FINAL REPORT

The 2011 California Smokers Cohort Study

Contents

Executive Summary

Chapter 1 - Smoking Behaviors

- A Large majority of 83% of the respondents in the California Smokers Cohort (CSC) self-reported that they believed that they were addicted to cigarettes. In comparison to smokers who do not perceive themselves as addicted, the self-identified addicted smokers were twice more likely to make a quit attempt but not more likely to abstain for one month or more or reduce their cigarette consumption after one year.
- Those who smoked their first cigarette after 30 minutes of waking up were 1.65 more likely to make a quit attempt at follow up compared to those who were more addicted and smoked within 30 minutes of waking up. There was no difference between the two groups in abstaining for one month or more or reducing cigarette consumption.
- The odds of being in a period of prolonged abstinence at follow up were lower for respondents who were Daily smokers at baseline than for Non-Daily smokers at baseline (Odds of 0.23), while the odds of reducing cigarette consumption by 20% or more were much higher for daily smokers (2.69) compared to non-daily smokers.
- Among our participants, 72.5% believed tobacco was as addictive as other drugs like heroin or cocaine but this belief did not impact any quitting behavior.
- A small percentage of 6.6% of smokers identified themselves as non-smokers, but this was no related to any quitting behavior in this group.
- A fifth (20.2%) of respondents in the CSC reported smoking menthol cigarettes and 27.2% reported smoking low-tar cigarettes but these behaviors were not related to any quitting behavior.
- Almost all (91.4%) of respondents from the CSC have heard about electronic cigarettes and 65.8% have used or might use it, whereas 42.1% have heard of snus and 26.8% have or might use it.
- Those who indicated that they have used or might use electronic cigarettes in the future were less likely (Odds of 0.62) to reduce their cigarette consumption by 20% at follow up.

Chapter 2 - Quitting Behavior

- After one year of follow up, 59.4% of current smokers in the CSC didn't attempt to quit smoking during the 12 month follow up period.

- After one year of follow up, 66.4% of participants indicated they had not reduced their average monthly cigarette attempt by at least 20%.

- Only 9.4% of respondents in the CSC were quit for least one month at the end of one year of follow up.

- Among those who intended to quit at baseline, 59.3% attempted to quit and 14.2% reported prolonged abstinence at the follow up interview compared to 26.7% and 4.8%, respectively, among those who did not intend to quit. Those who had intention to quit at baseline were more than 3 times as likely to have a quit attempt or abstinence of one month or more at follow up after 12 months.

- Among CSC respondents who had attempted to quit at baseline, 65.2% also reported attempting to quit at follow up compared to only 23.7% attempting a quit attempt among smokers who did not have such a quit attempt at baseline. In the multivariate analyses there was a 4 fold more likelihood of making a quit attempt at follow up if smokers made a similar quit at baseline.

- Among those who tried to quit at baseline, 13.7% were able to abstain from smoking for at least 1 month at follow up compared to only 6.2% of those who did not have a quit attempt at baseline. There was a 1.76 times more likelihood to have a long abstinence at follow up if smokers made a quit attempt at baseline.

- Non-traditional method of cessation used at baseline such as switching to light cigarettes, smokeless tobacco, cold turkey, stopped hanging out with friends who smoke, exercised more, tried to quit with a friend, or called the telephone quitline were all predictive of a quit attempt at follow up.

- Only using cold turkey to quit for the last quit attempt when reported at follow up was significantly related with close to 7 times more likely to have a prolonged abstinence of one month or more at follow up. None of the other quitting methods used at baseline or follow up were predictive of prolonged abstinence at follow up.

Chapter 3 - Use of Assistance and Quitting Behavior

- The smokers who consistently use assistance for cessation by reporting their use in our study at both baseline and follow up were more likely to be females, older in age (45 years or more), non-Hispanic Whites, daily smokers, and smoke their first cigarette within 30 minutes of waking up.

- Among those who used Nicotine Replacement Therapy (NRT) at baseline, 50.8% of them made a quit attempt, 9.4% quit for a month or more, and 31.1% reduced their cigarette consumption at follow up. Those who used counseling to quit reported similar quitting behavior.

- Utilizing any assistance for quitting at baseline or follow up was not associated with quitting for one month or more at follow up or reduction of cigarette consumption by 20% or more. Daily smoking at baseline was significantly less likely to use any assistance at follow up (0.26 odds of not using assistance).

- Once smokers use assistance for quitting they are more likely to continue using it as shown in our study sample that using such assistance at baseline was associated with odds of 7.39 to use it at follow up after one year. More addicted smokers who are daily smokers or smoke their first cigarette in the morning within 30 minutes were also more likely to utilize assistance at follow up.

- Predictors of follow up use of NRT were baseline use of NRT (odds of 11.06), being daily smokers (odds of 2.67). Smokers who believe smokers can quit without any pharmaceuticals were less likely to use NRT at follow up (odds of 0.47).

- Smokers with moderate/severe mental health problems are more likely than mentally normal smokers to use counseling (13.2% vs 3.4%) or combined treatment (18.4% vs 9.1%) and less likely to not use any treatment (44.7% vs 65.9%).

- Smokers with chronic medical conditions were less likely than smokers with any chronic medical condition to use medications alone (0.56 odds), or counseling alone (0.41 odds).

Chapter 4 - Price Sensitivity and Media Exposure

- Recall by smokers of anti-tobacco media messages at baseline was not related to increasing their quit attempts, prolonged quitting or reduction in cigarette consumption at one year follow up.

- When presenting 5 specific different Anti-tobacco commercials to study participants, there was wide variability in recall with 61% remembering the more graphic commercial with a woman having to breathe through a hole in her throat compared to a non-graphic add of people trapped inside a cigarette that only 28% recalled.

- Recall of any of the 5 anti-tobacco commercials at baseline was not related to quitting behavior after one year of follow up. However, when relating specific anti-tobacco commercials, only the advertisement of the women who breathes through a hole in her neck was significantly related to higher quit attempts (1.3 higher odds) and prolonged quitting of at least one month (1.58 higher odds) after one year of follow up.

- Close to half (47.5%) of smokers in our study reported seeing or hearing about tobacco coupons and 34.5% reported seeing posters or promotions in stores, while a small percentage reported seeing advertisements in other public events.

- Reporting any tobacco promotion or advertisement did not predict any quitting behavior but seeing or hearing about free coupons was significantly related to decreased odds of quitting for one month or longer.

- Smokers who indicated at baseline that price had influenced how much they smoke had higher odds (1.47) of making a quit attempt at follow then those who did not indicate price influenced their smoking rate.

- Smokers who indicated at baseline that price had influenced their desire to quit had higher odds (2.35) of making a quit attempt at follow than those who did not report price influencing their desire to quit.

- Smokers who reported at baseline that price influencing their desire to quit had higher odds (1.38) of reporting awareness of coupon promotions than those who did not report price influencing their desire to quit.

Chapter 5 - Change in Anti-Smoking Attitudes and Smoking Cessation

- The smokers who agreed with the statement of *"taking a stand against smoking is important to you"* were more likely than the smokers who disagreed with this statement to have made a quit attempt (56.5% vs 33.0% a 2.6 higher odds), quit for month or longer (12.4% vs 7.1%, 1.8 odds higher), and reduced cigarette consumption (38.2% vs 30.4%, 1.4 odds higher) after one year.
- The smokers who agreed with the statement of *"you want to be involved in efforts to get rid of smoking"* were more likely than the smokers who disagreed with this statement to have made a quit attempt (64.0% vs 36.3% nearly 3 higher odds), quit for month or longer (14.2% vs 7.7%, 1.9 odds higher), and reduced cigarette consumption but not statistically significant (39.6% vs 31.4%) after one year.
- The smokers who agreed with the statement of *"there should be a total ban on smoking everywhere in your city or town, except in one's home,"* were more likely than the smokers who disagreed with this statement to have made a quit attempt (62.8% vs 41.1%, 2.49 odds), quit for month or longer (13.0% vs 8.9%), and reduced cigarette consumption (43.4% vs 32.5%) after one year.
- The smokers who agreed with the statement of "*You would like to see tobacco companies go out of business"* were more likely than the smokers who disagreed with this statement to have made a quit attempt (56.5% vs 37.0%, 2.1 higher odds), quit for month or longer (11.8% vs 7.9%), and reduced cigarette consumption (35.5% vs 32.8%) after one year.
- The smokers who agreed with the statement of "*Tobacco companies have been punished enough*" were less likely than the smokers who agreed with this statement to have made a quit attempt (36.6% vs 49.6%, 0.6 odds), quit for month or longer (8.2% vs 10.4%), and reduced cigarette consumption (31.9% vs 34.9%) after one year.
- The selected strong attitudes all point in the expected direction of predicting quitting behavior. Quitting attempt was most strongly predicted by these views, and prolonged quitting of one month or more the least predicted. This is expected given that prolonged quitting is a more strict criteria for quitting behavior
- The two questions with the strongest prediction and consistency across the three outcomes was taking a stand against tobacco and wanting to get involved to get rid of smoking. The more strong attitudes of wanting tobacco companies to be out of business or tobacco companies punishment has not been enough were not strongly predicted, except for quit attempts. This is also expected since this is a population of smokers whom some are still not ready to ban tobacco.
- The implication of this view is that persons who hold intensive attitudes about tobacco control issues are more likely to live in a social environment that is hostile to tobacco, which in turn can help smokers quit.

Chapter 6 - Smoking Bans and Quitting Behavior

- Smokers with either a total home ban or partial home ban were more likely to make a quit attempt compared to smokers with no home smoking ban (46.3% and 39.9% vs 30.6% respectively). However, only total ban was significantly and independently associated with an increased 1.7 odds of having a quit attempt in the multivariate adjusted analyses.

- Smokers with a total home ban were more likely to reduce cigarette consumption by 20% or more after one year compared to the smokers without such a ban (38.4% vs 26.9%). The odds of reducing cigarette consumption among smokers who had a total ban compared to smokers without such a ban was 1.7.

- Smokers with total home ban were also more likely to be quit at follow up for one month or more (13.8%) than smokers without such bans (3.7%). In the multivariate analyses, there was an odds of 2.95 for such smokers to quit for one month or more compared to smokers without any bans. Partial bans had not influence on quitting.

- Smokers who perceived that there was a city/community smoking ban were more likely to report a quit attempt than smokers who didn't have such a perception (43.9% vs 32.8%).

- Smokers who at baseline reported they reduced the number of cigarettes they smoked as a result of a home smoking ban were significantly more likely to make quit attempt at follow-up than those who didn't reduce the number of cigarettes as a result of a home smoking ban (50.7% vs 39.6%). This was a significantly consistent association with a 1.82 odds of having a quit attempt among this group of smokers in the multivariate analyses.

- Smokers who allowed smoking in their car were significantly less likely to make a quit attempt than those who didn't (35.8% vs 54.0%) and less likely to have a prolonged quit of one month or more (6.8% vs 17.5%). The odds of making a quit attempt was 0.56 and for a prolonged quit of one month or more it was 0.51 among those who smoked in their cars and allowed it compared to those who did not.

- Smokers who agreed SHS causes lung cancer in non-smokers were significantly more likely to make a quit attempt (44.8%) than those who disagreed (31.6%) which translated into an odds of 1.43 in the multivariate analyses. This was similar for odds of reducing cigarette consumption among this group of smokers.

Chapter 7 - Physical & Mental Health and Tobacco Use

- At baseline, current daily smokers reported significantly lower levels of perceived health (2.9±1.1) than non-daily smokers (3.1 ± 1.0), however perceived health did not predict any quitting behavior at follow up

- Smokers with respiratory disease were more likely than smokers without respiratory illness to make a quit attempt (54.9% vs 45.6%) and reduction in cigarette consumption (40.6% vs 31.7%). Having diabetes, a heart disease or hypertension was not related to any quitting behavior.

- Having depressive symptoms was related to reduction of cigarette consumption (42.6% vs 31.2%) at follow up but not making a quit attempt or prolonged quitting.

- Smokers with anxiety were more likely than smokers without anxiety to make a quit attempt (51.5% vs 45.2%), and smoking reduction (38.2% vs 30.4%) but not prolonged quitting.

- Having comorbid conditions of anxiety and depression led to higher odds of making quit attempts among those with mild (1.57 odds) and moderate severe (1.53 odds) compared to smokers with no such comorbid conditions. Similarly the odds for those with these comorbid conditions to reduce consumption was 1.48 for mild and 1.46 for moderate/severe depression/anxiety compared to smokers without such conditions. There was no difference in prolonged quitting for one month or more.

- Obesity was not related to any quitting or smoking behavior at follow up. However, physically inactive smokers were less likely to make a quit attempt at follow up compared to more physically active smokers (0.69 odds). Sedentary smokers with more than 4 hours of TV and online time were more likely to make a quit attempt (1.34 odds), and reduce their smoking (1.43) compared to non-sedentary smokers.

- Having one or more chronic medical conditions was associated with significantly higher odds (1.42 odds) of reduced smoking over the year of follow-up. There was no relation to quit attempts or prolonged quitting.

- There was a higher odds (2.03) of making a quit attempt after receiving advice to quit by a health care provider among smokers with moderate/severe mental health problems.

Chapter 1

Smoking Behaviors

Chapter 1

KEY FINDINGS

Smoking Behaviors

In this chapter smoking behaviors amongst respondents from the California Smokers Cohort (CSC) are discussed. These behaviors include the length of smoking history, level of addiction to cigarettes, self-identification of smoking status label, use of low tar/menthol cigarettes, and use of tobacco products other than cigarettes.

- A Large majority of 83% of the respondents in the California Smokers Cohort (CSC) self-reported that they believed that they were addicted to cigarettes. In comparison to smokers who do not perceive themselves as addicted, the self-identified addicted smokers were twice more likely to make a quit attempt but not more likely to abstain for one month or more or reduce their cigarette consumption after one year.
- Those who smoked their first cigarette after 30 minutes of waking up were 1.65 more likely to make a quit attempt at follow up compared to those who were more addicted and smoked within 30 minutes of waking up. There was no difference between the two groups in abstaining for one month or more or reducing cigarette consumption.
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- Among our participants, 72.5% believed tobacco was as addictive as other drugs like heroin or cocaine but this belief did not impact any quitting behavior.
- A small percentage of 6.6% of smokers identified themselves as non-smokers, but this was no related to any quitting behavior in this group.
- A fifth (20.2%) of respondents in the CSC reported smoking menthol cigarettes and 27.2% reported smoking low-tar cigarettes but these behaviors were not related to any quitting behavior.
- Almost all (91.4%) of respondents from the CSC have heard about electronic cigarettes and 65.8% have used or might use it, whereas 42.1% have heard of snus and 26.8% have or might use it.
- Those who indicated that they have used or might use electronic cigarettes in the future were less likely (Odds of 0.62) to reduce their cigarette consumption by 20% at follow up.

Chapter 1

Smoking Behaviors

Introduction

The California Tobacco Control Program (CTCP) has for more than two decades operated under a strategy of creating a social and political environment in which tobacco use becomes less acceptable and less desirable in California; indirectly effecting tobacco use rather than marketing cessation to current smokers (Bal et al., 2001). Individual level studies have shown that this social norm change approach is associated with an increase in quitting attempts, success in quitting, and a change in social acceptance of the environments where smoking should be allowed (Gilpin et al., 2004; Zhang et. al, 2010). Ecological and econometric studies have also demonstrated these efforts are associated with a significant decline in smoking prevalence, cigarette consumption and healthcare expenditures on tobacco related illness (Hu et al, 1995; Lightwood & Glantz, 2013; Pierce et al., 1998). California now has the second lowest smoking prevalence in the United States (CDC, 2012; CDPH, in press).

These results are positive, but more can be done to lower tobacco exposure in California. Over 36,700 people die annually in California as a result of tobacco use (CDC, 2010) and while trends are showing a decline in the cigarette consumption and a shift towards non-daily smoking, even low levels of consumption can cause harms comparable to daily smoking (Bjartveit & Tverdal 2006; Schane et al, 2010; USPHSOSG, 2012).

Increasing cessation among smokers is one method of significantly improving health outcomes. Smoking cessation can increase life expectancy, lower risk for cancers, heart disease, and lung disease, ameliorating many of the negative health consequences even when cessation is accomplished later in life (Doll et al., 2004; U.S Department of Health and Human Services 2010, 2004, 2011).

The goal of this report is to provide the CTCP and other tobacco control programs with empirical evidence to support decision making for policies and programs that directly or indirectly promote cessation to current smokers. Throughout this report we characterize factors associated with making an attempt to quit smoking for at least one day, abstaining from smoking for a month or longer, and reducing the number of cigarettes per month.

In this first chapter we characterize smoking behavior among respondents in the California Smokers Cohort (CSC). We report their length of smoking history, level of addiction to cigarettes, level of identification with the label ‘smoker’, use of low tar or menthol cigarettes, and use of tobacco products other than cigarettes. These characteristics are then used to determine their association with making a quit attempt, reducing the number of cigarettes smoked and being in a period of prolonged smoking abstinence at follow up.

Addictive behavior

In this section we sought to measure the relation between addiction to smoking cigarettes and efforts to quit smoking.

Age of smoking initiation

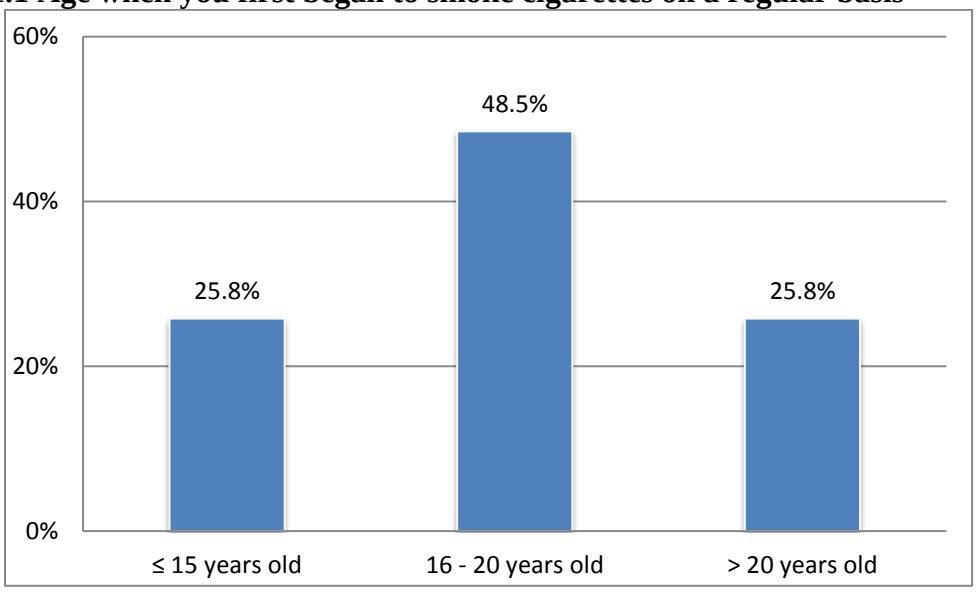
Most first use of cigarettes occurs by age 18 (87%) and nearly all use occurs by age 26 (98%) (U.S. Department of Health and Human Services, 2014). While not inevitable, individuals who experiment with tobacco during adolescence and early adulthood have a greater potential for progression to nicotine dependence and less likely to quit (Van De Ven et al., 2010).

We used the following question to examine associations with early smoking and quitting behaviors among respondents in CSC:

> *"How old were you when you first began to smoke cigarettes on a regular basis?"*

Figure 1.1 displays the percentage of respondents who started regularly at *"≤ 15 years"*, between *"16 - 20"*, or at *"> 20"* of age. Most respondents (48.5%) started smoking regularly between the ages of 16 and 20 years of age. Among those who started smoking at ≤ 15 years of age, 37.9% made a quit attempt at follow up compared to 39.3% among those who started at 16-20 years of age, and a higher percentage of 48.1% among those who started smoking after the age of 20 years. The age at which a smoker began to regularly smoke cigarettes however was not significantly associated with quit attempts, prolonged quitting of one month or more, or reduction in smoking after one year of follow up. This reflected other more important factors predicting quitting behavior in our study population.

Figure 1.1 Age when you first began to smoke cigarettes on a regular basis



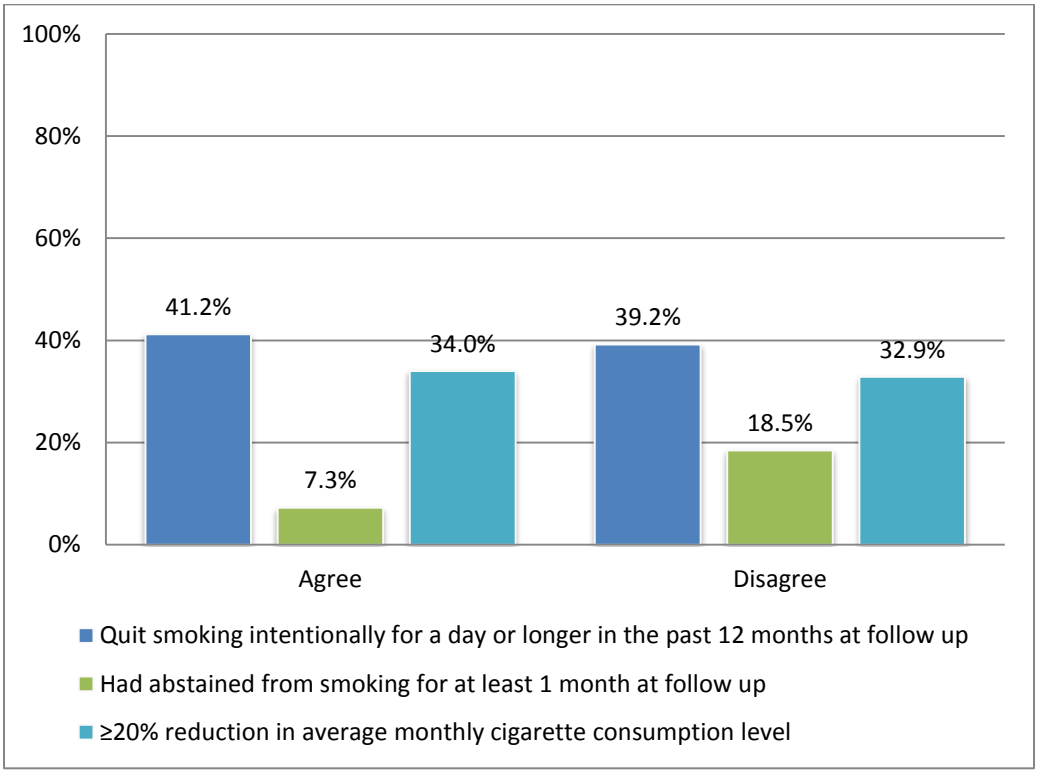
Self-belief about addiction

Participants were asked a question about addiction their perception regarding their level of addiction to smoking cigarettes. All respondents in CSC were asked the following question about addiction:

> *"You believe that you (are/were) addicted to cigarettes. (agree/disagree)"*

Figure 1.3 characterizes responses to this question according quit attempt during follow up, 20% reduction in monthly cigarettes consumed from baseline to follow up and prolonged abstinence (one month or more) at follow up. Tables are also available for each of these variables in appendices 1.1 - 1.3.

Figure 1.2 Self perceived addiction to cigarettes by quitting behavior among current and former smokers in CSC



The majority of respondents in CSC (83.6%) believed that they were addicted to cigarettes. Among those who believed they were addicted to smoking cigarettes at baseline 41.2% made at least one quit attempt at follow up, 7.3% were in a period of prolonged abstinence at follow up, and 34% had reduced their average monthly consumption of cigarettes by 20% at follow up. These percentages were not substantially different for those who did not believe they were addicted to cigarettes, although they were more likely to abstain from smoking for one month or more (18.5% vs 7.3%) but this was not significant in the multivariate analyses (see section on multivariate analyses below).

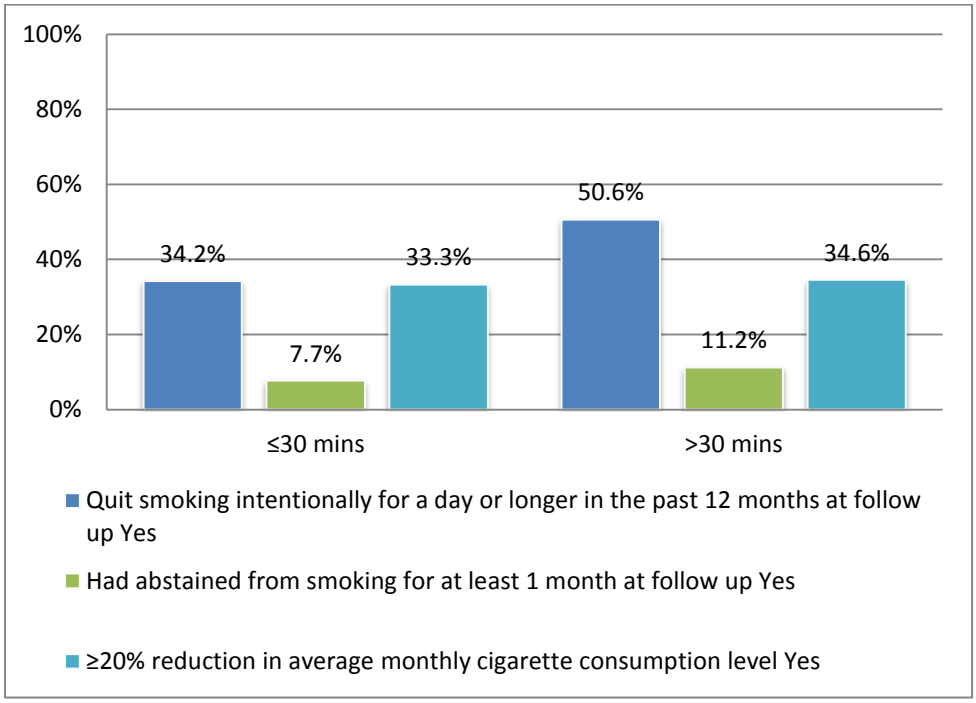
Time to first cigarette in the morning

We also used a component of a validated indicator for nicotine addiction known as the Fagerström Test for Nicotine Dependence (Heatherton et al., 1991). This question asked:

> *"How soon after you awake in the morning (do/did) you usually smoke your first cigarette?"*

We categorized this question to determine the proportion of respondents who smoked within the first 30 minutes after waking or waited more than 30 minutes after waking to smoke a cigarette. Figure 1.4 below characterizes responses to these categories according to quit attempt during follow up, 20% reduction in monthly cigarettes consumed from baseline to follow up and prolonged abstinence at follow up. Tables are also available for each of these variables in appendices 1.1 to 1.3.

