3713	0.2627
4 waves	0.9887	0.7861-1.2435	0.9226
5 wave	0.9431	0.7002-1.2703	0.6999

[a]GEE model with binomial variation and logit link
Overall 1 df test for age: p=0.4636
Overall 3 df test for income: p=0.0147
3 df test for age x income interaction: p=0.0033
Overall 3 df test for wave: p=0.0093
Overall 2 df test for education: p=0.4914
6 df test for wave x education interaction: p=0.0407

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