Figure 1.3 Time to smoking after waking by quitting behavior among current and former smokers in CSC.



Most respondents in CSC smoked within the first 30 minutes after waking in the morning (60.7%). Of those who smoked within the first 30 minutes after waking, only 34.2% made a quit attempt at follow up. When compared to respondents who smoked within 30 minutes after waking, those who did not smoke within 30 minutes after waking were more likely to make a quit attempt for at least one day between baseline and follow up (50.6% vs 34.2%). This was consistent in the multivariate analyses (see section on multivariate analyses). Time to first cigarette did not appear to be associated with prolonged abstinence or consumption reduction.

Beliefs regarding the addictiveness of tobacco

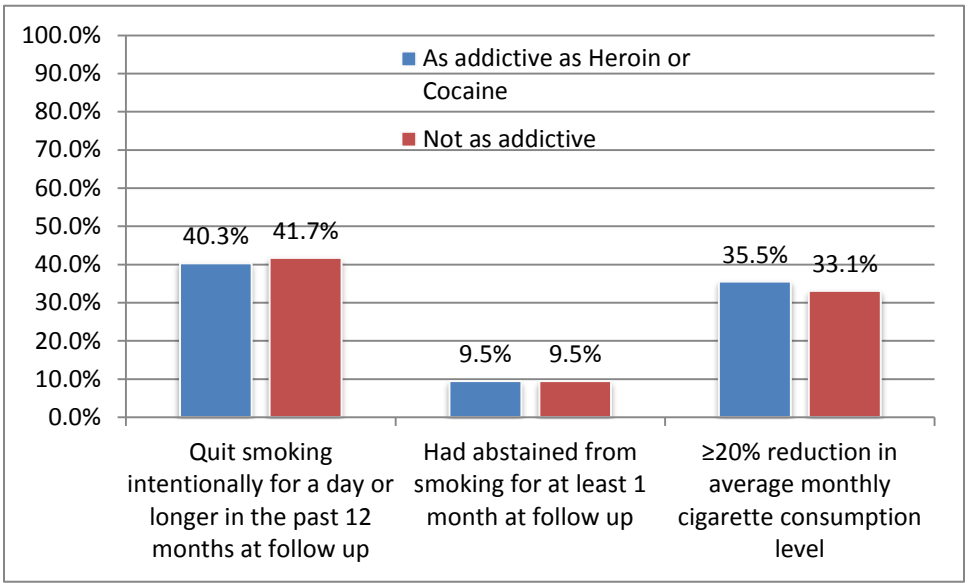
Scientific evidence indicates that tobacco is as addictive as drugs such as heroin and cocaine (NIDA, 2009). We were interested in determining if CSC respondent's beliefs about the addictive nature of tobacco were associated with their quitting behavior. We asked all respondents if they agreed or disagreed with the following statement:

"Tobacco is not as addictive as other drugs like heroin or cocaine"

Most respondents (72.5%) believed that tobacco was as addictive as drugs like heroin or cocaine. Figure 1.5 indicates that beliefs regarding the addictiveness of tobacco did not significantly impact quitting behavior among respondents in CSC. Among those who quit for one day, abstained for at least 1 month at follow up, or decreased cigarette consumption by 20% or more, there was no difference in such quitting behavior according to whether smokers believed tobacco was as addictive as heroin or cocaine or not. Among those who agree that nicotine is as addictive as heroin 40.3% of them made a quit attempt at follow up, 9.5% of them made a prolonged quitting

of at least one month, and 35.5% of them reduced their cigarettes by <20%. Among those who do not agree that nicotine is as addictive as heroin 41.7% of them made a quit attempt at follow up, 9.5% of them made a prolonged quitting of at least one month, and 33.1% of them reduced their cigarettes by <20%.

Figure 1.4 Self perceived addiction to cigarettes by quitting behavior among current and former smokers in CSC



"Smoker" Identity

While many report smoking cigarettes, this does not necessarily mean that they use the action of smoking to construct their identity. In a recent report, we demonstrated that a large number of individuals in California report smoking cigarettes but don't consider themselves a smoker; a term we refer to as Non-Identifying Smoker (NIS)(Leas et al., 2014).

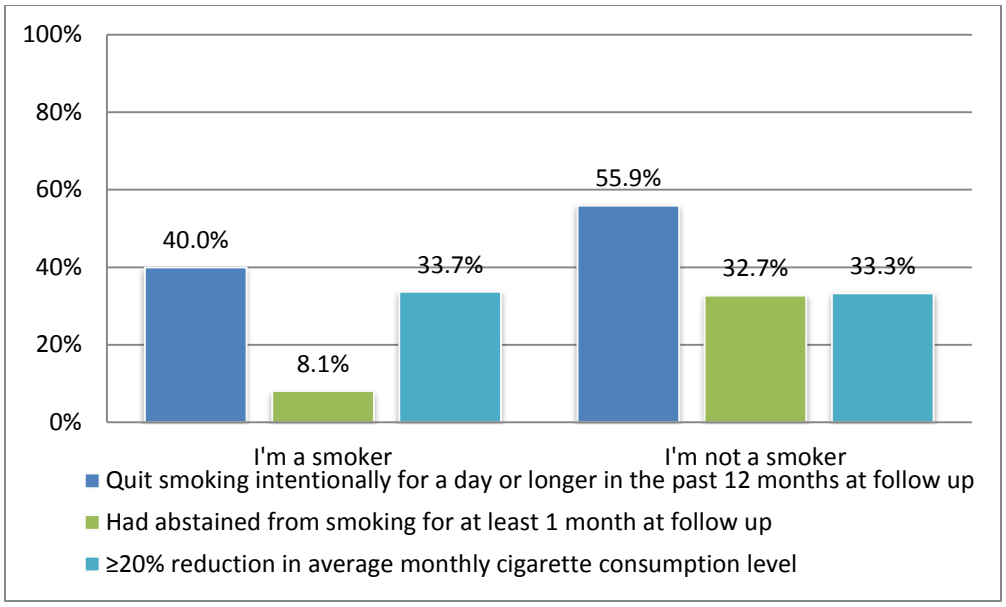
Motivations to identify or not-identify as a 'smoker' vary across demographic groups and some research suggests that self-identification is associated with motivations to quit smoking (Brown et al., 2011; Tracy et al., 2012; Berg et al., 2010) and making quit attempts(Berg et al., 2009; Lee et al., 2013; Tombor et al., 2013).

In this sub-section we describe the extent to which being a NIS predicted efforts to quit smoking between baseline and follow up among respondents in CSC. All respondents were asked the question:

"Do you consider yourself a smoker?"

Figure 1.5 displays the responses to this question among respondents in CSC according to quit attempt during follow up, 20% reduction in monthly cigarettes consumed from baseline to follow up and prolonged abstinence at follow up. Tables are also available for each of these variables in appendices 1.1 to 1.3. Note that all respondents reported smoking at least non-daily at baseline.

Figure 1.5 Self-identification as a smoker by quitting behavior among current and former smokers in CSC



The overwhelming majority of respondents in CSC considered themselves to be a smoker (94.4%), indicating that 6.6% of respondents were NIS at baseline in CSC. This estimate for the prevalence of NIS is lower than our estimate of 12.3% in the population of California established in previous reports (Leas et al., 2014). Self-Identification as a smoker appeared to have a strong effect on the likelihood of being in a period of prolonged abstinence at follow up. Those respondents who identified as smokers at baseline were less likely to have abstained from smoking for one month or more at follow up (8.1%) compared to the NIS group whom 32.7% of them abstained for at least one month at follow up. However, this was not statistically significant in the multivariate analyses after adjusting for other covariates (see figure 1.10 in the multivariate analyses section). 'Smoker' identification did not appear to be associated with either making a quit attempt or consumption reduction.

Menthol and low tar cigarette usage

Mentholated cigarettes

Menthol is an organic compound that is either derived or synthesized and is used in cigarettes because of its cooling effect on smoke. It became the only non-regulated cigarette flavouring allowed on the market with the passing of the *Family Smoking Prevention and Tobacco Control Act* (US Department of Health and Human Services, 2014; US Congress House Committee on Energy and Commerce, 2007). Mentholated Cigarettes continue to be heavily marketed towards African American communities who, along with youth and psychologically distressed, see the highest rates of mentholated cigarette use in the U.S. (US Department of Health and Human Services, 2014; Hickman et al., 2014). Currently, 85% of African American teenagers smoke mentholated cigarettes compared to just 32% of white and 45% of Hispanic (Mitka, 2013). New evidence suggests that mentholated cigarettes are beginning to take a larger share of the cigarette market (Delnevo et al., 2013). While there is a small amount of evidence that mentholated cigarettes can increase risks for negative health outcomes, a large concern is that menthol can increase the likelihood of smoking initiation among youth and young adults and reduce the likelihood for success in quitting. For these

reasons the Food and Drug Administration is currently considering further restrictions on the use of menthol in cigarettes (Mitka, 2013).

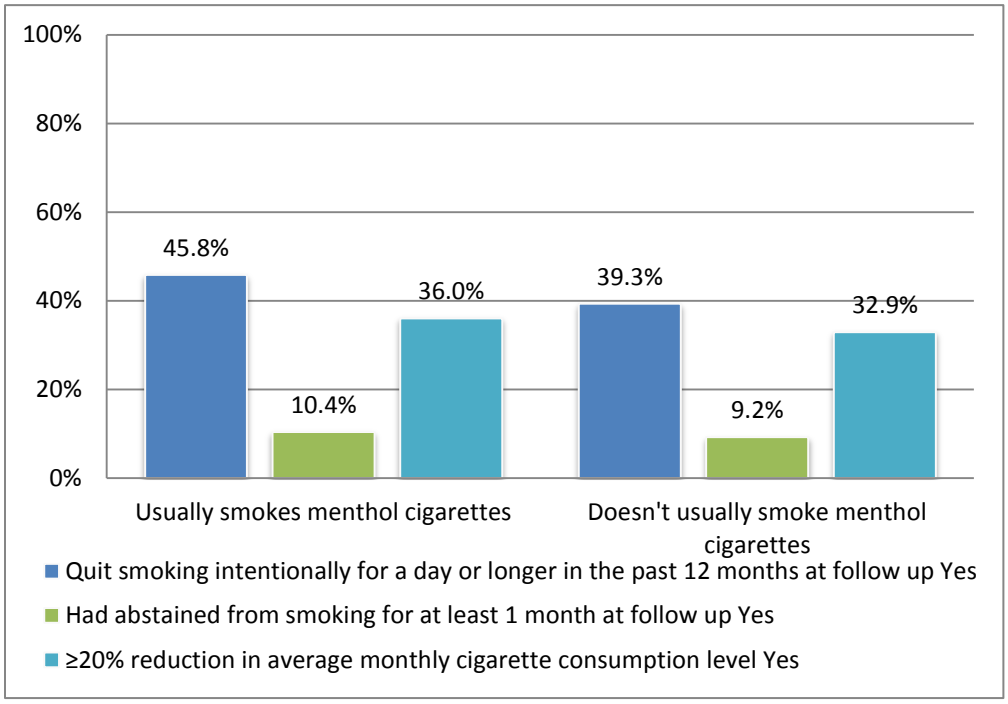
In order to assess the effect on quitting behavior among respondents in CSC, we asked all respondents the following question:

"(Do/Did) you usually (smoke/d) menthol or non menthol cigarettes?"

Figure 1.6 displays the results to this question according to quit attempts made during follow up, 20% reduction in monthly cigarettes consumed from baseline to follow up and prolonged abstinence at follow up. Estimates are also available in tables in Appendices 1.1 - 1.3.

Most respondents in CSC did not regularly use menthol cigarettes and only 20.2% did so. Compared to non-mentholated cigarettes, use of mentholated cigarettes did not appear to be associated with making a quit attempt (45.8% vs 39.3%), reducing average monthly cigarette consumption between baseline and follow up (36.0% vs 32.9%), or being in a period of prolonged abstinence at follow up (10.4% vs 9.2%).

Figure 1.6 Use of menthol cigarettes by quitting behavior among current and former smokers in CSC



Low tar or low nicotine cigarettes

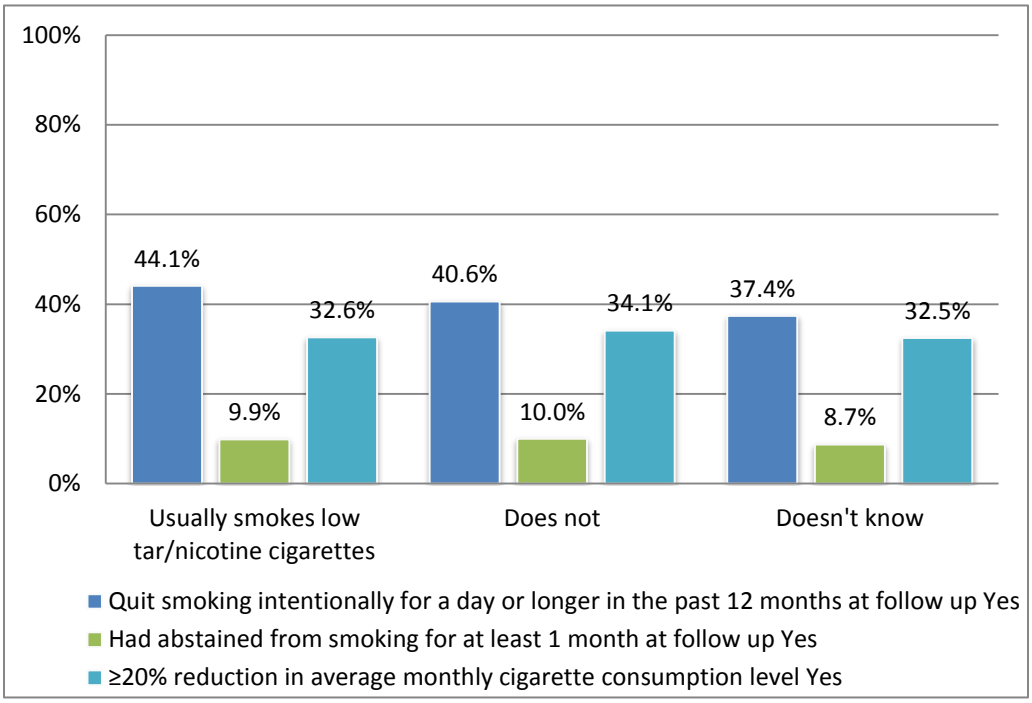
Since the 1950s low tar or low nicotine cigarettes have been marketed as a "safer alternative" to regular cigarettes, despite the clear evidence that they do not lower the risk of respiratory illness (US Department of Health and Human Services, 2014; Withey et al., 2013). Effective June 2010 the *Family Smoking Prevention and Tobacco Control Act* imposed new restriction on low tar cigarettes, banning the use of the terms "light", "low", or "mild" from packaging, making it illegal to market low tar cigarettes as "safe cigarettes" (US Congress Committee on Energy and Commerce, 2007).

We were interested in determining the extent respondents in CSC reported using "low tar" cigarettes and assess the effect that use of low tar cigarettes had on quitting behavior. All respondents were asked the following question:

> *"As far as you know, (do/did) the cigarettes you (smoke now/smoked) have lower levels of nicotine and tar than regular cigarettes?"*

Figure 1.7 displays the results to this question according to quit attempts made during follow up, 20% reduction in monthly cigarettes consumed from baseline to follow up and prolonged abstinence at follow up. Estimates are also available in tables in Appendices 1.1 - 1.3.

Figure 1.7 Use of low tar/nicotine cigarettes by quitting behavior among current and former smokers in CSC



Most respondent (45.1%) reported smoking "regular" cigarettes, compared to 27.2% who reported that they smoked lower tar/nicotine cigarettes and 27.0% who didn't know if the cigarettes they smoked had lower tar. Overall and as shown in Figure 1.6, reporting smoking low tar cigarettes compared to regular cigarettes, did not appear to be have any impact on making a quit attempt or reducing average monthly cigarette consumption between baseline and follow up, or being in a period of prolonged abstinence at follow up.

Use of other tobacco products

Finally we were interested in determining the proportion of respondents who had heard of or used tobacco product other than cigarettes including: cigars, cloves, snus, e-cigarettes, hookah, etc. All respondents were asked the following series of questions:

> *"Other than cigarettes, have you ever used any tobacco products such as chewing tobacco, snuff, cigars, pipes, bidis (bee-dees), clove cigarettes, or any other form of tobacco?"*
>
> *"Have you ever smoked a Hookah pipe?"*
>
> *"Do you now use a Hookah pipe every day, some days, or not at all?"*
>
> *"Do you smoke hookah on weekends only?"*
>
> *"Have you heard of snus"*

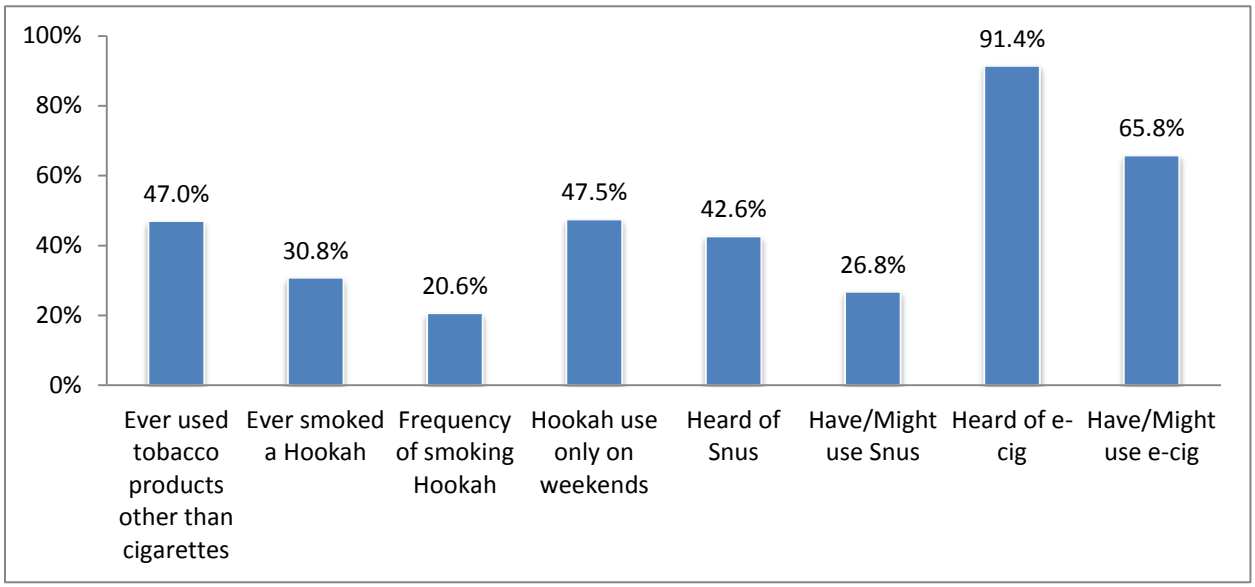
"What describes you best regarding your use of snus….(have used/might use/ will never use)"

"Have you heard of electronic cigarettes or e-cigarettes?"

"What describes you best regarding your use of e-cigarettes….(have used/might use/ will never use)"

The percentage responding affirmatively to each of these questions is presented in Figure 1.8 below and are also available in tables in Appendices 1.1 to 1.3.

Figure 1.8 Use of tobacco products other than cigarettes among current and former smokers in CSC



NOTE: for the questions asking about "use" of hookah, snus, or e-cigarettes respondents must first have answered "yes" to having heard about the respective tobacco product.

Almost all respondent's reported hearing about e-cigarettes (91.4%), while less had heard about snus (42.6%), demonstrating the pervasiveness and popularity of e-cigarette products among respondents in CSC. The reported awareness of e-cigarettes among respondents in CSC in 2011-2012 is much higher than the 58.2% of current smokers reported in national estimates in 2010, which may indicate a growing popularity of the product (Pearson et al., 2012). Of those who heard about e-cigarettes, the majority indicated that they have used or might use electronic cigarettes (65.8%).

About 47.0% of respondents reported using tobacco products other than cigarettes and 30.8% reported ever using a hookah pipe. Of those who reported using hookah at least "some days", about a half (47.5%) used hookah only on the weekends. Use of a hookah pipe, however, was not associated with quitting behavior (See Appendix Tables 1.1-1.3).

Awareness and use of tobacco products other than cigarettes generally did not appear to have an association with making a quit attempt between baseline and follow. The use of e-cigarettes appeared to have some effect against the reduction of the average monthly

cigarette consumption at follow up. Compared to CSC respondents who reported that they 'will never use e-cigarettes", those who reported that they "might use" or "have used" e-cigarettes were less likely to reduce their average monthly total of cigarette by >20% at follow up.

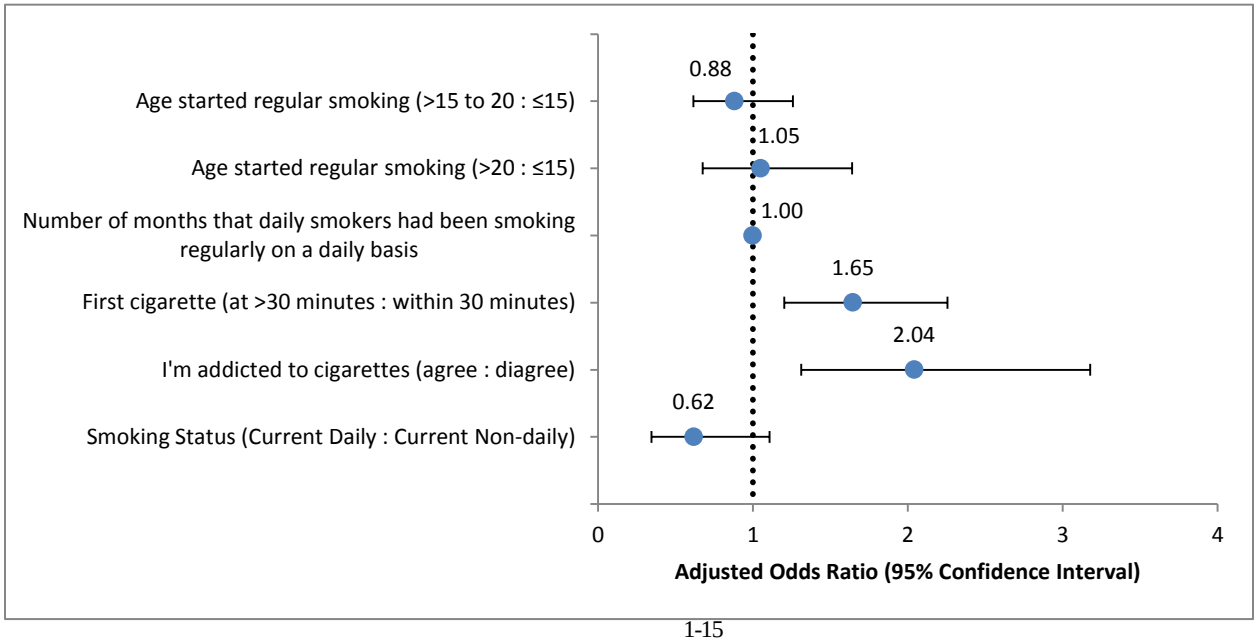
Multivariate Summary

In figures 1.9 - 1.11 below we present a visual representation of selected multivariate adjusted odds ratios for variables referring to smoking behavior we believed may influence quitting behavior among CSC respondents.

Quit attempts between baseline and follow up

Of the 11 variables assessed in this chapter, based on univariate analyses results, 5 variables warranted further exploration in relation to quit attempts in multivariate analysis. These variables were the cumulative number of months that daily smokers had smoked on a daily basis, the time to the first cigarette in the morning, self-perception of their addiction, smoking status and the age when the respondent first started smoking regularly. Figure 1.9 illustrates that of the 5 hypothesized variables we were interested in exploring with relation to quit attempts, only the questions about time to first cigarette in the morning and self-perception of addiction appeared to be associated with making a quit attempt. When compared to respondents who smoked within 30 minutes after waking, those who did not smoke within 30 minutes after waking were more likely to make a quit attempt for at least one day between baseline and follow up (Adjusted Odds Ratio (AOR) = 1.64, CI = 1.20 – 2.25). Those who reported addiction to cigarettes (vs 'not addicted') had higher odds of making a quit attempt between baseline and follow up (AOR = 2.04, CI = 1.31– 3.17)

Figure 1.9 Assessing the effect of cumulative number of months that respondents who reported smoking daily believed that they had been regularly smoking on a daily basis, the time to the first cigarette in the morning, and the age when the respondent believed they first started smoking regularly on attempting to quit smoking for > 1 day (vs Not quitting >1 day) at follow up after 1 year.

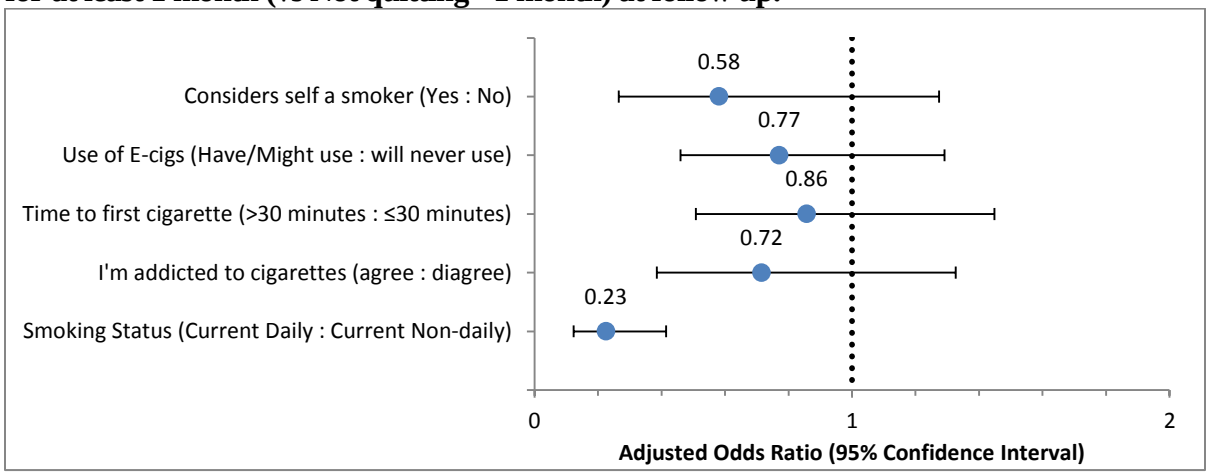


Note1: Model specified as quit smoking for at least 1 day = Yes; multivariate model adjusts for each variable that adjust for Age, Gender, Ethnicity, Education Level and the predictors of interest. Note2: Crosstabs of all covariates available in Appendix 1.1.

Prolonged abstinence at follow up

For prolonged abstinence at follow up outcome, 5 variables warranted inclusion in the multivariate analyses based on preliminary univariate analyses: respondent's self-identification with the label 'smoker', the time to the first cigarette in the morning, self-perception of their addiction, smoking status, and use of the use of electronic cigarettes. Figure 1.10 illustrates that only the variable for respondent's smoking status remained significant in multivariate analysis. The odds of being in a period of prolonged abstinence at follow up were lower for respondents who were Daily smokers at baseline than for Non-Daily smokers at baseline (AOR = 0.23 , 95% CI = 0.12 – 0.341).

Figure 1.10 Assessing the effect of e-cigarette use or prospective use on prolonged abstinence for at least 1 month (vs Not quitting >1 month) at follow up.

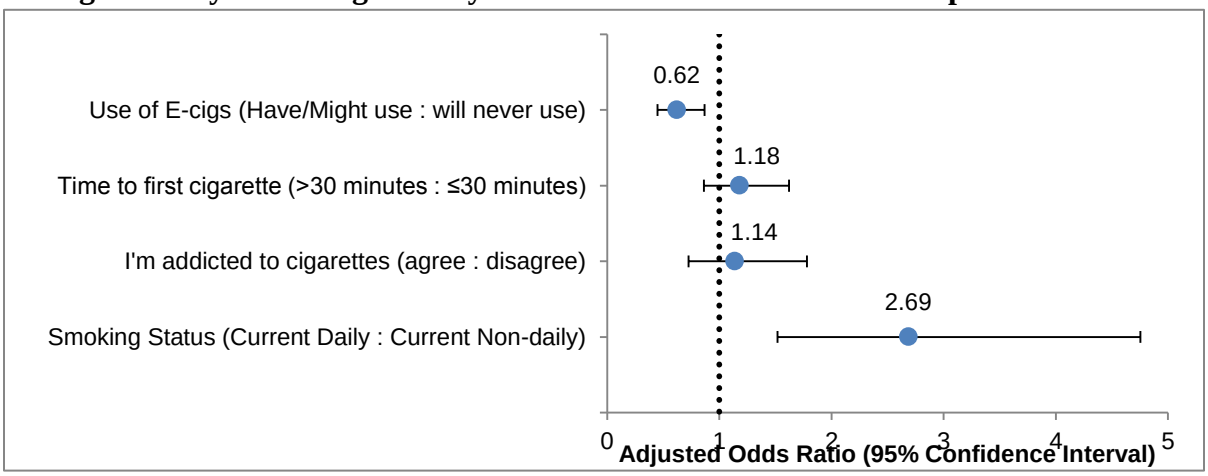


Note1: Model specified as quit smoking for at least 1 month = Yes; multivariate model adjusts for each variable that adjust for Age, Gender, Ethnicity, Education Level and the predictors of interest . Note2: Crosstabs of all covariates available in Appendix 1.1

Smoke less at follow up than at baseline

For the 20% or more reduction in cigarette consumption at follow up, in the multivariate model we included e-cigarettes, the time to the first cigarette in the morning, self-perception of their addiction, and smoking status to the model based on the above findings from the outcomes of quitting for 1 months and quit for 1 day. Figure 1.11 illustrates that the variables for e-cigarette use and smoking status remained significant in multivariate analysis adjusting for other covariates of addiction and smoking habits. Compared to those who reported that they will never use e-cigarettes, those who reported that they might use or have used e-cigarettes at baseline were less likely to reduce their monthly cigarette consumption by 20% between baseline and follow up (AOR = 0.62, CI = 0.45 – 0.86). Respondents who smoked on a daily basis at baseline were more likely to have reduced their monthly cigarette consumption by at least 20% at follow up (AOR = 2.69; 95% CI = 1.52 – 4.75).

Figure 1.11 Assessing the effect of e-cigarette use or prospective use on the reduction of the average monthly total of cigarette by 20% between baseline and follow up.



Note1: Model specified as reduce consumption by 20% = Yes; model adjust for Age, Gender, Ethnicity, Education Level and the predictors of interest. Note2: Crosstabs of all covariates available in Appendix 1.1

Summary

Despite the scientific evidence and personal experiences with addiction among respondents in CSC, most downplayed the addictive nature of tobacco reporting that it was less addicting than other drugs. There is well established evidence that nicotine dependence resulting from cigarette smoke is the most common form of drug dependence in the United States and that nicotine is as addictive as heroin, cocaine or alcohol, creating symptoms of both physical and psychological withdrawal (US Department of Health and Human Services, 2010; NIDA, 2009; ASAM, 2010). Better communication on the severity of nicotine addiction may be an important step for decreasing smoking initiation and prompting smokers to seek assistance in their quit attempts.

Others have found that self-identifying as a smoker may be associated with making quit attempts and prolonged abstinence (Berg et al., 2009; Lee et al., 2013, Tombor et al., 2013), but we did not find an association in CSC or in other population estimates in California (Leas et al., 2014). Smoking identification may at least in part be a result of the changing social climate of smoking in California which provides little advantage for individuals who actively smoke to identify with the term 'smoker' or provide accurate reports of smoking history (Bayer & Stuber, 2006; Bell et al., 2010; Cowling et al., 2003; McCool et al., 2013; Ritchie et al., 2010; Stuber et al., 2008).

We found that a relatively large number of respondents in CSC had heard of e-cigarettes and reported that they either had used or might use these products. Compared to those who said they would never use e-cigarettes, those who had or might use e-cigarettes were less likely to reduce their average monthly cigarette consumption by 20% between baseline and follow up. These findings demonstrate a popularity surrounding e-cigarettes and indicate that e-cigarette usage may be negatively associated with successful consumption reduction. Future confirmation of this finding is needed, especially in establishing the temporality of this association with quitting behavior to determine if smokers are mostly using e-cigarettes to try quit or as a 'bridge' to augment combustible cigarette consumption (Cobb et al., 2010).

Appendices

Appendix 1.1 Frequency of covariates used in multivariate models in follow up population of Daily and Non-Daily Smokers, California Smokers Cohort (*n =886*) Note: used for outcome variable "quit for at least one day"

QUIT SMOKING INTENTIONALLY FOR A DAY OR LONGER IN PAST 12 MONTHS	(Baseline and Follow-up smokers)	YES n(%)	NO n(%)
Overall		361(40.7)	525(59.3)
Gender	Male	172(40.1)	257(59.9)
	Female	189(41.4)	268(58.6)
Age	18 - 24	26(60.5)	17(39.5)
	25 - 44	96(44.0)	122(56.0)
	45 - 59	239(38.2)	386(61.8)
Ethnicity	Non-Hispanic White	241(37.1)	409(62.9)
	All others	120(50.8)	116(49.2)
Education	<=12 years	120(38.0)	196(62.0)
	Some College and Above	241(42.3)	329(57.7)
Live with Partner (including Married)?	Yes	172(38.7)	273(61.3)
	No	188(42.7)	252(57.3)
Time (minute) TO 1ST CIG AFTER WAKING IN MORNING	Within 30 Minutes	184(34.2)	354(65.8)
	> 30 Minutes	168(50.6)	164(49.4)
CONSIDER SELF A SMOKER	Yes	340(40.0)	510(60.0)
	No	19(55.9)	15(44.1)
BELIEVE SELF TO BE ADDICTED TO CIGS	Agree	301(41.2)	430(58.8)
	Disagree	58(39.2)	90(60.8)
AGE BEGAN TO SMOKE REGULARLY	<=15 years	86(37.9)	141(62.1)
	> 15 to <=20 years	170(39.3)	263(60.7)
	>20 years	103(48.1)	111(51.9)
USUALLY SMOKE MENTHOL OR NON-MENTHOL CIGS	Menthol	81(45.8)	96(54.2)
	Non-menthol	276(39.3)	426(60.7)
CIGS YOU SMOKE NOW HAVE LOWER NICOTINE / TAR THAN REGULAR CIGS	Yes	105(44.1)	133(55.9)
	No	162(40.6)	237(59.4)
	Don't Know	91(37.4)	152(62.6)
EVER USED TOBACCO PRODUCTS OTHER THAN CIGS	Yes	170(41.2)	243(58.8)
	No	191(40.5)	281(59.5)
EVER SMOKED A HOOKAH PIPE*	Yes	124(46.6)	142(53.4)
	No	235(38.1)	381(61.9)
CURRENT HOOKAH USAGE (Only among EVER SMOKED HOOKAH =YES)	Every day	0(0.0)	1(100)
	Some days	30(57.7)	22(42.3)
	Not at all	94(44.3)	118(55.7)

Appendix 1.1 Frequency of covariates used in multivariate models in follow up population of Daily and Non-Daily Smokers, California Smokers Cohort (*n =886*) Note: used for outcome variable "quit for at least one day"

QUIT SMOKING INTENTIONALLY FOR A DAY OR LONGER IN PAST 12 MONTHS	(Baseline and Follow-up smokers)	YES n(%)	NO n(%)
SMOKE HOOKAH ONLY ON WEEKENDS (Only among CURRENT HOOKAH USAGE = SOME DAYS)	Yes	15(57.7)	11(42.3)
	No	15(57.7)	11(42.3)
EVER HEARD OF SNUS*	Yes	166(43.1)	219(56.9)
	No	194(38.8)	306(61.2)
RESPONDENT'S USAGE OF SNUS (Only among EVER HEARD OF SNUS = YES)	Have used/might use	51(49.0)	53(51.0)
	Will never use	114(41.3)	162(58.7)
EVER HEARD OF E-CIGS*	Yes	332(41.0)	477(59.0)
	No	28(37.3)	47(62.7)
RESPONDENT'S USAGE OF E-CIGS (Only among EVER HEARD OF E-CIGS = YES)	Have used/might use	224(41.8)	312(58.2)
	Will never use	105(40.7)	153(59.3)
TOBACCO IS NOT ADDICTIVE AS OTHER DRUGS	Yes	95(40.3)	141(59.7)
	No	255(41.7)	357(58.3)
		Mean (SD)	Mean (SD)
MONTHS HAVE BEEN SMOKING ON A DAILY BASIS	Continuous	287.2 (161.7)	327 (136.7)

*Denotes indicator variable for usage of hookah, snus, or e-cigarettes

Appendix 1.2 Frequency of covariates used in multivariate models in baseline population of Daily and Non-Daily Smokers, California Smokers Cohort (n =1000) Note: used for outcome variable "quit for at least one month"

QUIT SMOKING INTENTIONALLY FOR A DAY OR LONGER IN PAST 12 MONTHS	(Baseline and Follow-up smokers)	YES n(%)	NO n(%)
Overall		94(9.4)	906(90.6)
Gender	Male	41(8.6)	437(91.4)
	Female	53(10.2)	469(89.8)
Age	18 - 24	1(2.2)	44(97.8)
	25 - 44	33(12.8)	224(87.2)
	45 - 59	60(8.6)	638(91.4)
Ethnicity	Non-Hispanic White	62(8.5)	664(91.5)
	All others	32(11.7)	242(88.3)
Education	<=12 years	27(7.8)	321(92.2)
	Some College and Above	67(10.3)	585(89.7)
Live with Partner (including Married)?	Yes	52(10.3)	452(89.7)
	No	42(8.5)	453(91.5)
Time (minute) TO 1ST CIG AFTER WAKING IN MORNING	Within 30 Minutes	46(7.7)	549(92.3)
	> 30 Minutes	43(11.2)	341(88.8)
CONSIDER SELF A SMOKER	Yes	76(8.1)	867(91.9)
	No	18(32.7)	37(67.3)
BELIEVE SELF TO BE ADDICTED TO CIGS	Agree	59(7.3)	749(92.7)
	Disagree	34(18.5)	150(81.5)

Appendix 1.2 Frequency of covariates used in multivariate models in baseline population of Daily and Non-Daily Smokers, California Smokers Cohort (n =1000) Note: used for outcome variable "quit for at least one month"

QUIT SMOKING INTENTIONALLY FOR A DAY OR LONGER IN PAST 12 MONTHS	(Baseline and Follow-up smokers)	YES n(%)	NO n(%)
AGE BEGAN TO SMOKE REGULARLY	<=15 years	23(9.1)	231(90.9)
	> 15 to <=20 years	38(7.9)	440(92.1)
	>20 years	33(13.0)	221(87.0)
USUALLY SMOKE MENTHOL OR NON-MENTHOL CIGS	Menthol	21(10.4)	181(89.6)
	Non-menthol	73(9.2)	718(90.8)
CIGS YOU SMOKE NOW HAVE LOWER NICOTINE / TAR THAN REGULAR CIGS	Yes	27(9.9)	245(90.1)
	No	45(10.0)	406(90.0)
	Don't Know	21(7.8)	249(92.2)
EVER USED TOBACCO PRODUCTS OTHER THAN CIGS	Yes	48(10.2)	422(89.8)
	No	46(8.7)	483(91.3)
EVER SMOKED A HOOKAH PIPE*	Yes	32(10.4)	275(89.6)
	No	62(9.0)	627(91.0)
CURRENT HOOKAH USAGE (Only among EVER SMOKED HOOKAH =YES)	Every day	0(0.0)	1(100)
	Some days	6(9.7)	56(90.3)
	Not at all	26(10.7)	217(89.3)
SMOKE HOOKAH ONLY ON WEEKENDS (Only among CURRENT HOOKAH USAGE = SOME DAYS)	Yes	3(10.3)	26(89.7)
	No	3(9.4)	29(90.6)
EVER HEARD OF SNUS*	Yes	32(7.5)	394(92.5)
	No	62(10.8)	511(89.2)
RESPONDENT'S USAGE OF SNUS (Only among EVER HEARD OF SNUS = YES)	Have used/might use	7(6.2)	106(93.8)
	Will never use	25(8.1)	283(91.9)
EVER HEARD OF E-CIGS*	Yes	84(9.2)	828(90.8)
	No	10(11.6)	76(88.4)
RESPONDENT'S USAGE OF E-CIGS (Only among EVER HEARD OF E-CIGS = YES)	Have used/might use	41(7.0)	547(93.0)
	Will never use	40(13.1)	266(86.9)
TOBACCO IS NOT ADDICTIVE AS OTHER DRUGS	Yes	25(9.5)	238(90.5)
	No	66(9.5)	630(90.5)
		Mean (SD)	Mean (SD)
MONTHS HAVE BEEN SMOKING ON A DAILY BASIS	Continuous	278.9 (154.0)	311.4 (148.9)

*Denotes indicator variable for usage of hookah, snus, or e-cigarettes

Appendix 1.3 Frequency of covariates used in multivariate models in follow up population of Daily and Non-Daily Smokers, California Smokers Cohort (*n =886*) Note: used for outcome variable ">20% reduction average monthly cigarette consumption"

QUIT SMOKING INTENTIONALLY FOR A DAY OR LONGER IN PAST 12 MONTHS	(Baseline and Follow-up smokers)	YES n(%)	NO n(%)
Overall		294(33.6)	581(66.4)
Gender	Male	136(32.3)	285(67.7)
	Female	158(34.8)	296(65.2)
Age	18 - 24	20(46.5)	23(53.5)
	25 - 44	73(34.4)	139(65.6)

Appendix 1.3 Frequency of covariates used in multivariate models in follow up population of Daily and Non-Daily Smokers, California Smokers Cohort (*n =886*) Note: used for outcome variable ">20% reduction average monthly cigarette consumption"

QUIT SMOKING INTENTIONALLY FOR A DAY OR LONGER IN PAST 12 MONTHS	(Baseline and Follow-up smokers)	YES n(%)	NO n(%)
	45 - 59	201(32.4)	419(67.6)
Ethnicity	Non-Hispanic White	204(31.8)	437(68.2)
	All others	90(38.5)	144(61.5)
Education	<=12 years	109(34.7)	205(65.3)
	Some College and Above	185(33.0)	376(67.0)
Live with Partner (including Married)?	Yes	150(33.9)	292(66.1)
	No	144(33.3)	288(66.7)
Time (minute) TO 1ST CIG AFTER WAKING IN MORNING	Within 30 Minutes	177(33.3)	355(66.7)
	> 30 Minutes	113(34.6)	214(65.4)
CONSIDER SELF A SMOKER	Yes	284(33.7)	559(66.3)
	No	10(33.3)	20(66.7)
BELIEVE SELF TO BE ADDICTED TO CIGS	Agree	247(34.0)	480(66.0)
	Disagree	47(32.9)	96(67.1)
AGE BEGAN TO SMOKE REGULARLY	<=15 years	84(37.3)	141(62.7)
	> 15 to <=20 years	127(29.7)	300(70.3)
	>20 years	80(37.9)	131(62.1)
USUALLY SMOKE MENTHOL OR NON-MENTHOL CIGS	Menthol	63(36.0)	112(64.0)
	Non-menthol	228(32.9)	466(67.1)
CIGS YOU SMOKE NOW HAVE LOWER NICOTINE / TAR THAN REGULAR CIGS	Yes	77(32.6)	159(67.4)
	No	133(34.1)	257(65.9)
	Don't Know	79(32.5)	164(67.5)
EVER USED TOBACCO PRODUCTS OTHER THAN CIGS	Yes	140(34.6)	265(65.4)
	No	154(32.8)	315(67.2)
EVER SMOKED A HOOKAH PIPE*	Yes	99(37.9)	162(62.1)
	No	194(31.8)	416(68.2)
CURRENT HOOKAH USAGE (Only among EVER SMOKED HOOKAH =YES)	Every day	0(0.0)	1(100)
	Some days	21(41.2)	30(58.8)
	Not at all	77(37.0)	131(63.0)
SMOKE HOOKAH ONLY ON WEEKENDS (Only among CURRENT HOOKAH USAGE = SOME DAYS)	Yes	9(34.6)	17(65.4)
	No	12(48.0)	13(52.0)
EVER HEARD OF SNUS*	Yes	122(32.2)	257(67.8)
	No	172(34.7)	323(65.3)
RESPONDENT'S USAGE OF SNUS (Only among EVER HEARD OF SNUS = YES)	Have used/might use	35(34.0)	68(66.0)
	Will never use	87(32.0)	185(68.0)
EVER HEARD OF E-CIGS*	Yes	266(33.3)	532(66.7)
	No	27(36.0)	48(64.0)
RESPONDENT'S USAGE OF E-CIGS (Only among EVER HEARD OF E-CIGS = YES)	Have used/might use	161(30.4)	368(69.6)
	Will never use	97(38.0)	158(62.0)

Appendix 1.3 Frequency of covariates used in multivariate models in follow up population of Daily and Non-Daily Smokers, California Smokers Cohort (*n =886*) Note: used for outcome variable ">20% reduction average monthly cigarette consumption"

QUIT SMOKING INTENTIONALLY FOR A DAY OR LONGER IN PAST 12 MONTHS	(Baseline and Follow-up smokers)	YES n(%)	NO n(%)
TOBACCO IS NOT ADDICTIVE AS OTHER DRUGS	Yes	82(35.5)	149(64.5)
	No	201(33.1)	407(66.9)
		Mean (SD)	Mean (SD)
MONTHS HAVE BEEN SMOKING ON A DAILY BASIS	Continuous	302.1 (155.1)	318 (144.2)

*Denotes indicator variable for usage of hookah, snus, or e-cigarettes

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Chapter 2

Quitting Behavior

Chapter 2

KEY FINDINGS
Quitting Behavior

In this chapter we report on quitting behavior among individuals in the California Smokers Cohort (CSC) and evaluate the extent to which intentions to quit and previous quit attempts predicted a quit attempt for at least a day, quit for at least 1 month at follow-up, or reduced cigarette consumption by 20%. We also provide estimates of the effect of non-traditional quitting methods on quitting behavior.

- After one year of follow up, 59.4% of current smokers in the CSC didn't attempt to quit smoking during the 12 month follow up period.

- After one year of follow up, 66.4% of participants indicated they had not reduced their average monthly cigarette attempt by at least 20%.

- Only 9.4% of respondents in the CSC were quit for least one month at the end of one year of follow up.

- Among those who intended to quit at baseline, 59.3% attempted to quit and 14.2% reported prolonged abstinence at the follow up interview compared to 26.7% and 4.8%, respectively, among those who did not intend to quit. Those who had intention to quit at baseline were more than 3 times as likely to have a quit attempt or abstinence of one month or more at follow up after 12 months.

- Among CSC respondents who had attempted to quit at baseline, 65.2% also reported attempting to quit at follow up compared to only 23.7% attempting a quit attempt among smokers who did not have such a quit attempt at baseline. In the multivariate analyses there was a 4 fold more likelihood of making a quit attempt at follow up if smokers made a similar quit at baseline.

- Among those who tried to quit at baseline, 13.7% were able to abstain from smoking for at least 1 month at follow up compared to only 6.2% of those who did not have a quit attempt at baseline. There was a 1.76 times more likelihood to have a long abstinence at follow up if smokers made a quit attempt at baseline.

- Non-traditional method of cessation used at baseline such as switching to light cigarettes, smokeless tobacco, cold turkey, stopped hanging out with friends who smoke, exercised more, tried to quit with a friend, or called the telephone quitline were all predictive of a quit attempt at follow up.

- Only using cold turkey to quit for the last quit attempt when reported at follow up was significantly related with close to 7 times more likely to have a prolonged abstinence of one month or more at follow up. None of the other quitting methods used at baseline or follow up were predictive of prolonged abstinence at follow up.

Chapter 2

Quitting Behavior

Introduction

Globally, one person dies from a tobacco related exposure every six seconds and in the United States tobacco related exposures continue to remain the single greatest cause of preventable morbidity and mortality (US Department of Health and Human Services, 2010; WHO,2012). However, increasing smoking cessation can significantly improve life expectancy, lower risk for cancers, heart disease, and lung disease, and in women can lower the risk infertility or low birth weight children (US Department of Health and Human Services, 2010, 2004, 2011; Doll et al., 2004).

Most adult smokers in the California and United States are making efforts to quit smoking. In 2010, 61.2% of California adult smokers and 55.7% of U.S. adult smokers made a quit attempt (CDC, 2012, 2011). This ranks California seventh among all other states in the percentage of smokers making quit attempts (CDC, 2012). National trends also indicate that more individuals who try to quit are successful. Successful quitting is generally defined as quitting for longer than 1 or 6 months, whereas quitting attempts can last as long as just 1 day (Borland et al., 2012). Between 1997 and 2011 the ratio of adults reporting successful quit attempts to adults reporting that they were current smokers increased by 92.6% (CDC, 2011).

While the frequency of quit attempts and success in those quit attempts continues to increase, the psychoactive properties of tobacco products and the sociality of smoking continue to make it challenging for individuals to make attempts at quitting or be successful in those attempts (US Department of Health and Human Services, 2010, 2000; Poland et al., 2006; Fiore et al., 2008; NIDA, 2009). Nicotine dependence resulting from cigarette smoke is the most common form of drug dependence in the United States and is considered as addictive as heroin, cocaine or alcohol, creating symptoms of both physical and psychological withdrawal (US Department of Health and Human Services, 2010; NIDA, 2009; ASAM, 2010). To add to these pharmacological effects, smoking is most often a shared experience that can bond groups of individuals together (Poland et al., 2006). This makes it less likely for individuals to quit smoking unless the social group they are a part of either does not smoke or collectively decides to quit (Christakis et al., 2008). The result of these barriers is that often smokers will need to make several attempts at quitting before they are successful, and even when they are highly motivated to quit (Borland et al., 2012; Hughes & J.R., 2003).

Proven treatments to alleviate these barriers to quitting include counseling, behavioral therapies and nicotine and non-nicotine medications, but most individuals who quit smoking do so without these forms of assistance (CDC, 2011; Fiore et al., 2008). Between 2001 and 2011, 5.9% of adult smokers who made a quit attempt or successfully quit in the United States reported using

counseling to aid in their quit attempt and only 30.0% reported using endorsed medications (CDC, 2011). In California estimates were similar, with only 8.8% using counseling and 22% using endorsed medication to aid in their quit attempt in 2006 (CDC, 2012; CDPH, 2008). These low rates indicate that most smokers who try to quit either do it on their own without any form of assistance or use interventions such as herbal remedies, exercise, acupuncture, hypnoses, switching to light cigarettes or smokeless tobacco, changing smoking habits with a friend or disassociating with friends who smoke and other non-traditional methods of quitting assistance. There is very little or no evidence on the extent that these methods predict quit attempts or prolonged abstinence using longitudinal data.

In this chapter we report on quitting behavior among individuals in the California Smokers Cohort (CSC) and evaluate the extent to which intentions to quit and previous quit attempts predicted a quit attempt for at least a day or at least 1 month at follow-up. We also provide estimates of the effect of non-traditional quitting methods on predicting a quit attempt for at least a day or least 1 month at follow-up.

Descriptions of Smokers Quitting Behavior

Efforts to quit smoking are not synonymous with successful quitting. Successful quitting is generally defined as quitting for longer than 1 or 6 months at the time of survey whereas quitting attempts can last as long as just 1 day (Borland et al., 2012). In this section we summarize the prevalence of quitting attempts for at least a day and prolonged abstinence for at least a month among respondents in CSC. We also determine the reporting of smokers on whether they decreased the number of cigarettes they smoked as another quitting behavior since most of those who have a successful quit usually decrease the daily consumption first. These variables are used as "outcome" variables throughout the report and each chapter seeks to determine factors that predict higher or lower levels of quitting attempts, smoking reduction, or prolonged abstinence.

Quitting Attempts

The following question was asked of individuals who reported smoking 100 cigarettes in their lifetime and smoking at least "some days" at baseline:

> *"During the past 12 months, have you ever tried to quit smoking for one day or longer?"*

We use this question throughout this report to determine if a respondent had made a "quit attempt" in the 12 months between baseline and follow up. Depending on the context of the chapter this variable can include or exclude individuals who reported no longer smoking at follow up. For example, in the later sections of this chapter we choose to exclude individuals who reported no longer smoking at follow up to describe the characteristics of individuals who reported quitting attempts but were current smokers at follow up. These respondents can be viewed as those who had "unsuccessful" quit attempts. In this section we report both measures of quit attempts to provide context for other chapters.

Figure 2.1 displays the prevalence of quitting attempts among respondents in CSC who reported smoking at both baseline and follow up or smoking at baseline and not smoking at follow up.

Most current smokers in CSC did not make a quit attempt during the 12 months between baseline and follow up surveys (59.4%). When including those who were in a prolonged quit attempt at follow up, this percentage only slightly decreased (52.6%).

Prolonged Abstinence

The following question was asked of individuals who reported smoking 100 cigarettes, smoking at their first interview and no longer smoking at follow up:

> *"When was the start of your most recent quit attempt that lasted for one day or longer?"*

We use this question throughout the report to determine if a respondent had quit for "at least one month" at the time of follow up. Figure 2.1 indicates that only very few respondents reported smoking at least "some days" at baseline and had quit for at least one month at follow-up (9.4%). This may be a result of a relatively quick follow-up interval (1 year) and some quit attempts had not yet lasted 1 month. Nonetheless the 31.3% difference between the percentage of smokers reporting quit attempts and the percentage of smokers reporting prolonged smoking abstinence clearly indicates that it was challenging for smokers in CSC to maintain their quit attempt between baseline and follow up.

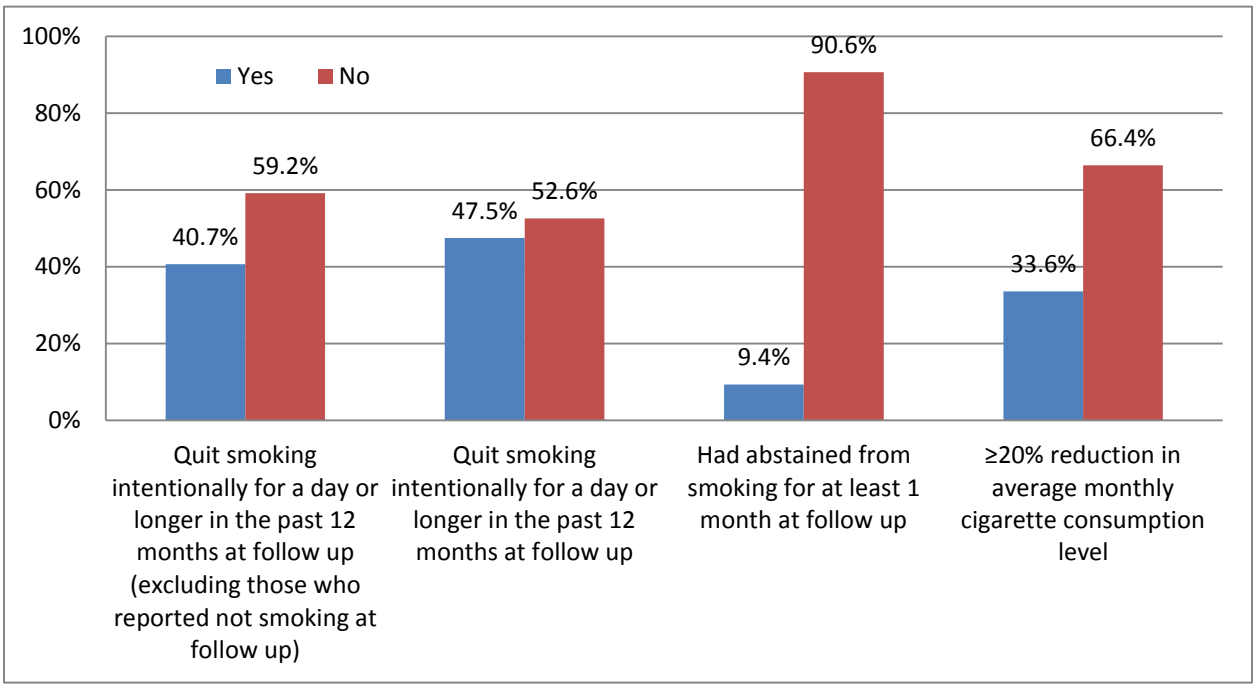
Reduction in Consumption of Cigarettes

The following questions were asked of individuals who reported smoking 100 cigarettes, smoking at their first interview and smoking at follow up:

> *"During the past 30 days, on the days that you DID smoke, about how many cigarettes did you usually smoke per day?"; "On how many of the past 30 days did you smoke cigarettes?"*

We used these questions to determine the average number of cigarettes consumed per month. This number was then dichotomized for analysis purposes; respondents were grouped into two groups, which corresponded to a 20% reduction of average monthly cigarette consumption between baseline and follow-up. Most respondents (66.4%) had not reduced their average monthly cigarette consumption by at least 20% at follow up.

Figure 2.1 Percentage of quitting attempts, smoking reduction and prolonged abstinence among respondents in the California Smokers Cohort (CSC) at follow up.



Intentions to Quit Between Baseline and Follow up and Previous Quitting Attempts

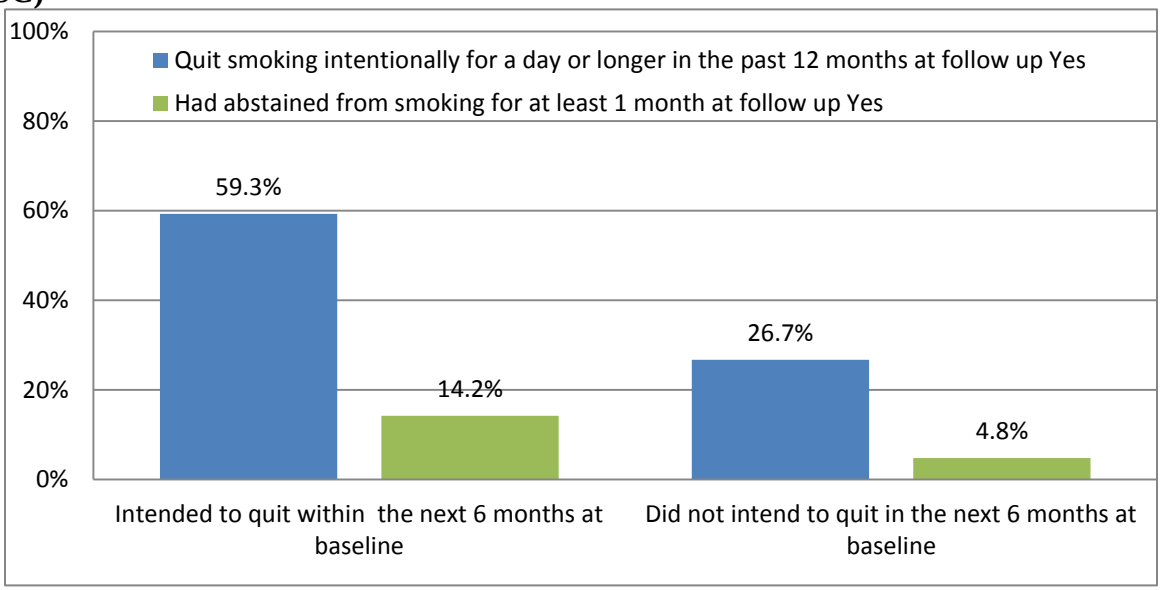
Intentions to Quit

Intentions to quit smoking often are the first step in the path toward quitting smoking (DiCLemente et al., 1991). At baseline, current smokers were asked:

> *"Which of the following best describes your intentions regarding quitting smoking? Would you say you . . .'never expect to quit smoking', 'you may quit in the future, but not in the next 6 months', 'you will quit in the next 6 months', or 'you will quit in the next month'"*

The above question was categorized to determine if individuals had "*intentions to quit within the next 6 months"* or not. We used the answer to this question to determine if individuals who intended to quit at baseline tried to quit or were successful at maintaining smoking abstinence between baseline and follow up. Figure 2.2 displays these categorized responses by reported quit attempts and prolonged abstinence for at least a month at follow up.

Figure 2.2 Intentions to quit in the next 6 months at baseline by quit attempts and prolonged abstinence at follow up among respondent in the California Smokers Cohort (CSC)



While more than half (59.3%) of follow-up smokers who had intended to quit at baseline made a quit attempt, only 14.2% of respondents intending to quit reported prolonged abstinence at follow up. This clearly illustrates that, for most respondents, intentions to quit were not always enough to make a quit attempt or to stay quit. However, when compared to those who did not intend to quit when asked at baseline, those who did not intent to quit were much less likely to make a quit attempt at follow up (26.7%) or abstain from smoking for at least 1 month (4.8%). Intention to quit was a strong predictor of both reporting a quit attempt at follow up and prolonged abstinence at follow up among respondents in CSC (Adjusted Odds Ratio (AOR) =3.74, 95% Confidence Interval (CI) = 2..75 – 5.08,; OR =3.11; CI = 1.88 – 5.16). This relationship between intention to quit and prolonged abstinence did not appear to be explained by gender, age, ethnicity, education, or certainty of restraining from smoking in multivariate adjusted model.

These results underscore an important concept. Although not necessarily deterministic of quitting in all cases, intentions to quit are an important process of mentally preparing to quit (Borland et al.,2012; DiClemente et al., 1991; Durkin et al., 2012). Efforts such as media campaigns and health education can be extremely influential at affecting intentions regarding quitting and may be a first step towards a process of quitting smoking (CDC, 2013).

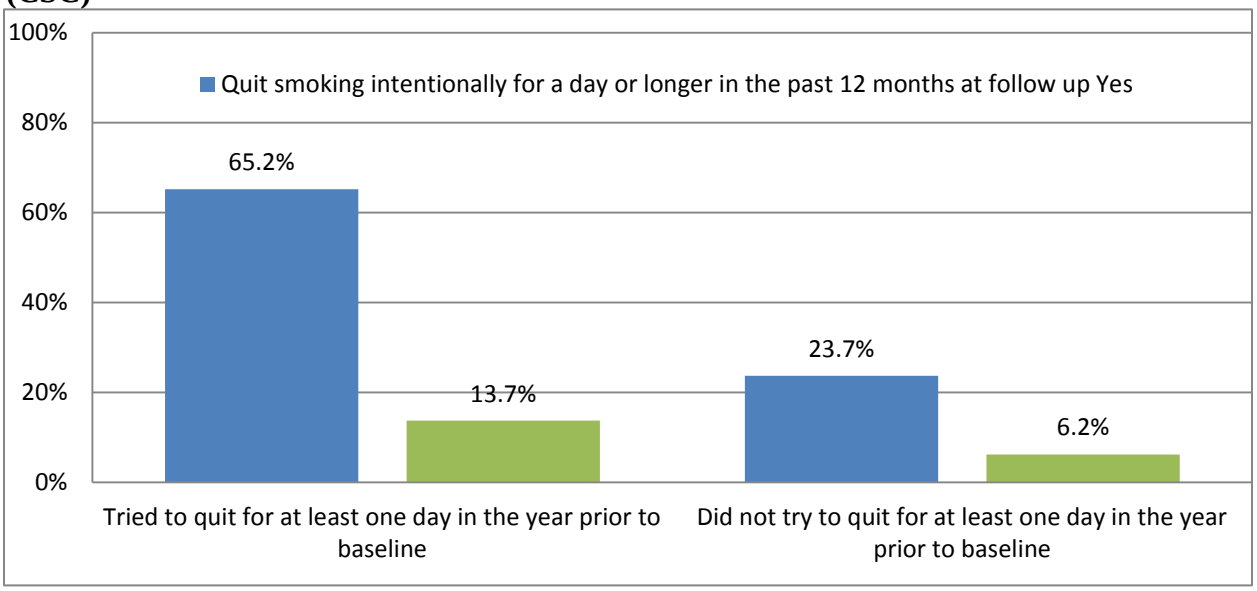
Previous Quit Attempts

At both follow up and baseline, individuals who reported smoking 100 cigarettes in their lifetime and smoking at least "Some days" were asked the following question:

> *"During the past 12 months, have you ever tried to quit smoking for one day or longer?"*

We used both baseline and follow up responses to determine if reporting a quit attempt in the 12 months prior to baseline predicted making a quit attempt at follow up and if these previous quit attempts lead to prolonged abstinence at follow up. Figure 2.3 presents the percentage of quitting attempts for at least a day and at least a month for those respondents that had previously tried to quit in the 12 months before entering the CSC.

Figure 2.3 Previous quit attempts in the year prior to baseline by quit attempts and prolonged abstinence at follow up among respondent in the California Smokers Cohort (CSC)



Most CSC respondents (65.2%) who had made a quit attempt in the 12 months prior to their first survey also made a quit attempt between baseline and follow up while only 23.7% of those who did not try to quit at baseline were reporting a quit attempt at follow up. The odds of making a quit attempt between baseline and follow up were much higher for those who reported making previous quit attempts at baseline compared to those reporting no previous quit attempt at baseline (AOR = 4.13, CI = 3.11 – 8.10). This shows that while many were unsuccessful in their quit attempts before the first survey, they continued to make efforts to quit between baseline and follow up.

Respondents in CSC who continued to make quit attempts, were also more likely to be successfully quit for at least one month at follow up. While the percentage of those who made a previous quit attempt at baseline and were in a prolonged quit attempt at follow up was only 13.7% (Figure 2.3), they were more likely to be in a period of prolonged abstinence at follow up (AOR = 1.76, CI = 1.05 – 2.96) compared to those who did not report at baseline making a previous quit attempt at baseline. This association did not appear to be explained by gender, age, ethnicity, education, or certainty of restraining from smoking.

While many others have reported on factors that predict relapses during quit attempts (US Department of Health and Human Services, 2010), very little is known about how patterns of quit attempts influence subsequent quit attempts and prolonged abstinence in quitting (Borland,

2012). Our results indicate that resilience through unsuccessful quit attempts may be an important process for learning how to quit.

Methods of Cessation Assistance

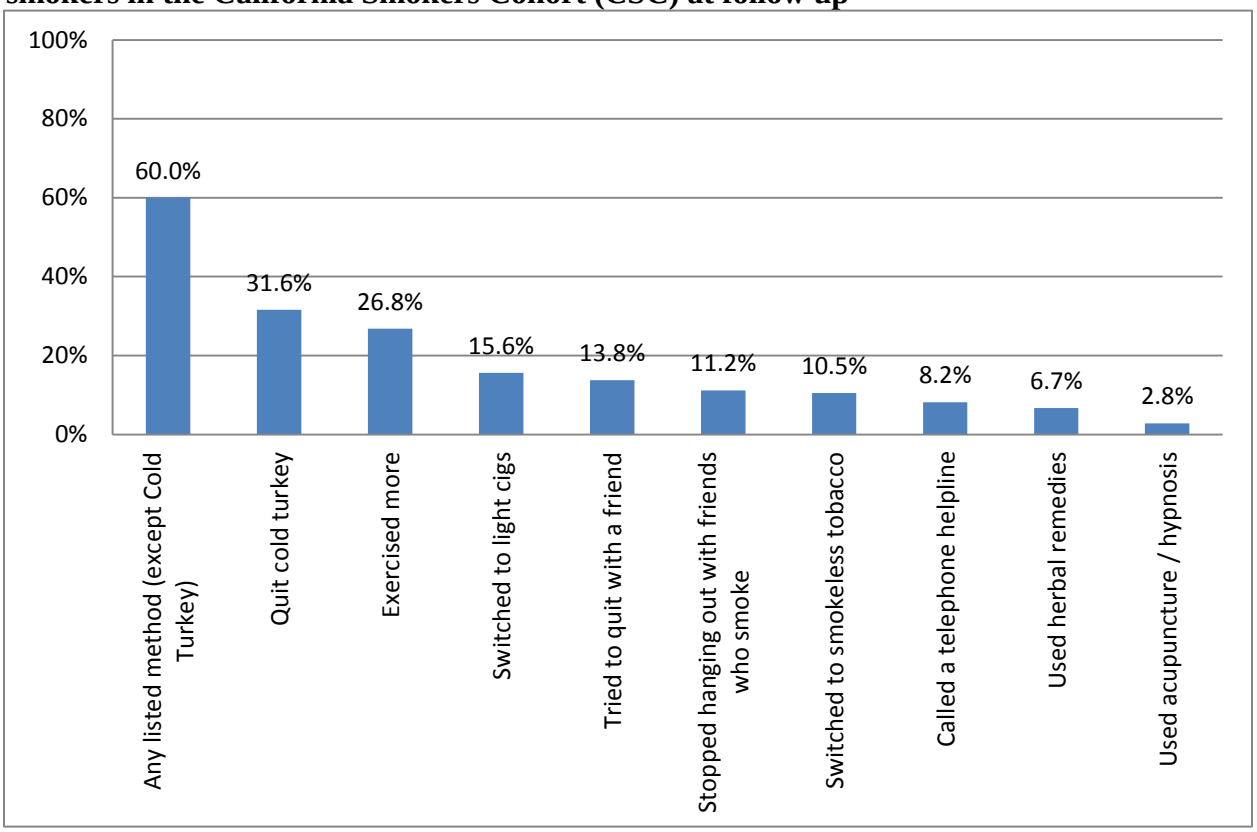
Proven treatments for quitting include counseling, behavioral therapies and nicotine and non-nicotine medications; however, most individuals who quit smoking do so without these forms of assistance (CDC, 2011a; Fiore MC, 2008). Assessment of these endorsed treatment methods among respondents in CSC is discussed in chapter 3. In this chapter we report the use of quitting assistance methods among respondents in CSC.

We asked several questions regarding strategies that baseline smokers used to help them try to quit smoking in the 12 months before their first survey. The methods of cessation included the following:

1. Switched to "light" cigarettes
2. Switched to smokeless tobacco
3. Quit cold turkey (without assistance)
4. Stopped hanging out with friends who smoke
5. Tried to quit with a friend
6. Exercised more
7. Used herbal remedies
8. Used acupuncture/hypnosis
9. Call a telephone helpline

The percentage of each of these responses among participants in CSC is presented in Figure 2.4. At baseline slightly over half of respondents (51.3%) reported that they had tried using any of the above mentioned methods (excluding cold turkey) in the 12 months before their survey. Respondents were most likely to report increasing exercise as a method of assisting in quitting (26.8%), while very few respondents had used herbal remedies (6.7%), acupuncture / hypnosis (2.8%), or a telephone quitline (8.2%). Surprisingly, only 31.6% of respondents followed up in CSC reported trying to quit "cold turkey" at baseline, a much lower prevalence than previous studies in California have reported (CDPH 2008; Al-Delaimy et al., in press, 2010).

Figure 2.4 Prevalence of quitting methods used at baseline among current or former smokers in the California Smokers Cohort (CSC) at follow up

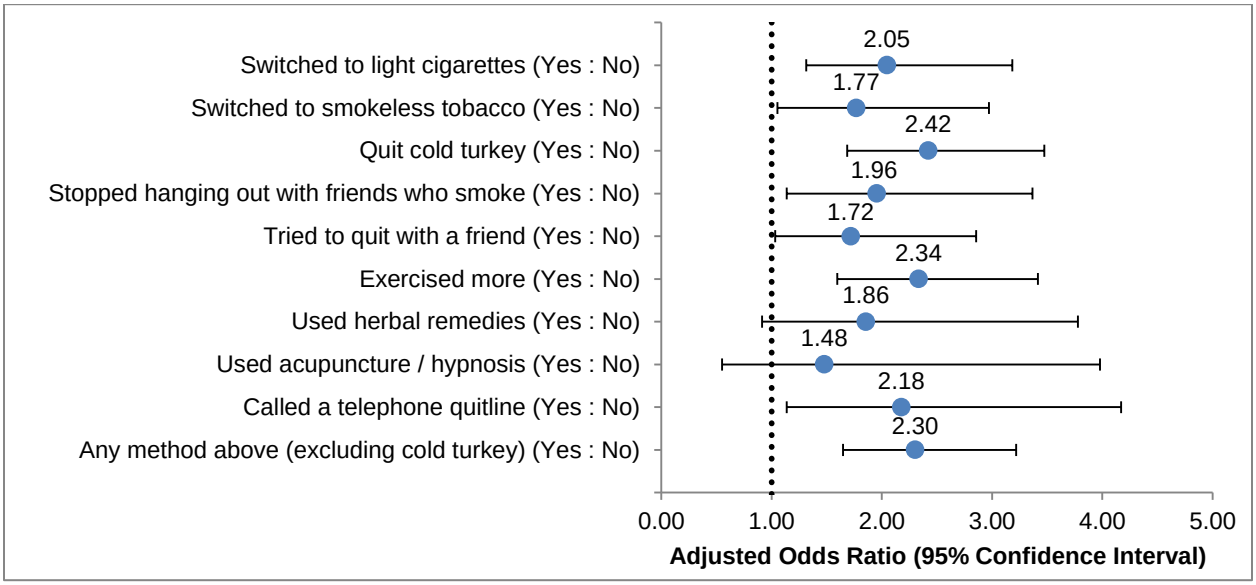


We were interested in estimating the effect that each individual quitting method or use of "any" treatment method other than "cold turkey" had on quitting for a least a day or at least a month at follow up.

The Effect of Cessation Methods on Quitting Attempts

We used multivariate logistic regression models to assess the relationship between the use cessation methods during a quit attempt prior to the baseline survey as a predictor of making a quitting attempt for at least one day at follow up. Each multivariate model was adjusted for age, ethnicity, gender, education level, certainty of restraining from smoking and intentions to quit smoking. The results for each multivariate model displaying the effect of each method of cessation on quitting attempts is presented in Figure 2.5 below.

Figure 2.5 Assessing the association between reported use of cessation methods at baseline and attempting to quit smoking for > 1 day (vs Not quitting >1 day) at follow up after 1 year, among adults (>18 years) who report smoking at least non-daily in the California Smokers Cohort.



Note1: Model specified as quit smoking for at least 1 day = Yes; Separate multivariate models for each variable that adjust for Age, Gender, Ethnicity, Education Level, Certainty of Restraining from Smoking and Intention to Quit Smoking. Note2: Crosstabs of all covariates available in Appendix Table A2-1

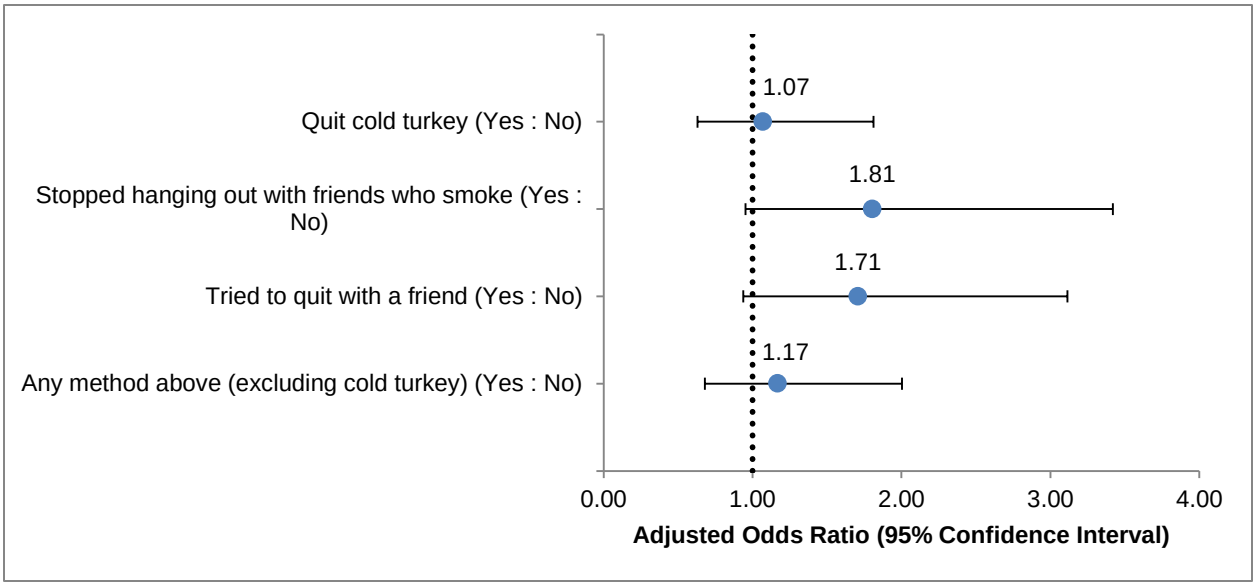
Of the 10 cessation methods assessed in this chapter, only the reported use of herbal remedies or acupuncture prior to baseline were not predictive of quitting attempts at follow up. However, herbal remedies and acupuncture/hypnosis were the least likely cessation methods to be used resulting in less statistical certainty and may be leading to the marginal insignificance observed. This can be seen in the large confidence intervals surrounding herbal remedies and acupuncture/hypnosis.

Nonetheless these results clearly indicate that previous quitting attempts are highly associated with future quitting attempts independent of the method of cessation used to make a quit attempt. We explore the effect these cessation methods have on producing prolonged abstinence in the sub-section below.

The Effect of Cessation Methods on Prolonged Abstinence

We used 4 multivariate logistic regression models to assess the relationship between any uses of each individual cessation method prior to the baseline survey independently as a predictor of being in a prolonged quitting attempt for at least one month at follow up. We could not assess the variables: “switched to light cigarettes”, “switched to smokeless tobacco”, “exercised more”, “use of herbal remedies”, “use of acupuncture/hypnosis”, or “use of quit line”, because the proportion of results in these strata were too sparse to produce statistically reliable effect estimates. Each multivariate model was adjusted for age, ethnicity, gender, education level, certainty of restraining from smoking and intentions to quit smoking. The results for each multivariate model displaying the effect of each non-recommend method of cessation on having prolonged smoking abstinence for at least one month is presented in Figure 2.6 below.

Figure 2.6 Assessing the association between reported use of non-endorsed cessation methods at baseline and prolonged abstinence for at least 1 month (vs Not quitting >1 month) at follow up after 1 year, among adults (>18 years) who reporting smoking at least non-daily in the California Smokers Cohort.



Note1: Model specified as quit smoking for at least 1 month = Yes; Separate multivariate models for each variable that adjust for Age, Gender, Ethnicity, Education Level, Certainty of Restraining from Smoking and Intention to Quit Smoking. Note2: Crosstabs of all covariates available in Appendix Table A2-2.

All of the 4 cessation methods assessed during the interval prior to baseline had no association with prolonged abstinence for at least a month at follow up. While there is a possibility this can be explained by statistical instability, it may be an indicator that cessation methods are not effective in producing prolonged abstinence.

In our analyses we use responses to baseline questions that include statements such as: "*In the past 12 months have you used…*" to assess outcomes for prolonged abstinence at follow up. This leaves open the possibility for cessation methods to vary between baselines and follow.

We conducted a sensitivity analysis to assess whether using responses to the questions at follow up changed the relationships observed in our analysis. Sensitivity analyses showed that all relationships between cessation methods and prolonged abstinence remained in the same direction and non-significant with the exception of "cold turkey". Compared to those who had not tried cold turkey or not tried to quit, those who reported trying the "cold turkey" method at follow had an OR of 6.92 (95% CI 3.61-13.28) up were significantly more likely to be in a period of prolonged abstinence at follow up. Future longitudinal studies need to account for changes in patterns of the cessation methods used among their respondents throughout time.

Summary

For most smokers, cessation is a long process that may be both psychological, physiologically and socially challenging. Those who continue to preserver through multiple quit attempts, however, are usually the ones who are successful at quitting (Borland et al., 2012, DiClemente et al., 1991; Durkin et al., 2012). Among respondents in CSC, the large majority of smokers did

not make a quit attempt, decrease their cigarette consumption, nor quit for at least a month after one year of follow up. However, those who intended to quit or reported a past quit attempt at baseline were more likely to make a quit attempt at follow up and were more likely to be in a prolonged quit attempt at the time follow up. Encouraging smokers to continue preserving through unsuccessful quit attempts may be an important role for tobacco programs to play.

While more than half of the respondents in CSC people reported using methods of smoking cessation other than the traditional nicotine replacement and prescription pills methods, these methods did not appear to have a significant impact on producing prolonged abstinence from smoking but were mostly related to making future quit attempts. This may demonstrate that these cessation assistance methods are not effective and the success obtained when using these methods may be driven more by the will to quit as demonstrated by relationship of quitting cold turkey. This finding has important implications for program planning. Tobacco Control programs should teach smokers who are serious about quitting to continue to learn from their previous quit attempts and encourage them to use methods of cessation that have proven effectiveness.

Appendix

Table A2-1 Frequency of covariates used in multivariate models in follow up population of Daily and Non-Daily Smokers, California Smokers Cohort (*n =886*) Note: used for outcome variable "quit for at least one day"

Quit smoking intentionally for a day or longer in past 12 months	(Baseline and Follow-up smokers)	YES n(%)	NO n(%)
Overall		361(40.7)	525(59.3)
Gender	Male	172(40.1)	257(59.9)
	Female	189(41.4)	268(58.6)
Age	18 - 24	26(60.5)	17(39.5)
	25 - 44	96(44.0)	122(56.0)
	45 - 59	239(38.2)	386(61.8)
Ethnicity	Non-Hispanic White	241(37.1)	409(62.9)
	All others	120(50.8)	116(49.2)
Education	<=12 years	120(38.0)	196(62.0)
	Some College and Above	241(42.3)	329(57.7)
Intention regarding quitting in the next 6 months	Yes	204(59.3)	140(40.7)
	No	136(26.7)	373(73.3)
Certainty about restraining from smoking for at least one month	Very/Somewhat sure	232(47.7)	254(52.3)
	Very/Somewhat unsure	126(32.6)	260(67.4)
To help quit in past 12 months - switched to light cigs	Yes	75(63.0)	44(37.0)
	No	265(42.0)	366(58.0)
To help quit in past 12 months - switched to smokeless tobacco	Yes	47(58.8)	33(41.3)
	No	294(43.8)	378(56.3)
To help quit in past 12 months - quit cold turkey	Yes	146(65.5)	77(34.5)
	No	193(36.8)	332(63.2)
To help quit in past 12 months - stopped hanging out with friends who smoke	Yes	50(64.9)	27(35.1)
	No	286(42.9)	381(57.1)
To help quit in past 12 months - tried to quit with a friend	Yes	62(66.0)	32(34.0)
	No	279(42.4)	379(57.6)
To help quit in past 12 months - exercised more	Yes	129(67.2)	63(32.8)
	No	209(37.5)	348(62.5)
To help quit in past 12 months - used herbal remedies	Yes	32(68.1)	15(31.9)
	No	309(43.8)	396(56.2)
To help quit in past 12 months - used acupuncture / hypnosis	Yes	11(55.0)	9(45.0)
	No	330(45.1)	402(54.9)
To help quit in past 12 months - called a telephone helpline	Yes	39(66.1)	20(33.9)

Table A2-1 Frequency of covariates used in multivariate models in follow up population of Daily and Non-Daily Smokers, California Smokers Cohort (*n =886*) Note: used for outcome variable "quit for at least one day"

Quit smoking intentionally for a day or longer in past 12 months	(Baseline and Follow-up smokers)	YES n(%)	NO n(%)
	No	302(43.6)	391(56.4)
To help quit in past 12 months - Any of Methods above (except Cold Turkey)	Yes	225(59.5)	153(40.5)
	No	115(31.1)	255(68.9)
Any quit attempts in the 12 months before baseline	Yes	236 (65.2)	126 (34.8)
	No	123 (23.7)	396 (76.3)

Table A2-2 Frequency of covariates used in multivariate models in baseline population of Daily and Non-Daily Smokers, California Smokers Cohort (*n =1000*) Note: used for outcome variable "quit for at least one month"

Baseline smokers who quit more than 1 month at follow-up	(Baseline smokers)	YES n(%)	NO n(%)
Overall		94(9.4)	906(90.6)
Gender	Male	41(8.6)	437(91.4)
	Female	53(10.2)	469(89.8)
Age	18 - 24	1(2.2)*	44(97.8)
	25 - 44	33(12.8)	224(87.2)
	45 - 59	60(8.6)	638(91.4)
Ethnicity	Non-Hispanic White	62(8.5)	664(91.5)
	All others	32(11.7)	242(88.3)
Education	<=12 years	27(7.8)	321(92.2)
	Some College and Above	67(10.3)	585(89.7)
Intention regarding quitting <= 6 months	Yes	59(14.2)	356(85.8)
	No	26(4.8)	516(95.2)
Certainty about restraining from smoking for at least one month	Very/Somewhat sure	68(12.0)	499(88.0)
	Very/Somewhat unsure	24(5.8)	393(94.2)
To help quit in past 12 months - switched to light cigs	Yes	10(7.6)	122(92.4)
	No	73(10.2)	644(89.8)
To help quit in past 12 months - switched to smokeless tobacco	Yes	8(9.0)	81(91.0)
	No	75(9.8)	687(90.2)
To help quit in past 12 months – quit cold turkey	Yes	35(13.1)	233(86.9)
	No	48(8.3)	531(91.7)
To help quit in past 12 months - stopped hanging out with friends who smoke	Yes	15(16.0)	79(84.0)
	No	67(9.0)	680(91.0)
To help quit in past 12 months - tried to quit with a friend	Yes	20(17.1)	97(82.9)

Table A2-2 Frequency of covariates used in multivariate models in baseline population of Daily and Non-Daily Smokers, California Smokers Cohort (*n =1000*) Note: used for outcome variable "quit for at least one month"

Baseline smokers who quit more than 1 month at follow-up	(Baseline smokers)	YES n(%)	NO n(%)
	No	63(8.6)	671(91.4)
To help quit in past 12 months - exercised more	Yes	27(11.9)	200(88.1)
	No	56(9.0)	565(91.0)
To help quit in past 12 months - used herbal remedies	Yes	9(15.8)	48(84.2)
	No	73(9.2)	720(90.8)
To help quit in past 12 months - used acupuncture / hypnosis	Yes	3(12.5)	21(87.5)
	No	80(9.7)	747(90.3)
To help quit in past 12 months - called a telephone helpline	Yes	8(11.4)	62(88.6)
	No	75(9.6)	706(90.4)
To help quit in past 12 months - Any of Methods above (except Cold Turkey)	Yes	52(11.8)	388(88.2)
	No	31(7.6)	376(92.4)
Any quit attempts in the 12 months before baseline	Yes	59 (13.7)	373 (86.3)
	No	35 (6.2)	528 (93.9)

*The two levels have been combined in the hypotheses testing.

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Chapter 3

Use of Assistance and Quitting Behavior

Chapter 3

KEY FINDINGS

Use of Assistance and Quitting Behavior

The focus in the present chapter is on examining utilization of assistance in relation to smoking cessation outcomes after one year of follow up examines the California Smokers Cohort (CSC) Survey

- The smokers who consistently use assistance for cessation by reporting their use in our study at both baseline and follow up were more likely to be females, older in age (45 years or more), non-Hispanic Whites, daily smokers, and smoke their first cigarette within 30 minutes of waking up.

- Among those who used Nicotine Replacement Therapy (NRT) at baseline, 50.8% of them made a quit attempt, 9.4% quit for a month or more, and 31.1% reduced their cigarette consumption at follow up. Those who used counseling to quit reported similar quitting behavior.

- Utilizing any assistance for quitting at baseline or follow up was not associated with quitting for one month or more at follow up or reduction of cigarette consumption by 20% or more. Daily smoking at baseline was significantly less likely to use any assistance at follow up (0.26 odds of not using assistance).

- Once smokers use assistance for quitting they are more likely to continue using it as shown in our study sample that using such assistance at baseline was associated with odds of 7.39 to use it at follow up after one year. More addicted smokers who are daily smokers or smoke their first cigarette in the morning within 30 minutes were also more likely to utilize assistance at follow up.

- Predictors of follow up use of NRT were baseline use of NRT (odds of 11.06), being daily smokers (odds of 2.67). Smokers who believe smokers can quit without any pharmaceuticals were less likely to use NRT at follow up (odds of 0.47).

- Smokers with moderate/severe mental health problems are more likely than mentally normal smokers to use counseling (13.2% vs 3.4%) or combined treatment (18.4% vs 9.1%) and less likely to not use any treatment (44.7% vs 65.9%).

- Smokers with chronic medical conditions were less likely than smokers with any chronic medical condition to use medications alone (0.56 odds), or counseling alone (0.41 odds).

Chapter 3

Use of Assistance and Quitting Behavior

Introduction

The focus in the present chapter is on examining utilization of assistance in relation to smoking cessation outcomes after one year of follow up examines the California Smokers Cohort (CSC) Survey. This information has implications for efforts to promote smoking cessation, as evidence from a large national survey indicates that utilization of smoking cessation medications and other forms of assistance is low (Saul Shiffman, Brockwell, Pillitteri, & Gitchell, 2008) despite consistent findings that their use improves cessation outcomes (Fiore et al., 2008).

Despite high levels of motivation for quitting, frequent quit attempts, and the availability of evidence-based interventions, treatment utilization remains distressingly low among all smokers (S. Shiffman, 2010). Although clinical trials suggest that smokers may double their odds of success when using evidence-based treatment, less than a third of quit attempts involve use of medications, and only about 4% include behavioral counseling delivered in individual, group or telephone format (Saul Shiffman, et al., 2008). As such, very few quit attempts involve the most efficacious treatment approach, consisting of a combination of medication and behavioral counseling (Fiore, et al., 2008). These findings suggest that overall quit rates could be dramatically improved by increasing utilization of evidence based treatments.

Recent research has increased awareness that motivations to quit, interest in cessation treatment, and efforts to quit among smokers with psychiatric disorders mirror the general population of smokers (J. J. Prochaska, 2010; Siru, et al., 2009). For example, in a study of mental health and readiness to change smoking, smokers with poorer mental health had increased odds of being in contemplation (i.e., considering quitting) compared to the precontemplation (i.e., not thinking about quitting) stage, and were equally likely as those with better mental health to be preparing to quit (Schorr et al., 2009). However, despite high motivation to quit, accumulating evidence suggests that psychiatric symptoms are reliably associated with smoking cessation failure. Studies employing a variety of cessation methods consistently find an association between current psychiatric symptoms and poor smoking outcomes (Blondal et al., 1999; Cinciripini, et al., 2003; Niaura et al., 2001). However, at this time little is known regarding the relationship between psychiatric symptoms and treatment utilization. This information is important given the high rates of smoking among individuals with psychiatric disorders along with the poorer outcomes such smokers have when attempting to quit.

We examined use of assistance with respect to, a) demographic characteristics, b) smoking status variables (daily versus non-daily smoking, and time to first cigarette, an indicator of nicotine dependence), c) smoking cessation outcomes, and d) mental health and chronic medical conditions both cross-sectionally (i.e., use of assistance reported at follow-up in relation to

follow-up outcomes) and prospectively (i.e., use of assistance reported at baseline in relation to follow-up outcomes).

Use of assistance (medications and counseling/advice/self-help) in relation to smoking outcomes

We examined use of smoking cessation medications and other assistance utilization for a 24 hour quit attempt among respondents completing the follow-up survey. As medication use has been previously reported in detail for the California Health Interview Survey (CHIS) Longitudinal Smokers Survey (CLSS) study, we briefly provide an overview of use of nicotine replacement and other medications in the follow-up sample.

Medication use

For use of nicotine replacement, the following question was asked:

> *There are many products called Nicotine Replacement Therapy or NRT that replace nicotine to help people quit smoking. For this last quit attempt, did you use a nicotine replacement therapy such as a… (Nicotine patch, nicotine gum, nicotine inhaler, nicotine lozenge)*

Overall, 30.8% (n=159) of smokers who reported quitting for 24 hours in the previous year reported using a nicotine replacement medication during a quit attempt. Nicotine patch was the most commonly used, with 16.6% of respondents reporting patch use. Nicotine gum was next most common, with use reported by 8.1% of respondents who quit in the prior year, followed by nicotine lozenge (4.8%) and nicotine inhaler (4.5%) which were the least commonly used.

For use of non-nicotine smoking cessation medications the following question was asked:

> *For this last quit attempt, did you use a prescription pill to help you to quit such as… (Zyban, Prozac, Chantix)*

Overall, only 13.7% (n=71) of smokers who reported quitting or attempting to quit in the previous year reported using a non-nicotine smoking cessation medication during a quit attempt. Zyban and Chantix were the most commonly used, with 7.2% and 6.8% of respondents reporting use respectively. Prozac was rarely used, 1.7%.

Advice/self-help use

In addition to use of nicotine replacement and other smoking cessation medications, use of assistance during the most recent quit attempt reported at the follow up interview among those reporting a quit attempt was examined using the item asking:

> *Did you use counseling advice or self-help materials to adjust to life without cigarettes?*

We next examined the counseling/advice/self-help variable in relation to demographic and baseline smoking characteristics. Those who reported counseling/advice/self-help were more

likely to be female than male (24.3% versus 14.1%), and tended to be older (22.1% of 45+ years old versus 16.2% of those 25 – 44 years, versus 6.7% of those 18-24). For smoking characteristics, daily smokers tended to be more likely to use counseling advice – self-help than non-daily smokers (21.4% versus 13.7%), and were more likely to smoke their first cigarette of the day within 30 minutes of waking up than after 30 minutes (22.2% versus 17.1%). (Appendix Table A3-1)

Respondent characteristics and outcomes

To describe in more detail the use of assistance, and examine utilization of assistance in relation to respondent characteristics and smoking outcomes we created composite variables reflecting a) use of any assistance (medication/nicotine replacement and/or counseling/advice/self-help) versus no assistance; and b) type of assistance used across four categories: no assistance; medication/nicotine replacement only; counseling/advice/self-help only; and use of both medication/nicotine replacement and counseling/advice/self-help.

We employed these variables to describe utilization of quitting assistance among those reporting a quit attempt in the past year at the follow-up survey. Among these respondents, almost half, 44.8%, reported some form of assistance (medication/nicotine replacement and/or counseling/advice/self-help), with the remaining 55.2% reporting no use of assistance. Examining the types of assistance utilized reveals that 25.3% of those who tried to quit used medication/nicotine replacement only, 5.6% counseling/advice/self-help only, and 13.8% used both forms of assistance.

To further characterize smokers who use assistance, we next compared use of assistance at both time-points (baseline and follow-up) with no use of assistance at either time by demographic and baseline smoking characteristics. Those who reported using assistance at both time points were more likely to be female than male (65.3% versus 54.3%), and older (65.4% of 45 or more years old, 51.9% of those 25 – 44 years of age, and 27.8% of those 18-24 years of age). In addition, Non-Hispanic White smokers were more likely to use assistance at both time-points than Non-White smokers (63.4% versus 52.6%). For smoking characteristics, daily smokers were far more likely to use assistance at both time-points than non-daily smokers (68.6% versus 24.7%). Those who used assistance at both time points were significantly more likely to smoke their first cigarette of the day within 30 minutes of waking up than after 30 minutes (73.8% versus 43.5%, $p<.001$). Thus, characteristics of those utilizing any type of assistance at both time-points compared with those not utilizing assistance at all was similar to those utilizing assistance for a follow-up quit attempt. Those using repeated assistance were more likely to be female, white, over 45 years of age and heavy smokers (daily smokers and those who smoke their first cigarette within 30 minutes of waking up). (Appendix Table A3-5)

As shown in Figure 1, among those who used any Nicotine Replacement Therapy (NRT) at baseline, 50.8% of them made a quit attempt, 9.4% of them quit for at least one month, and 31.1% reduced their cigarette consumption by 20% or more after one year of follow up. The results for using counselling or self-help were very comparable and shown in Figure 2 where 55.6% of such users quit smoking, 8.0% quit smoking for at least one month, and 31.1% reduced cigarette consumption by 20% or more after one year of follow up.

Figure 1: Frequency of use of any NRT at baseline by quit attempts and smoking reduction.

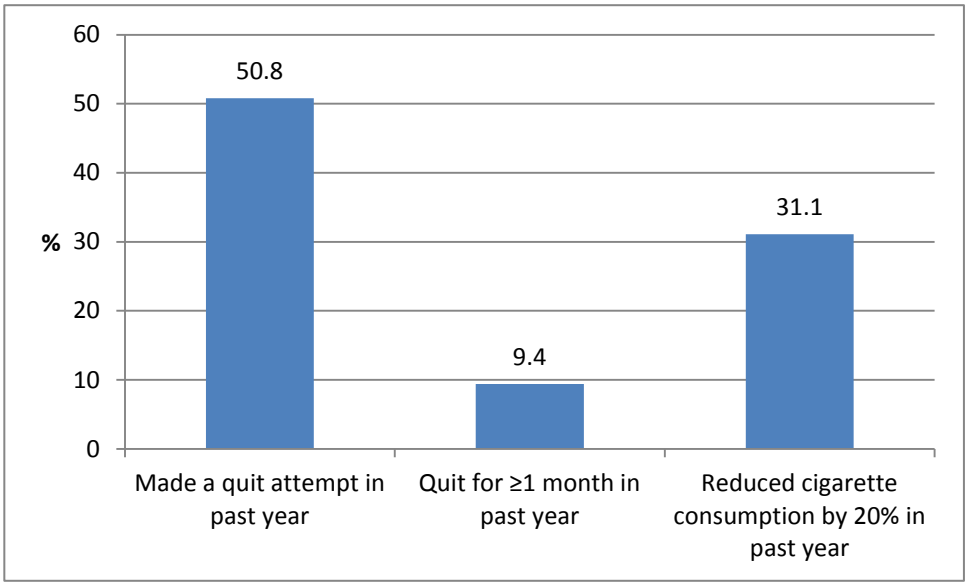
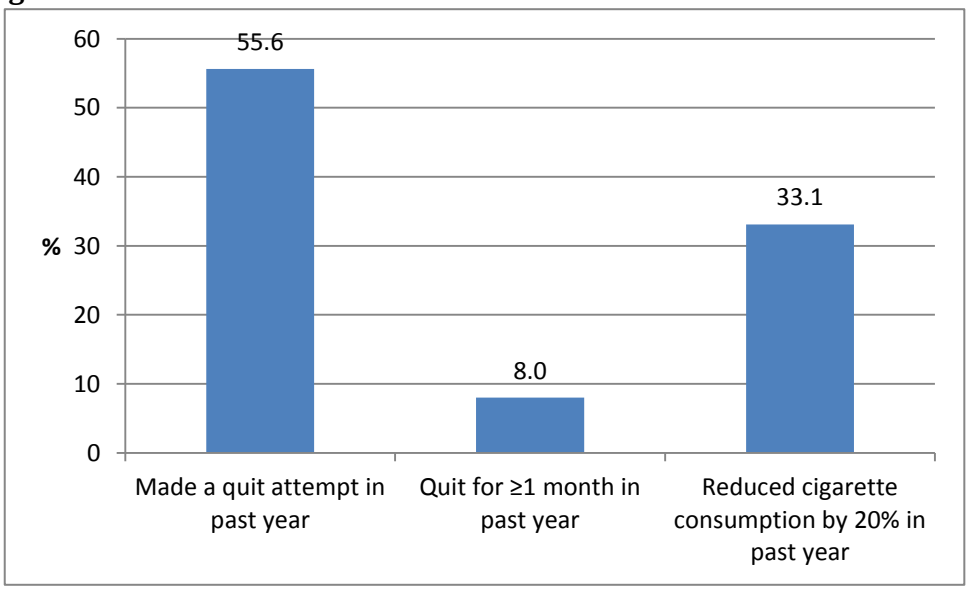


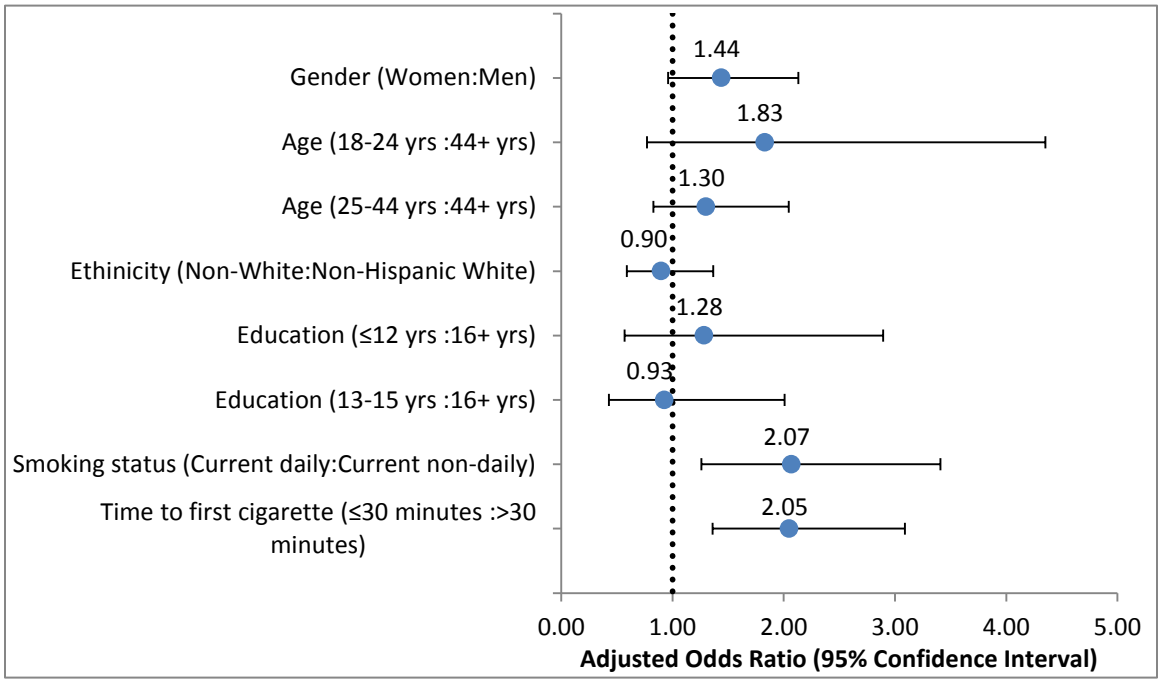
Figure 2: Frequency of use of counseling or self-help at baseline by quit attempts and smoking reduction.



Next, we examined baseline demographic and smoking variables associated with utilization of assistance for quitting at follow up (any form of assistance versus none).

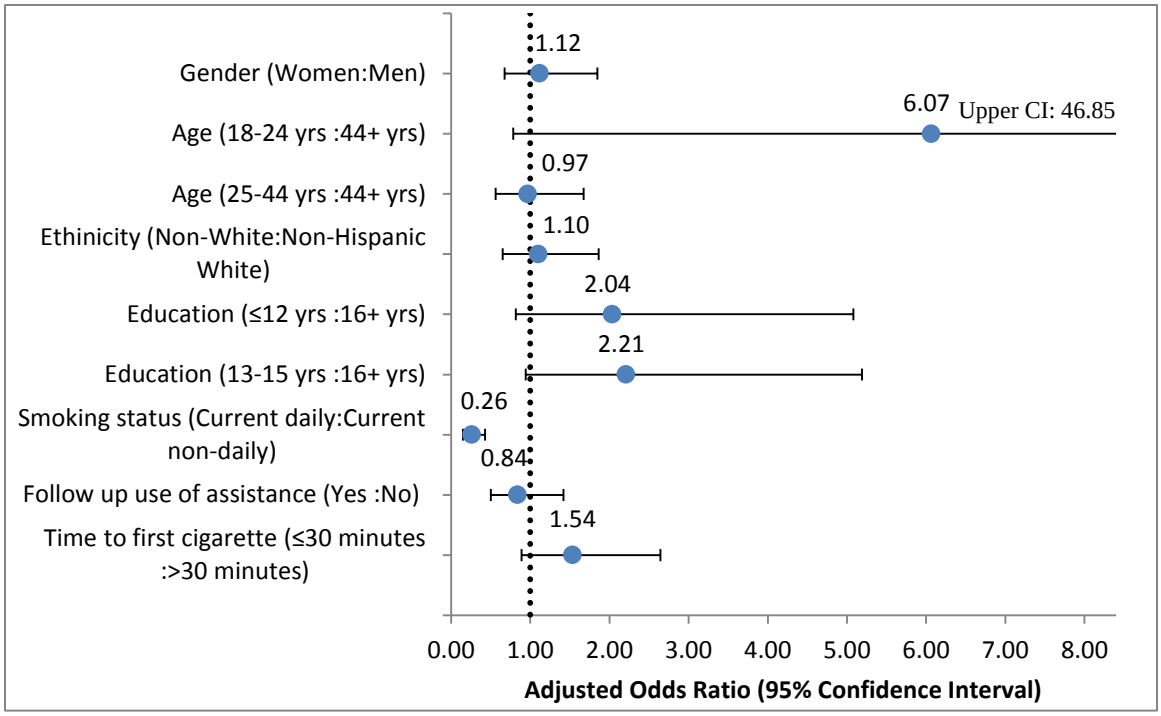
As shown in Figure 3, the multivariate model predicting any utilization of assistance during follow up none of the demographic variables significantly predicted use of assistance. Women did tend to be more likely to utilize assistance than men but was not statistically significant (OR = 1.44, 95% CI: 0.96 – 2.13). The two primary indicators of nicotine dependence, frequency of smoking and smoking a cigarette shortly after waking up, were the only significant predictors of use of assistance. Daily smokers were significantly more likely to utilize any assistance (OR = 2.07, 95% CI: 1.26 – 3.41) than non-daily smokers. Similarly, smokers who had their first cigarette within 30 minutes of waking were more likely to utilize assistance than those who smoked later (OR = 2.05, 95% CI: 1.36 – 3.09).

Figure 3 Baseline Demographic Characteristics and Smoking Variables Predicting Use of Assistance during Follow-up Quit Attempt



Cross sectional multivariate models were constructed to predict follow-up smoking outcomes from follow-up assistance utilization, controlling for baseline smoking and demographics. As shown in Figure 4, the model examining predictors of being quit for ≥1 month at follow-up was significant, however utilizing any assistance (OR=0.84, 95% CI: 0.50-1.42) was not associated with being quit. Daily smokers were significantly less likely than non-daily smokers to be quit for ≥ 1 month at the follow-up survey (OR=0.26, 95% CI: 0.15 – 0.43). A number of significant predictors emerged for the model examining predictors of reducing smoking by ≥20% at follow-up, but use of assistance during a quit attempt at follow-up was not related to smoking reduction at follow up (OR= 0.83, 95% CI: 0.52-1.31).

Figure 4. Cross-sectional Multivariate Model for Follow-Up Use of Assistance Predicting Quit for ≥ 1 Month at Follow-Up.



This analysis indicates that heavier smokers are significantly more likely to use assistance during their most recent quit attempt. However, using assistance was not associated with being quit for ≥ 1 month at follow-up nor associated with smoking reduction. Thus in the present sample use of assistance does not correspond with better outcomes. This may be explained by the observation that individuals with higher nicotine dependence are significantly more likely to utilize assistance, but are also significantly less likely to quit or reduce smoking. Thus, it may be that any positive effects of employing assistance are outweighed by the smoking characteristics of those most likely to use assistance. Regardless, there is no evidence that use of assistance leads to better outcomes in the present sample.

Baseline use of assistance

Finally, we examined utilization of assistance during a baseline quit attempt for all baseline smokers reporting a quit at baseline who completed the follow-up survey. Baseline utilization of assistance was examined in relation to a) utilization of assistance during the follow-up period and b) in relation to follow-up smoking outcome variables (quitting for 24 hours, quitting for 24 hours (including imputed cases), being quit for ≥ 1 month at follow-up, and reducing smoking by ≥ 20%). Multivariate models including Baseline smoking status and demographic characteristics were employed to examine these relationships. The model predicting future use of assistance shows that baseline assistance is the strongest predictor, with those reporting prior use of assistance 7 times more likely to do so in future quit attempts (OR 7.39, 95% CI: 4.52-12.09) (Appendix Table A3-3). Daily smokers and those smoking their first cigarette within 30 minutes of awakening were also significantly more likely to utilize assistance during the follow-up

period, above and beyond the effect of prior use of assistance. None of the demographic variables predicted subsequent use of assistance when considered together with prior assistance and smoking variables.

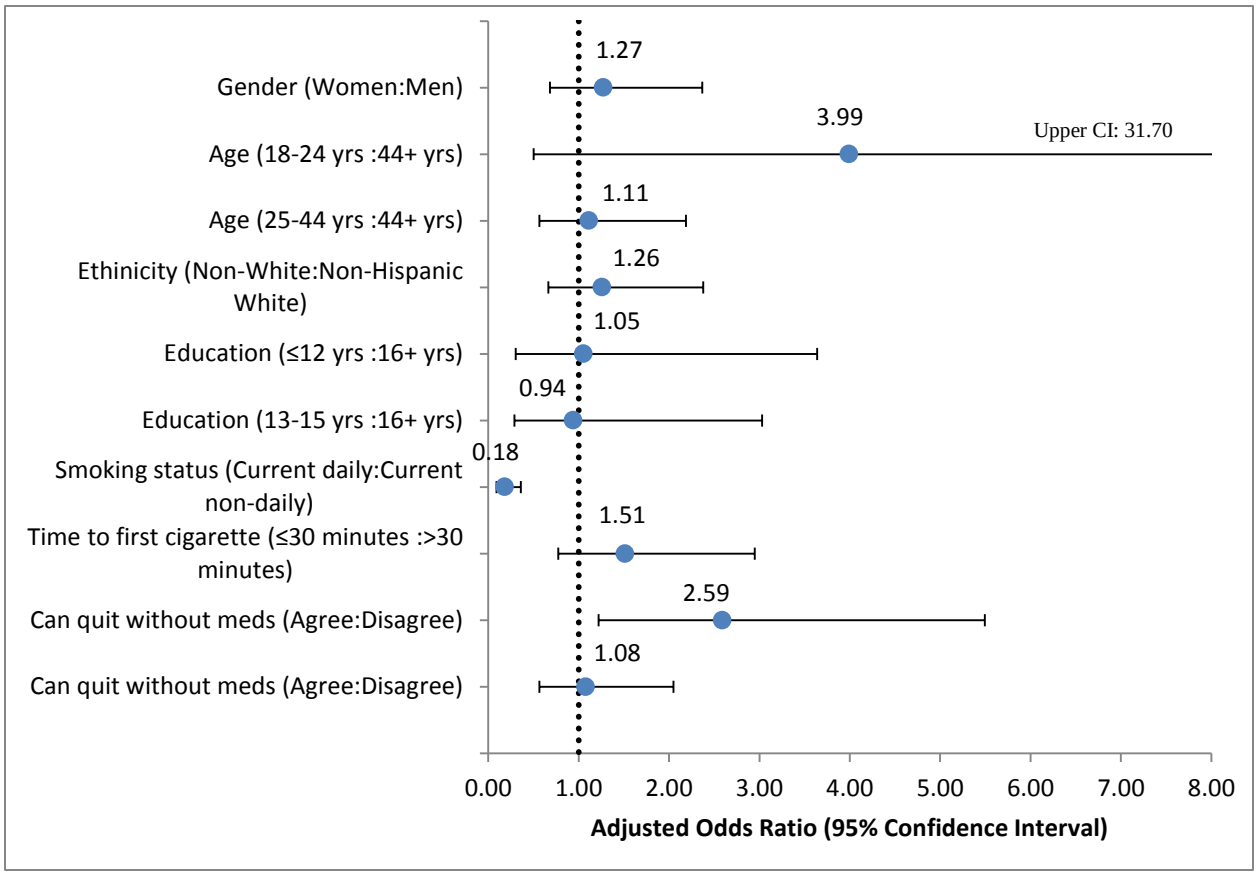
Next, we examined factors associated with repeated use of assistance despite previous failure. To this end we examined two items reflecting attitudes regarding perceived value of NRT's for helping smokers quit. Respondents were asked:

> *Please tell me if you agree or disagree with the following statements about Nicotine Replacement Therapy, or NRT.*
>
> Response options were *Agree, Disagree, or Don't Know:*
>
> *Most smokers who use NRT to quit are successful*
>
> *Smokers can quit on their own without any pharmaceutical aids*

Because these items centered on use of NRT, we employed use of NRT for a quit attempt reported at follow-up as the dependent variable. A multivariate logistic model was examined including both NRT belief items and whether smokers had reported using NRT during a quit attempt at the baseline survey, along with demographic and smoking variable covariates. Included were all smokers reporting a quit attempt at the follow-up survey. The overall model indicated Daily smokers (OR 2.67, 95% CI: 1.28-5.56) and those who reported use of NRT during a quit at baseline (OR 11.06, 95% CI: 6.31-19.38) were significantly more likely to use NRT for a follow-up quit attempt. Conversely, those who agreed that smokers can quit without pharmaceuticals were significantly less likely to use NRT at follow-up (OR 0.47, 95% CI: 0.27-0.82) (Appendix Table A3-4). This finding suggests that smokers who previously failed NRT are likely to use NRT's again, especially if they believe they cannot quit without medication.

Next, multivariate binary logistic regression models were conducted examining prediction of the follow-up survey smoking outcomes; because the NRT belief item that smokers can quit without pharmaceuticals was predictive in the prior analysis, we included it in these models for explanatory purposes. Overall, baseline use of assistance did not predict any of the follow-up smoking outcome variables. However, it is of interest to note that the belief that smokers can quit without medications was significantly associated with quitting, with those who agreed more than twice as likely to be quit for $\geq$ 1 month at follow-up (OR 2.59, 95% CI: 1.22-5.50) (Figure 5).

Figure 5 Baseline use of Assistance Predicting Quit ≥ 1 Month at Follow-Up



Examination of baseline reports of utilizing quitting assistance indicates that previous utilization is a strong predictor of future use of assistance when attempting to quit smoking.

Use of cessation treatment in relation to mental health and chronic medical conditions

At the follow up assessment, smokers were asked about their use of strategies when making an attempt to quit. We examined mental and physical health correlates of treatment utilization. Smokers were asked at follow up if, during their last quit attempt, they tried to quit using

a) a medication such as nicotine replacement, bupropion or varenicline,

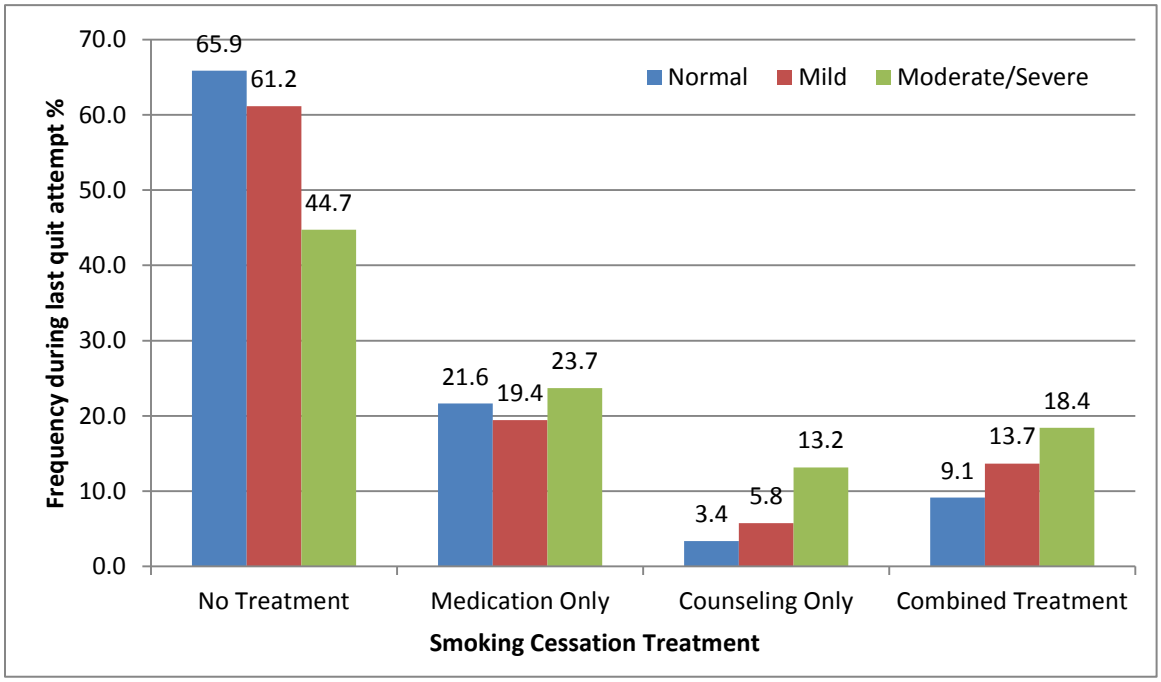
b) behavioral counseling, or

c) no assistance from counseling or medication.

We evaluated only smokers reporting a quit attempt lasting at least 24 hours in the past 12 months (n=474). The majority of quit attempts occurred with no treatment (59.2%) followed by medication only (21.5%), combined medication and counseling (12.8%), and counseling alone (6.5%). As shown in Figure 6, past-year utilization of cessation methods differed among smokers who at baseline reported normal range (n=213), mild (n=145), and moderate/severe (n=116) levels of mental health problems on the Four-Item Patient Health Questionnaire (PHQ-4) for

Anxiety and Depression. Those with normal range of PHQ4 were more likely (65.9%) to not use treatment for their last quit attempt, while those with moderate/severe mental health problems according to the PHQ4 were less likely (44.7%) to not use treatment and more likely to use counseling only or combined counselling and medical treatment, compared to smokers with normal PHQ4 (Figure 6). We evaluated the association between reports of mental health and chronic medical conditions and engagement in treatment in multivariable logistic regression models that adjusted for sociodemographic characteristics (i.e. age, gender, ethnicity, education) and baseline smoking characteristics (i.e. frequency and level of tobacco dependence). Although overall rates of treatment were low, smokers with moderate/severe mental health were less likely (OR=0.45; CI=0.27-0.74) to attempt cessation without assistance from counseling and/or medication. Mild mental health symptoms and having one or more chronic medical conditions were not significantly associated with engaging in unaided quit attempts (see Table 1).

Figure 6 Past-year utilization of cessation methods according to level of mental health problems.



When examining individual methods of quitting, smokers with no chronic medical conditions were less likely (OR=0.56; CI=0.35-0.91) than other smokers to use medication alone during their last quit attempt. Level of mental health problems was not significantly related to using medication alone after accounting for the presence of chronic medical conditions (see Table 1).

Having moderate/severe mental health problems (OR=4.96, CI=1.98-13.00) and having a chronic medical condition (OR=0.41, CI=0.17-0.97) were independently related to using counseling alone in their last quit attempt. Level of mental health symptoms and the presence of a chronic medical condition were not significantly related to the use of combined treatment during their most recent quit attempt.

Table 1: Use of cessation treatment and presence of health conditions.

		Unaided cessation attempt	Medications alone	Counseling alone	Medication & Counseling
		OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Level of mental health symptoms as reported at basesline on the PHQ4.	**Mild vs. Normal**	0.86 (0.53-1.4)	0.8 (0.45-1.41)	1.85 (0.63-5.42)	1.5 (0.74-3.04)
	Moderate/ severe vs. Normal	0.45 (0.27-0.74)	1 (0.56-1.78)	4.96 (1.89-13.02)	1.87 (0.94-3.76)
Chronic medical conditions	**None vs. One or more**	1.51 (1.00-2.27)	0.56 (0.35-0.91)	0.41 (0.17-0.97)	1.63 (0.92-2.90)

Summary

Use of assistance during survey respondents' previous quit attempt at the follow-up survey indicated higher rates than reported in national surveys. Overall, 30.8% reported use of nicotine replacement medications, 13.7% other medications, and 19.4% reported counseling advice or self-help. In aggregate, 44.7% of respondents who attempted to quit in the previous year reported use of assistance.

Overall, the proportion of quitters reporting use of assistance is substantially higher in the present sample than observed in a large national sample (Shiffman, 2008). This discrepancy may reflect regional differences in awareness and availability of smoking cessation resources, or alternately may reflect sampling issues and/or self-report bias. However, it is apparent that the rates of utilizing combined medications and counseling/advice (13.8%) is quite low even though this may reflect the optimal evidence-based approach to treating tobacco use based on clinical trials (Fiore et al., 2008).

Of those who used assistance, the majority (56.6%) used medications only, 12.5% used counseling advice or self-help only, and 30.87% used medication and counseling advice or self-help. While some demographic differences emerged between those who did or did not use assistance, differences by smoking characteristics were most consistent, indicating that those using assistance were heavier smokers as indicated either by daily smoking status or shorter time to first cigarette of the day. Thus, it may be that smokers who have previously failed at quitting are more likely to employ assistance over time, as is suggested by baseline reports of assistance utilization strongly predicting reported use of assistance at the follow-up survey. This repeated use of assistance despite prior failure in part reflects beliefs that smokers may not be able to quit without pharmaceutical assistance. Thus, smokers who have previously failed but believe they cannot quit without assistance seem likely to continue employing assistance to quit. Not surprisingly, given the heavier smoking status of those employing assistance, use of medications and/or counseling advice or self-help does not correspond with smoking outcomes. The present

data cannot be fully interpreted with respect to the utility of assistance, however some conclusions are warranted. Discrepancies have been noted between results of clinical trials of cessation medications and population-based studies (Walsh 2008). The present results are consistent with these observations in that no advantage is evident for use of cessation assistance. Although there is no clear and consistent evidence to explain this discrepancy, it is likely a combination of multiple factors related to the utilization of smoking cessation, including characteristics of those who employ assistance and how they utilize assistance. However, based on our previous data, quitters appear to use nicotine replacement products appropriately, and few smoked cigarettes while using these products. Rather, our present results suggest that a belief that one cannot quit without medications may be one such characteristic that explains these findings. It may be that smokers who believe they can quit without medications have higher self-efficacy and are more likely to succeed regardless of assistance. In contrast, those who believe they cannot quit unassisted appear to have poorer outcomes even after accounting for the influence of assistance and smoking characteristics. As such, the belief in need for medications to quit successfully may hinder quitting, and this in turn may reflect an influence of pharmaceutical industry advertising of smoking cessation medications.

Despite the present findings, and in light of the limitations of our outcome measures, the Clinical Guideline for Treating Tobacco Use and Dependence (Fiore et al., 2008) clearly identifies optimal treatment as consisting of use of pharmacotherapy in combination with behavioral counseling, and also clearly identifies a dose-response relationship such that greater intensity and frequency of behavioral treatment corresponds with better outcomes. For our sample less than half of quit attempts reported in the follow-up survey involve use of any quitting assistance, thus presumably reducing the likelihood of successful quitting. This may reflect smokers attitudes about the value of cessation medications and treatment as well as provider's failure to recommend treatment. The public health implications of these recommendations when viewed in the context of the present findings suggest the value of attending to smoker's beliefs about the role of medication and counseling. This can be done by reinforcing smokers beliefs in their ability to quit regardless of assistance, and to articulate the ways in which assistance, whether medication or counseling support, can enhance efforts to quit smoking.

Appendix

Table A3-1 Characteristics of smokers according to whether they used Counseling Advice or Self-help at baseline.

		% YES	% NO
Overall		19.4 (100)	80.6 (415)
Gender	Male	14.1 (35)	85.9 (213)
	Female	24.3 (65)	75.7 (202)
Age	18-24	6.7 (2)	93.3 (28)
	25-44	16.2 (25)	83.8 (121)
	45+	22.1 (73)	77.9 (258)
Ethnicity	Non-Hispanic White	18.6 (63)	81.4 (276)
	Non-White	21.0 (37)	79.0 (139)
Education	≤12 Years	18.5 (31)	81.5 (137)
	Some college/college	21.1 (65)	78.9 (243)
	Postgraduate	10.3 (4)	89.7 (35)
Smoking Status	Current Daily	21.4 (74)	78.6 (272)
	Current Non-daily	13.7 (16)	86.3 (101)
Time to First Cigarette	≤ 30 Minutes	22.2 (59)	77.8 (207)
	> 30 Minutes	17.1 (40)	82.9 (104)

Table A3-2 Characteristics of smokers reporting a quit attempt in the past year at the follow-up survey, according to whether they used Any Form of Assistance

		% YES	% NO
Overall		44.8 (208)	54.0 (256)
Gender	Male	38.7 (84)	61.3 (133)
	Female	50.2 (124)	49.8 (123)
Age	18-24	32.1 (9)	67.9 (19)
	25-44	39.7 (52)	60.3 (79)
	45+	48.2 (147)	51.8 (148)
Ethnicity	Non-Hispanic White	46.0 (143)	54.0 (168)
	Non-White	42.5 (65)	57.5 (88)
Education	≤12 Years	43.6 (65)	56.4 (84)
	Some college/college	45.9 (129)	54.1 (142)
	Postgraduate	41.2 (14)	58.8 (20)
Smoking Status	Current Daily	50.6 (176)	49.4 (172)
	Current Non-daily	27.6 (32)	72.4 (84)
Time to First Cigarette	≤ 30 Minutes	55.5 (132)	34.7 (106)
	> 30 Minutes	44.5 (74)	65.3 (139)

Table A3-3 Baseline use of Assistance Predicting Follow-Up Use of Assistance Controlling for Demographics and Smoking

Dependent Variable	**Use of Assistance During Follow-up Quit Attempt**					
Covariates	**OR**	**95% CI**		**B**	***SE B***	***p***
Gender (Female vs Male)	1.137	0.69	1.872	0.128	0.254	0.614
Age (18-24 vs 45+)	1.263	0.444	3.596	0.234	0.534	0.661
Age (25-44 vs 45+)	1.373	0.783	2.41	0.317	0.287	0.269
Ethnicity (Non-White vs Non-Hispanic White)	0.828	0.49	1.399	-0.189	0.268	0.48
Education (≤ 12th grade vs college+)	2.479	0.842	7.299	0.908	0.551	0.099
Education (Some College/College vs college+)	2.062	0.733	5.803	0.724	0.528	0.171
Smoking Status (Daily vs Non-Daily)	2.502	1.366	4.583	0.917	0.309	0.003
Time to First Cigarette (<= 30 minutes vs >30 minutes)	1.836	1.104	3.055	0.608	0.26	0.019
Predictor						
Baseline Use of Assistance	7.394	4.524	12.085	2.001	0.251	<0.001
$\chi 2 = 124.765, \pi < .001$						

Table A3-4 Baseline use of NRT and NRT Beliefs Predicting Follow-Up Use of NRT Controlling for Demographics and Smoking

Dependent Variable	**Use of NRT During Follow-up Quit Attempt**					
Covariates	**OR**	***95% CI***		**B**	***SE B***	***p***
Gender (Female vs Male)	0.963	0.552	1.678	-0.038	0.283	0.894
Age (18-24 vs 45+)	0.928	0.298	2.888	-0.075	0.579	0.897
Age (25-44 vs 45+)	1.609	0.855	3.026	0.476	0.322	0.14
Ethnicity (Non-White vs Non-Hispanic White)	1.309	0.729	2.353	0.27	0.299	0.367
Education (≤ 12th grade vs college+)	2.759	0.833	9.141	1.015	0.611	0.097
Education (Some College/College vs college+)	1.85	0.592	5.783	0.615	0.582	0.29
Smoking Status (Daily vs Non-Daily)	2.669	1.281	5.558	0.982	0.374	0.009
Time to First Cigarette (<= 30 minutes vs >30 minutes)	1.582	0.895	2.796	0.459	0.291	0.115
Predictors						
Used NRT Baseline (Yes vs No)	11.059	6.312	19.375	2.403	0.286	<0.001
Most who use NRT are successful (Don't Know vs disagree)	0.872	0.382	1.99	-0.137	0.421	0.744
Most who use NRT are successful (Agree vs disagree)	0.992	0.549	1.793	-0.008	0.302	0.98
Can quit without meds (Agree vs Disagree)	0.469	0.269	0.817	-0.757	0.283	0.008
$\chi^2 = 141.037, \pi < .001$						

Table A3-5 Characteristics of those who used any assistance at both time-points (baseline and follow up).

		% YES
Overall		
Gender	Male	54.3
	Female	65.3
Age	18-24	27.8
	25-44	51.9
	45+	65.4
Ethnicity	Non-Hispanic White	63.4
	Non-White	52.6
Smoking Status	Current Daily	68.6
	Current Non-daily	24.7
Time to first cigarette	≤30 minutes of waking	73.8
	>30 minutes of waking	43.5

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Chapter 4

Price Sensitivity and Media Exposure

Chapter 4

KEY FINDINGS

Price Sensitivity and Media Exposure

In this chapter we explore the relationship Tobacco Industry promotional activities, Tobacco Control Advertisement, and Price of Cigarettes each independently have in relation to quitting behavior among respondents in the California Smokers Cohort (CSC).

- Recall by smokers of anti-tobacco media messages at baseline was not related to increasing their quit attempts, prolonged quitting or reduction in cigarette consumption at one year follow up.

- When presenting 5 specific different Anti-tobacco commercials to study participants, there was wide variability in recall with 61% remembering the more graphic commercial with a woman having to breathe through a hole in her throat compared to a non-graphic add of people trapped inside a cigarette that only 28% recalled.

- Recall of any of the 5 anti-tobacco commercials at baseline was not related to quitting behavior after one year of follow up. However, when relating specific anti-tobacco commercials, only the advertisement of the women who breathes through a hole in her neck was significantly related to higher quit attempts (1.3 higher odds) and prolonged quitting of at least one month (1.58 higher odds) after one year of follow up.

- Close to half (47.5%) of smokers in our study reported seeing or hearing about tobacco coupons and 34.5% reported seeing posters or promotions in stores, while a small percentage reported seeing advertisements in other public events.

- Reporting any tobacco promotion or advertisement did not predict any quitting behavior but seeing or hearing about free coupons was significantly related to decreased odds of quitting for one month or longer.

- Smokers who indicated at baseline that price had influenced how much they smoke had higher odds (1.47) of making a quit attempt at follow then those who did not indicate price influenced their smoking rate.

- Smokers who indicated at baseline that price had influenced their desire to quit had higher odds (2.35) of making a quit attempt at follow than those who did not report price influencing their desire to quit.

- Smokers who reported at baseline that price influencing their desire to quit had higher odds (1.38) of reporting awareness of coupon promotions than those who did not report price influencing their desire to quit.

Chapter 4

Price Sensitivity and Media Exposure

Introduction

Media advertising and price of tobacco products can both positively and negatively impact smoking behaviour (National Cancer Institute (U.S.), 2008). California and the United States have a history of policies that regulate the methods that Tobacco Companies can use to promote their products, including restrictions on television and radio advertisement; outdoor advertisements; advertisements directed toward children; the use of cartoons; offering free samples of cigarettes; and more recently the sponsorship of community and sports events ("Federal Smoking Prevention and Tobacco Control Act," 2009; "Master Settlement Agreement," 1998; "Public Health Cigarette Smoking Act of 1969," 1970). Despite these restrictions, the tobacco industry continues to spend $8.05 billion nationally on promotional expenditures annually, according to estimates in 2010 (Al-Delaimy, 2010; "Federal Trade Commission Cigarette Report for 2009 and 2010," 2012). As of 2010, per capita industry expenditures exceed the entire per capita budget of California Tobacco Control Program by a margin of 23:1 (Al-Delaimy, 2010; "Federal Trade Commission Cigarette Report for 2009 and 2010," 2012). Since the Master Settlement Agreement in 1998, the Tobacco Industry has shifted promotional expenditures heavily toward price discounts and promotional allowances, which facilitate the placement of cigarettes in stores and subsidize the inflated costs of cigarettes that result from heavy taxes that are currently at a rate of 29.82% in California (Bartolo L, 2013; Campaign for Tobacco-Free Kids and American Heart Association, 2012; "Federal Trade Commission Cigarette Report for 2009 and 2010," 2012; Pierce & Gilpin, 2004) . Expenditures in this form of promotion have been increasing since 1998, and in 2010 $7.27 billion, or 90%, of expenditures nationally went to this category (Campaign for Tobacco-Free Kids and American Heart Association, 2012; "Federal Trade Commission Cigarette Report for 2009 and 2010," 2012; Pierce & Gilpin, 2004). The effects on quitting behavior from shifting these expenditures and the remaining unrestricted categories of advertisement are beginning to receive attention but there is still paucity of data in this area.

In the meantime, while tobacco control programs continue to grapple with the effects of tobacco advertisement they have also designed advertisements of their own which can encourage individuals not to start smoking or to quit smoking, inform them of the environmental impacts of tobacco waste, and educate them about the harm of secondhand smoke (CTCP, 2013). These anti-tobacco media programs have demonstrated an effect on quitting behaviour at both the national (Borland & Balmford, 2003; Donovan, Boulter, Borland, Jalleh, & Carter, 2003; Hurley & Matthews, 2008; McAfee, Davis, Alexander, Pechacek, & Bunnell, 2013) and local level(K. C. Davis, Farrelly, Duke, Kelly, & Willett, 2012; R. M. Davis & National Cancer Institute (U.S.). 2008; S. Durkin, Brennan, & Wakefield, 2012; Wakefield, Loken, & Hornik, 2010; Wilson et al., 2012), but more needs to be done to find out which types of advertisements are most effective.

In addition to counter advertisement and restrictions on tobacco advertisements, price increases can impact individuals desire to quit smoking, likelihood of making a quit attempt, and their smoking rates (Choi & Boyle, 2013; Vijayaraghavan, Messer, White, & Pierce, 2013). As more tobacco advertisement money continues to shift toward cost subsidization it will be increasingly important to understand the interaction between price, cost subsidization and quitting behaviour.

While accounting for only 1.6% of tobacco advertisement expenditures, another important category in need of research is Point-of-Sale advertisement, as it remains a less regulated area of advertisement. Point-of-Sale advertisement can be especially effective at making it hard for smokers who are trying to quit smoking and influencing children's desire to smoke (Campaign for Tobacco-Free Kids and American Heart Association, 2012; Clattenburg, Elf, & Apelberg, 2013). A recent study found that 11.3% of tobacco purchases were unplanned and those who made unplanned purchases were more likely to report that they planned to quit in the next month and agree that the point-of-sale advertisement made it harder for them to quit (Clattenburg et al., 2013) .

In this chapter we explore the relationship Tobacco Industry promotional activities, Tobacco Control Advertisement, and Price of Cigarettes each independently have in relation to quitting behavior among respondents in the California Smokers Cohort (CSC).

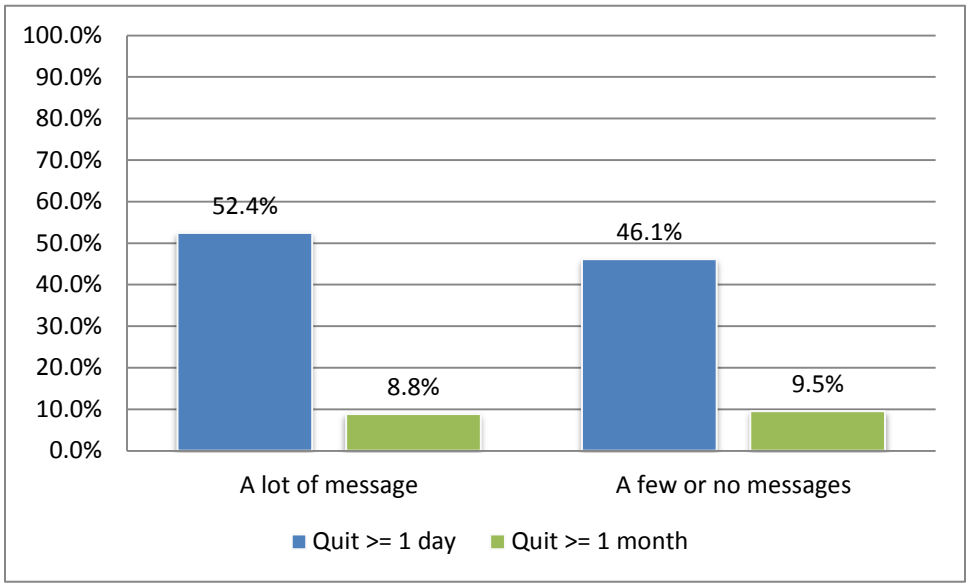
Adult Recall of Anti-Tobacco Media in California

The current CSC introduced a question to assess recall of anti-tobacco media messages:

> *Please think about any messages against smoking that you saw on TV, heard on the radio, or saw on a billboard. In the last 60 days, Did you see or hear... a lot of messages against smoking, a few messages against smoking, or no messages against smoking?*

This question was used to determine if exposure to anti-tobacco advertisement at baseline was associated with quitting behaviour a year later. Overall, most (77.3%) respondents reported seeing or hearing "A few or no message" and 22.7% reported having seen or heard "A lot of messages". Summary data for percentage of smokers who made quit attempts at follow up according to recall of anti-smoking advertisement in 2011is presented in Figure 4.1. Seeing or hearing any anti-tobacco advertisement did not predict making a quit attempt or quitting (Appendix Tables A4-2 and A4-3).

Figure 4.1 California adult smokers' reports of quit attempts or prolonged quitting at follow up according to their report of seeing or hearing anti-tobacco ads on TV, radio, or billboards in the past 60 days at baseline.



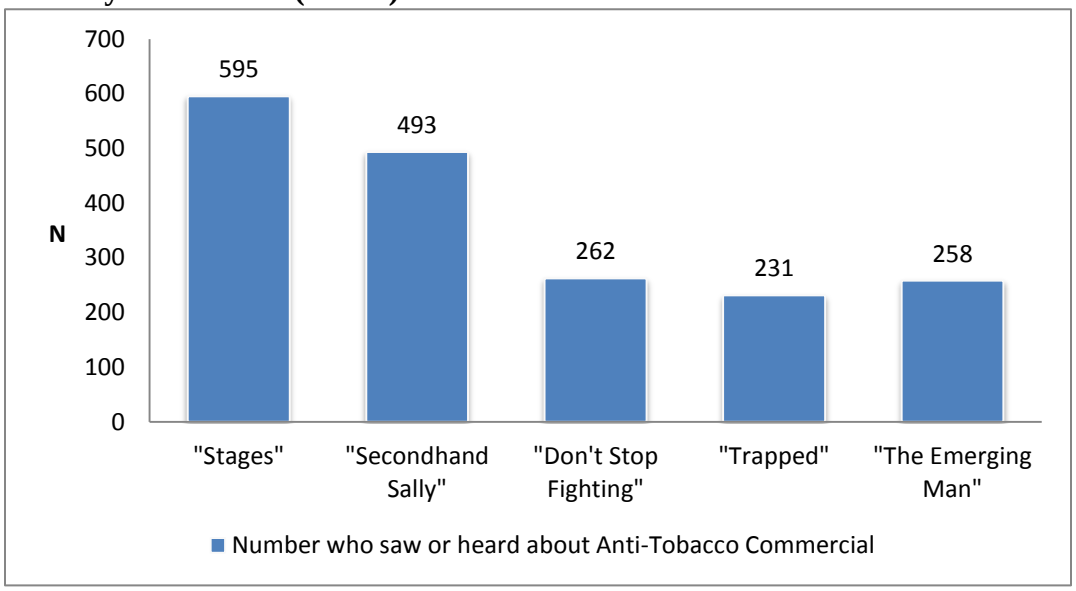
We were also interested in evaluating the effect of exposure to Anti-Tobacco commercial advertisements in relation to smoking behavior. The California Tobacco Control Program has aired Anti-Tobacco Television Commercials since 1990, shortly after the program began. During the first data collection period 5 advertisements were being aired on television. Detailed descriptions, the rating points, and airing period of each ad are available in Appendix Table A4-1. Still frames and links to view the commercials are also provided for available ads. The following question was also asked to assess the recollection of each of these advertisements:

> *Thinking about the PAST 60 DAYS, have you seen an anti-smoking TV ad that: Shows people trapped inside giant cigarettes, trying to get out? Shows two men wrestling on the floor while a woman reading a magazine ignores them? Shows a man pop out of a pizza oven and jump out of a fish tank while talking about California laws? Shows a little girl playing in front of a mirror with a cigarette and an older lady with a hole in her throat? Shows how secondhand smoke can travel into an apartment and ends in a baby's crib?*

Figure 4.2 reports recollection of each of these ads among survey respondents. The commercial that was the most likely to be recalled was the Anti-Tobacco commercial called "Stages" which depicted a little girl playing in front of a mirror with a cigarette and an older lady with a hole in her throat (61%). The least likely to be recalled was a commercial called "Trapped" which depicted people trapped inside a giant cigarette (28%). The difference in prevalence observed between these commercials may be partially explained by the amount of rating points given to the advertisement, as has been previously suggested (Cowling, Modayil, Stevens, 2010). However the rating points likely do not explain all recollection, as the ad called "Emerging Man," which depicted a man popping out of a pizza box and fish tank while talking about

California laws, had the highest amount of rating points, but was among the least likely to be recalled (Figure 4.2 and Appendix Table A4-1). The high prevalence of seeing "Stages" and "Secondhand Sally" among the respondents in the CSC indicates that in addition to rating points, graphic commercials that depict emotional testimonials, physical harm or harm to family members resulting from tobacco exposure may be remembered more often than less graphic commercials. Such findings have been observed elsewhere in the United States (E. T. Durkin, McDonald, Munoz, & Mahvi, 2008).

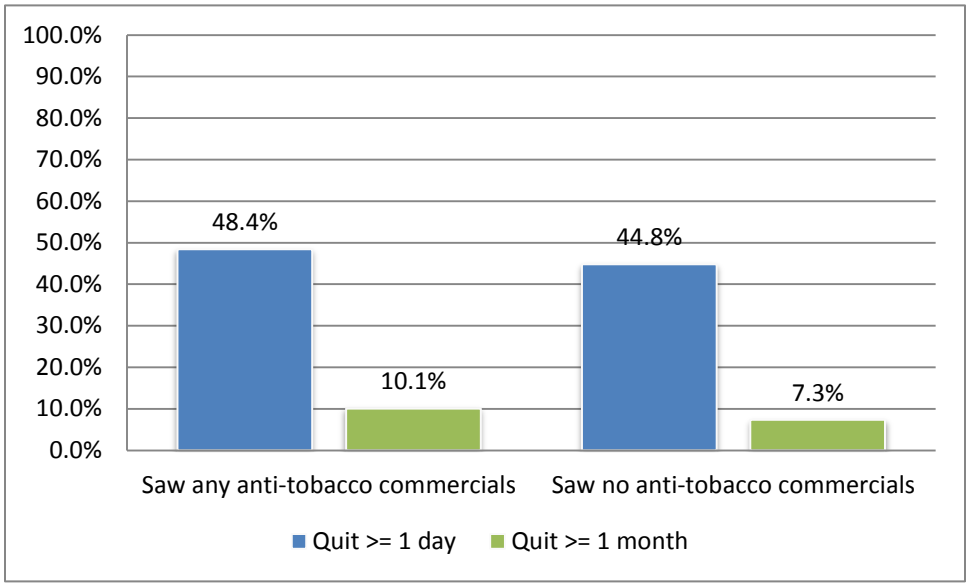
Figure 4.2 California adult smokers' seeing or hearing anti-tobacco commercials on TV in the past 60 days at baseline (n=997)



Note: Details of Advertisements available in Appendix Table A4-1

To assess the extent to which anti-tobacco commercial exposure predicted quitting behaviour, the answer to each of the above questions was used to determine if a respondent recalled seeing "any" or "no" anti-tobacco commercials on television by creating a new variable. Among all respondents, 76.7% indicated that they recalled seeing at least one of the anti-tobacco commercials, but seeing any form of commercial (vs. no commercials) did not predict quitting behaviour (Figure 4.3; Appendix Table A4-2 and A4-3).

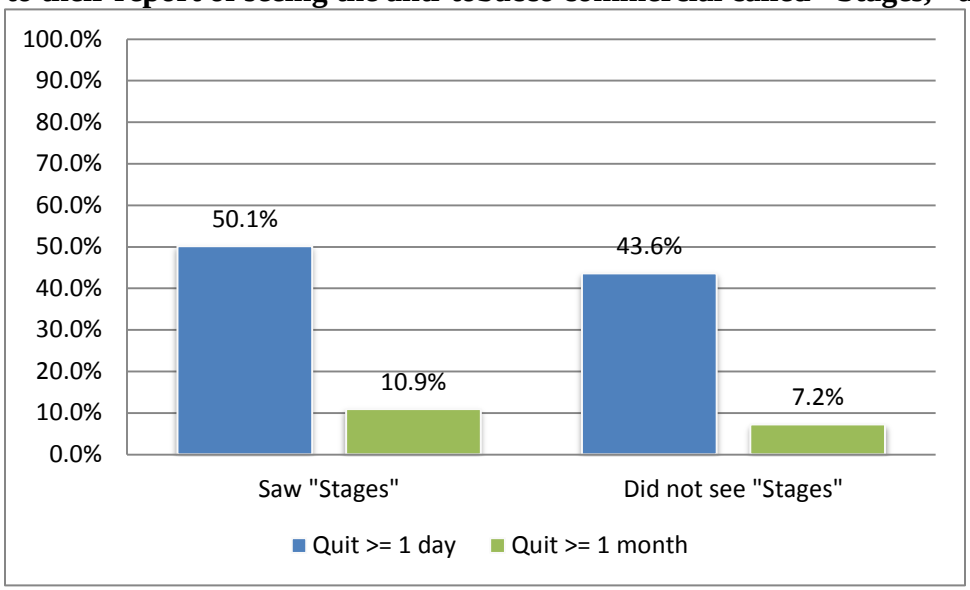
Figure 4.3 California adult smokers' quit attempts and prolonged quitting at follow up according to their reports of seeing or hearing anti-tobacco commercials on TV in the past 60 days at baseline



We were also interested in exploring specific advertisements' impact on quitting behavior. Figure 4.4 shows the percentage of respondents who saw the ad called "Stages" according to their quitting behavior at follow up. About half (48.4%) of the respondents who had seen this advertisement at baseline made a quit attempt during the follow up period and 10.1% were in a period of abstinence from smoking for at least a month at the time of follow up. Respondents who recalled seeing this advertisement had higher odds of making a quit attempt during the follow up interval (Odds Ratio (OR) = 1.30; 95% Confidence Interval (CI): 1.01 - 1.68) and higher odds of having stayed quit for at least a month (OR = 1.58; CI = 1.00 – 2.50), compared to those who did not recall this add. This associations remained significant for quitting attempts after adjusting for age, gender, education, time to first cigarette in the morning, living with other smokers, living with children under 18, time spent watching television, diagnosis with a chronic physical illness, and diagnosis with a chronic mental illness (Appendix Table A4-4). After adjusting for these above covariates, however, the association between seeing "stages" and prolonged quitting for at least a month remained in the same direction, but failed to reach significance. There is a possibility that this insignificance can be explained by low power to detect this effect resulting from a low number of respondents quitting less than a month (n = 90).

Respondents who had seen an advertisement called the "The Emerging Man" had lower odds of prolonged quitting for at least a month at follow up than those who had not seen this ad (AOR = 0.54; CI = 0.30, 0.97; Appendix Table A4-4). We do not have an explanation for this result, but it may also be a result of small sample size. Other commercials were not associated with quitting behavior (Appendix Table A4-4).

Figure 4.4 California adult smokers' quit attempt and prolonged quitting at follow up according to their report of seeing the anti-tobacco commercial called "Stages," at baseline.



Many other studies have found that anti-tobacco advertisement can be successful in encouraging quitting behavior at both the national level (Borland & Balmford, 2003; Donovan et al., 2003; Hurley & Matthews, 2008; McAfee et al., 2013) and the local level (K. C. Davis et al., 2012; R. M. Davis & National Cancer Institute (U.S.). 2008; S. Durkin et al., 2012; Wakefield et al., 2010; Wilson et al., 2012). Although the effect size seems small in this study and other studies on advertisement, this intervention can have important impacts on quitting behavior at the population level. The graphic form of advertisement depicted in "Stages" is analogous to the advertisement campaign called "Tips from Former Smokers" (TIPS) conducted by the Center for Disease Control which has estimated that TIPS led to 1.6 million quit attempts and 200,000 successful cases of smoking cessation (CDC, 2013; McAfee et al., 2013).

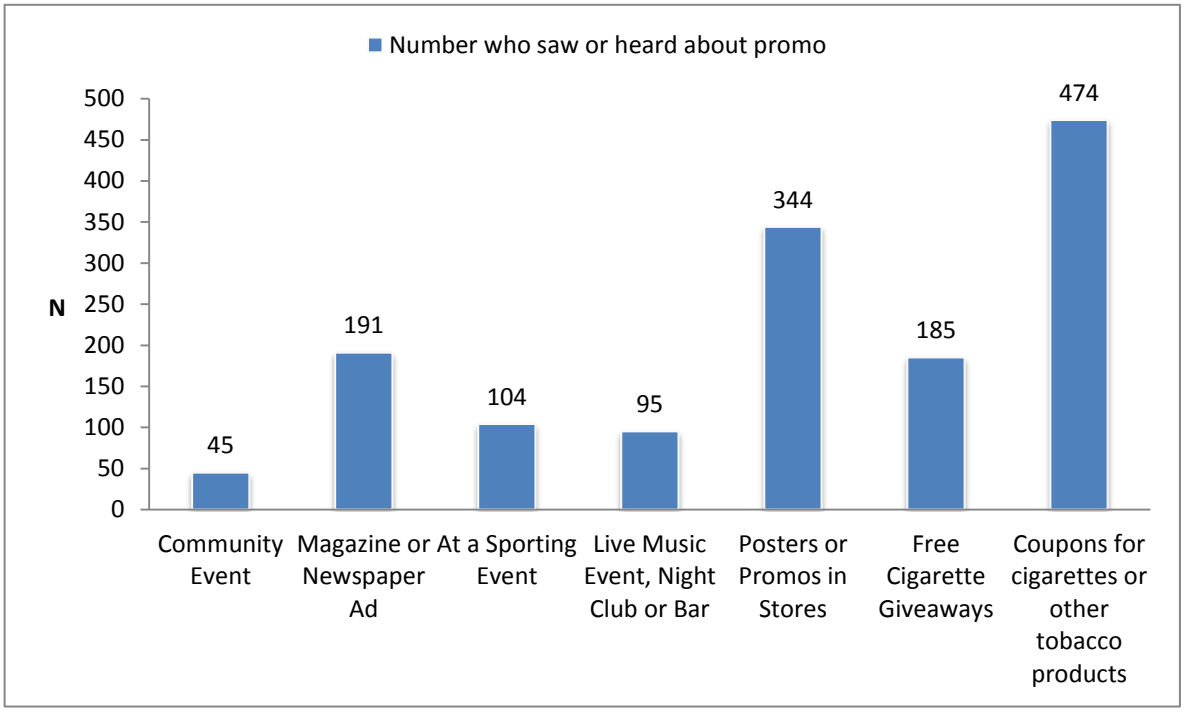
Adult Recall of Tobacco Company Advertisement in California

To assess exposure to tobacco promotions in the past 30 days, and to assess if exposure was associated with quitting behavior during one year of follow up, the survey included the following questions:

> *In the past 30 days, do you remember seeing or hearing about any of the following? Local community events /magazine or newspaper ads /sporting events / live music, nightclub, or bar events/ posters or promotions in local stores or supermarkets sponsored by tobacco companies? Free cigarette give-aways /free coupons for cigarettes or other tobacco products from tobacco companies?*

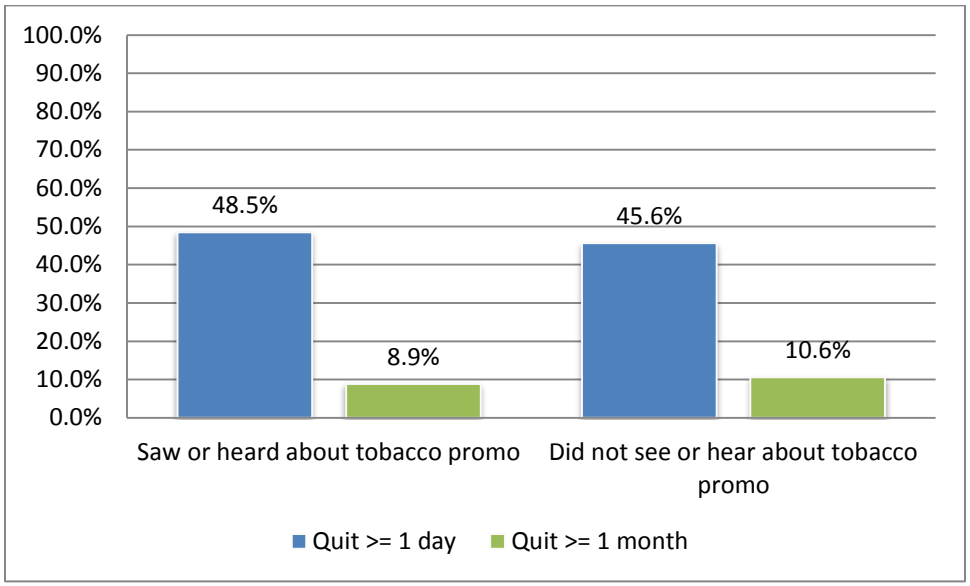
Figure 4.5 shows that 474 (47.5%) respondents reported seeing or hearing about tobacco coupons and 344 (34.5%) had seen posters or promotions in stores. In contrast, only 45 (4.5%) had seen advertisements at community events, 95 (9.5%) at live music events or nightclubs, and 104 (10.4%) at sporting events. These results reflect current tobacco spending patterns (FTC) (Campaign for Tobacco-Free Kids and American Heart Association, 2012).

Figure 4.5 Frequency of tobacco promotion recollection among current and former smokers in California at baseline by type of promotion (n=999)



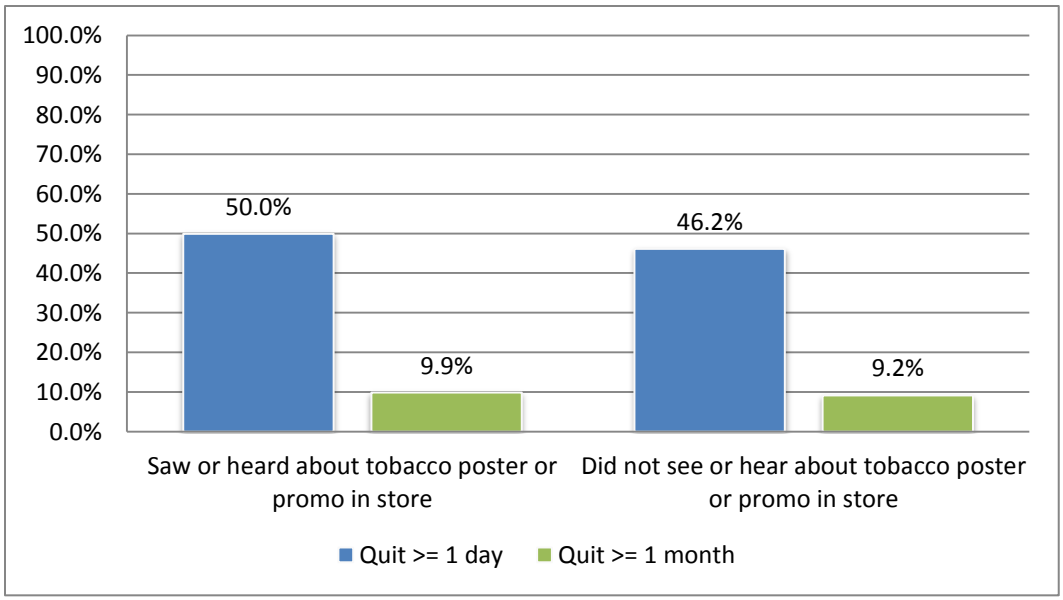
The answer to each tobacco promotion question was used to determine if respondents had seen "any" or "no" tobacco promotion. The answer to this question was used to assess the extent to which tobacco promotions were associated with quitting behavior. Figure 4.6 shows the percentage of smokers who made quit attempt or abstained from smoking for at least one month according to their reported seeing "any" or "no" promotions. Most respondents (63%) had seen some form of tobacco promotion advertisement. Among those who saw or heard about tobacco promotions, 48.5% quit for 1 day at follow up and 8.9% quit for one month or more, which was similar to the percentages among smokers who did not see or hear about tobacco promotions (Figure 4.6). Exposure to "any" tobacco promotions did not have a significant impact on quitting behavior; this relationship did not change in multivariate analysis (Appendix Table A4-2 and A4-3). As with exposure to anti-tobacco commercials, certain promotions were associated with quitting behavior in subsequent analyses.

Figure 4.6 California adult smokers' quit attempt and prolonged quitting at follow up according to their report of seeing or hearing tobacco promotions in the past 30 days at baseline.



We estimated the effect that exposure to the two most commonly reported tobacco promotions (posters and promo in store and awareness of coupons) had on quitting behavior, using the above questions. Figure 4.7 shows quitting attempt and abstinence for at least one month according to reports of seeing posters or promos in stores. Awareness of tobacco promos or posters in stores was not associated with quitting behavior (Appendix Table A4-2 and A4-3).

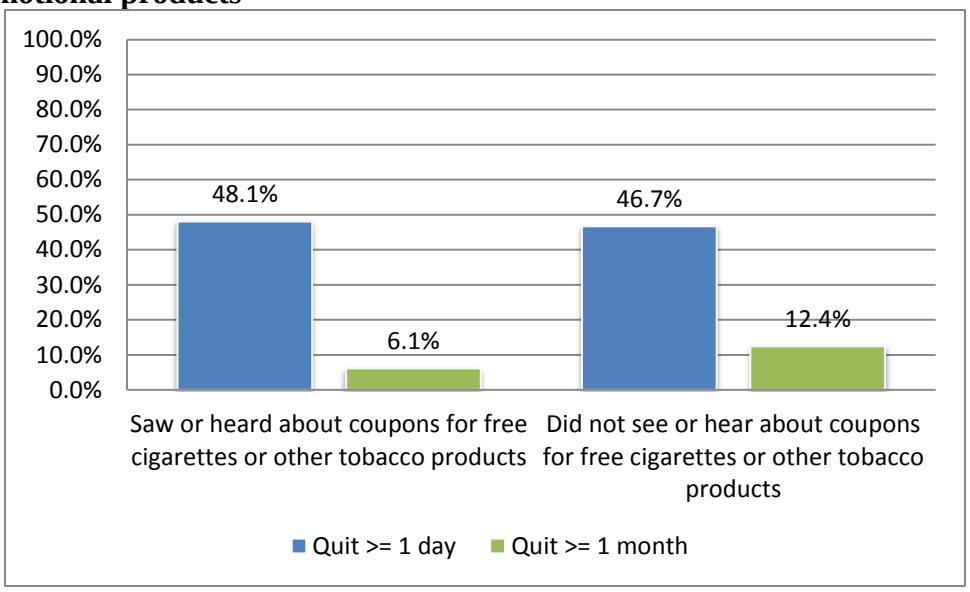
Figure 4.7 California adult smokers' quit attempts and prolonged quitting at follow up according to seeing or hearing tobacco promotions or promos *in stores* in the past 30 days at baseline.



As shown in Figure 4.7, exactly half (50%) of the smokers who reported seeing or hearing about tobacco poster or promotion in store made a quit attempt at follow up and 9.9% made a prolonged quit of one month or longer. For smokers who did not see or hear about tobacco posters or promotions in stores they were less likely to quit (46.2%) but similarly only 9.2% made a prolonged quit attempt. The difference was not statistically significant.

Figure 4.8 shows quitting behavior according to reports of seeing coupons for free cigarettes. Seeing or hearing about free coupons was not associated with quitting attempts, but was associated with being less likely to quit for a month at follow up. Smokers who were exposed to free coupons were less likely to quit at follow up than those who were not exposed to free coupons (OR = 0.46; CI = 0.29-0.73; Appendix Table A4-3). This relationship was not explained by age, gender, education, or ethnicity, using coupons, intention to quit, or level of addiction (measured by time to first cigarette) (AOR = 0.43; CI = 0.27-0.68; Appendix Table A4-3).

Figure 4.8 California adult smokers seeing or hearing about coupons for free cigarettes or other promotional products



Price of Cigarettes and Quitting Behavior

The following questions were used to determine if price was associated with quitting behavior at follow up:

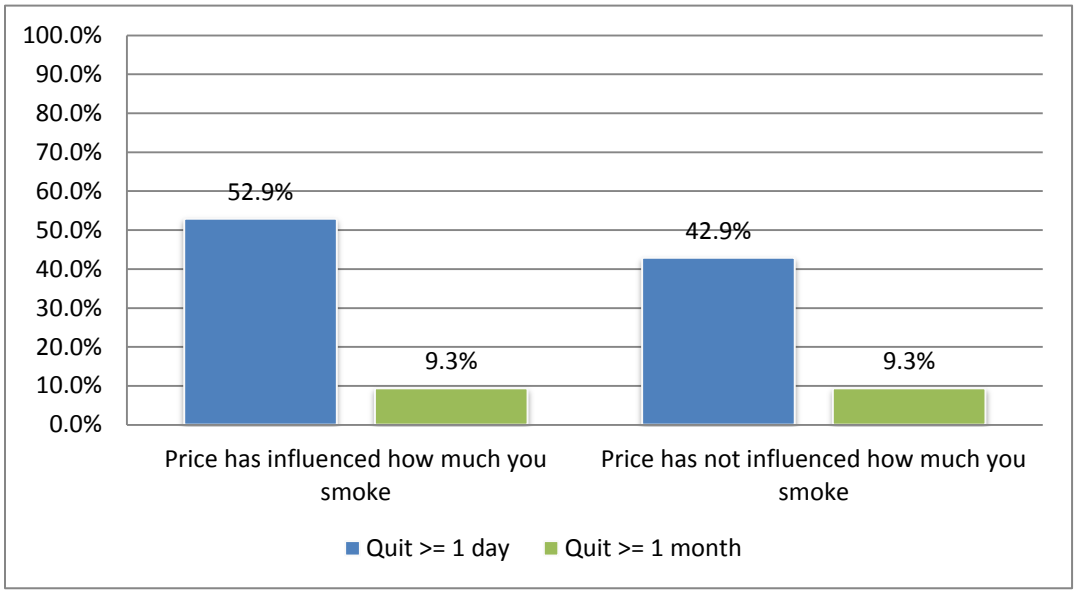
Has price influenced … your desire to quit [smoking]? How much you smoke?

Close to half (47.98%) indicated that price influenced their desire to quit smoking, and 45.14% indicated that price influenced how much they smoke. Previous reports have demonstrated that price is more relevant to daily than nondaily smokers (Chen, Chang, & Lin, 2013), but in a recent publication we also demonstrated that price is equally influential among nondaily and daily smokers (Myers, Edland, Hofstetter, & Al-Delaimy, 2013).

We examined the extent to which reporting a price influence on smoking frequency and desire to quit led to quitting behavior after one year of follow-up.

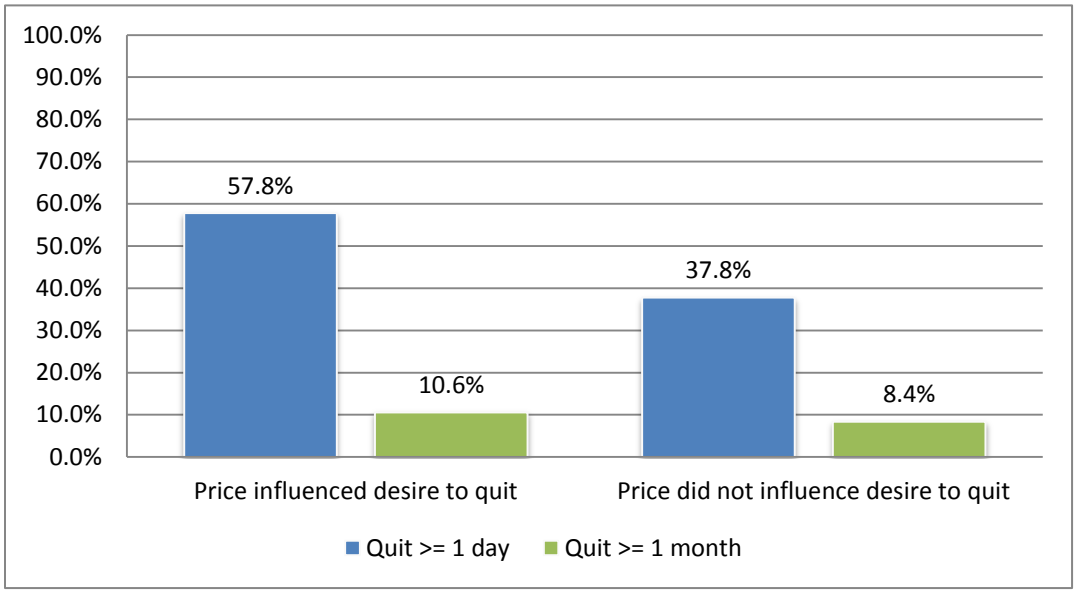
As shown in Figure 4.9, reporting that price had influenced how much a respondent smoked at baseline did not seem to have an impact on making a quit attempt during follow up. However, those who reported price influenced their smoking rate had higher odds of attempting to quit than those who did not indicate a price influence on smoking frequency (OR = 1.49; CI = 1.16 – 1.92). This association was not explained by age, gender, education, ethnicity, or addiction (measured by time to first cigarette) (AOR = 1.47; CI = 1.13 – 1.90; Appendix Table A4-2).

Figure 4.9 California adult smokers' quit attempt and prolonged quitting at follow up according to baseline reporting that price influenced how much they smoke.



In Figure 4.10, we analyze the extent to which reporting that price influenced ones desire to quit led to quitting behavior after one year of follow-up. Among those who indicated that price influenced their desire to quit smoking at baseline, 57.8% of respondents reported making a quit attempt between baseline and follow up, while only 38.7% of the smokers whom price has not influenced their desire to quit at baseline made a quit attempt at follow up. When compared to those who did not report a price influence, those who reported that price influenced their desire to quit at baseline had higher odds of making a quit attempt (OR = 2.25; CI = 1.75 – 2.91; Appendix Table A4-2). This association was not explained by race, education, sex, ethnicity or addiction (measured by time to first cigarette) (AOR = 2.35; CI = 1.81 – 3.05; Appendix Table A4-2).

Figure 4.10 California adult smokers' quit attempt and prolonged quitting at follow up according to baseline reporting that price influenced their desire to quit, by quitting behavior

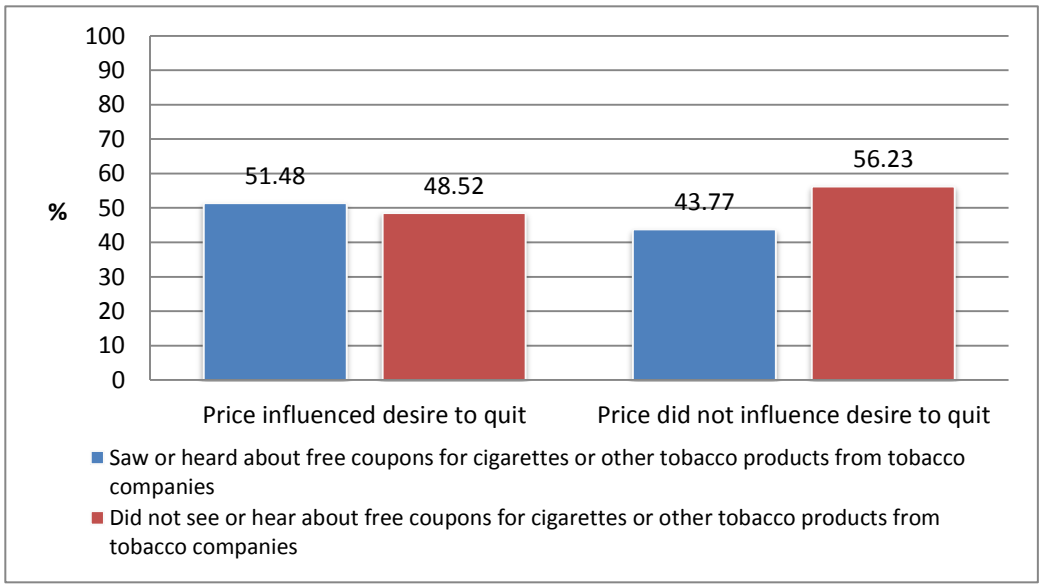


Price did not appear to be associated with quitting for longer than a month (Appendix Table A4-3).

Price of Cigarettes, Quitting Behaviour, and Coupons Use

Finally we were interested in exploring the extent to which price-sensitivity was associated with awareness of coupons. To assess this association, we used the question about coupons and price influence on desire to quit that was described above. Figure 4.11 displays the percentage awareness of coupons by the influence of price on desire to quit. Among those who reported price influenced their desire to quit, 51.48% reported seeing or hearing about free coupons for cigarettes or other tobacco compared to only 43.77% of smokers who reported that price did not influence their desire to quit. Those who reported that price had influenced their desire to quit had higher odds of reporting awareness of coupons than those who did not report a price influence (OR = 1.36; CI = 1.06 – 1.75). After controlling for age, gender, education, ethnicity, and addiction (measured by time to first cigarette) this association remained significant (AOR = 1.38; CI = 1.07 – 1.78; Appendix Table A4-6).

Figure 4.11 California adult smokers reporting awareness of coupons according to whether price influenced their desire to quit (n = 988)



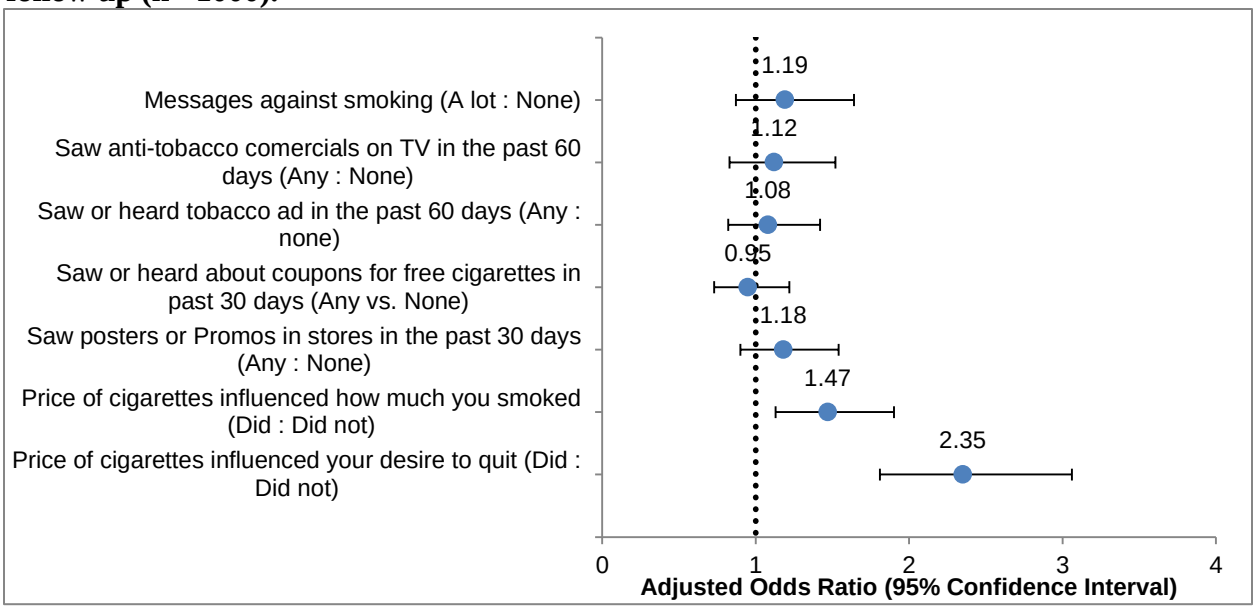
This finding has important policy implications. While increasing the price of cigarettes may increase the likelihood that price-sensitive smokers make quit attempts, the high price of cigarettes may lead individuals to notice coupons for free cigarettes. Further evidence is needed to establish the temporality of this association, but it is an alarming finding given that exposure to coupons and use of coupons may be associated with a decreased likelihood of quit attempts and prolonged quitting (Choi, Hennrikus, Forster, & Moilanen, 2013). While increasing the price of cigarettes is an effective policy intervention for cessation, it may need to be accompanied with policies controlling cost subsidization of cigarettes occurring through vehicles such as free coupons.

Multivariate Summary

In figures 4.12 and 4.13 below we present a visual representation of selected multivariate adjusted odds ratios for variables relevant to media and promotion that influence quitting behavior. These estimates are also available in tabular format in appendices 4.2 and 4.3 respectively. Figures 4.12 illustrates that of the 7 hypothesized variables we were interested in exploring with relation to quit attempts, only those questions that asked about price influences were significantly associated with quitting attempts. The odds of making a quit attempt during follow up was significantly higher for those who reported that price influenced how much they smoke (OR = 1.47; 95% CI = 1.13 – 1.90) or their desire to quit (OR 2.35; 95% CI = 1.81 – 3.06) compared to those who did not report as such.

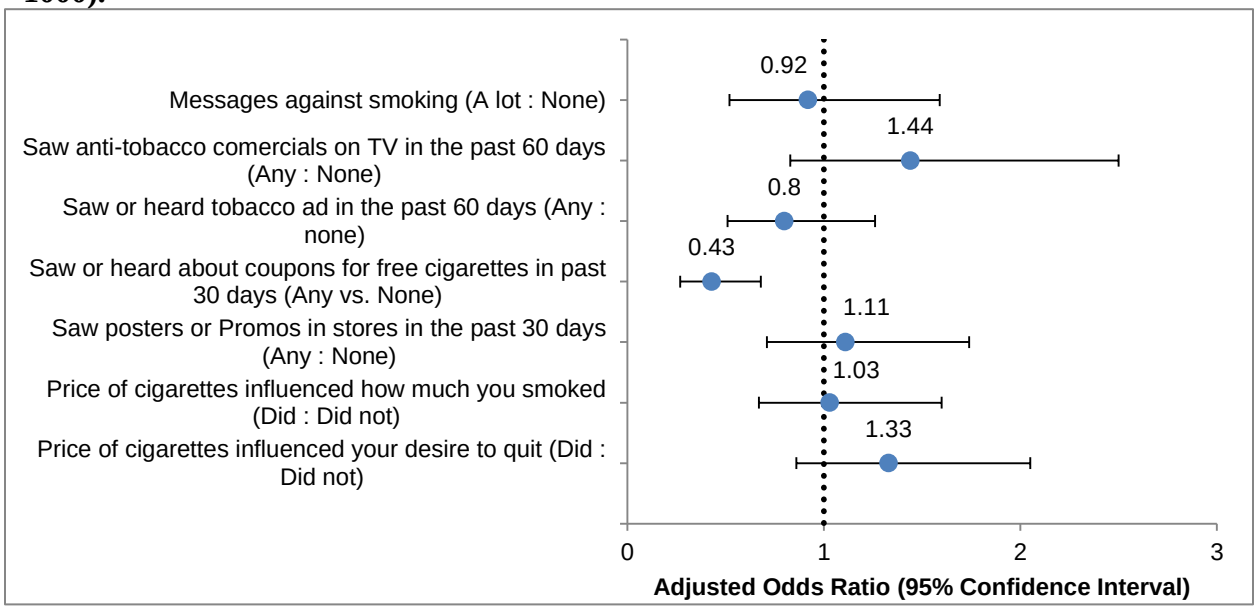
Figure 4.13 illustrates that of the 7 hypothesized variables we were interested in exploring with relation to predicting prolonged quit attempts for at least a month, only awareness of coupons for free cigarettes was associated with successful quitting. Those who reported awareness of coupons at baseline had significantly lower odds of having made a prolonged quit attempt by follow up (OR 0.43; 95% CI = 0.27 – 0.68).

Figure 4.12 Assessing the association between baseline exposure to advertisement, reported price influence and attempting to quit smoking for > 1 day (vs Not quitting >1 day) at follow up (n =1000).



Note1: Model specified as quit smoking for at least 1 day = Yes; Separate multivariate models for each variable that adjust for Age, Gender, Ethnicity, Education Level, and Addiction (Time to first Cigarette). Note2: Estimates also available in Appendix Table A4-2. Note 3: Crosstabs of covariates available in Appendix Table A4-5

Figure 4.13 Assessing the association between baseline exposure to advertisement, reported price influence and quitting smoking > 1 month (vs Not quitting >1 month) at follow up (n =1000).



Note1: Model specified as quit smoking > 1 month = Yes; Separate multivariate models for each variable that adjust for Age, Gender, Ethnicity, Education Level, and Addiction (Time to first Cigarette). Note2: Estimates also available in Appendix Table A4-3. Note 3: Crosstabs of covariates available in Appendix Table A4-5

Summary

We found that survey respondents were more likely to remember seeing two graphic anti-smoking commercials developed by the California Tobacco Control Program ("Stages" and "Secondhand Sally") than non-graphic smoking commercials. These graphic commercials depicted emotional testimonials, physical harm or harm to family members resulting from tobacco exposure. Other studies have also found that these types of advertisements may be more likely to be recalled ("Master Settlement Agreement," 1998). Recent findings from similar national mass media advertisements in the United States agree with this finding (McAfee et al., 2013). These data suggest that graphic anti-smoking commercials are more memorable and likely more effective to help smokers quit.

A large number of smokers (63%) reported being exposed to point-of-sale tobacco promotions. While this was not significantly associated with quitting behavior in our sample, others have found that point-of-sale advertisement can be very effective at influencing purchasing patterns, especially among children and those trying to quit (Campaign for Tobacco-Free Kids and American Heart Association, 2012; Clattenburg et al., 2013). Individuals who reported that price influenced their desire to quit smoking had higher odds of making a quit attempt during follow up than those who did not report price had an influence. However, a large percentage of survey respondents were exposed to free coupons for tobacco products (47.5%) and those who had seen or heard about free coupons had lower odds of making a prolonged quit attempt for at least a month than those who were not aware of advertisements. Others recently found that redeeming coupons is associated with being less likely exhibit quitting behavior (Choi, Hennrikus, Forster, & Moilanen, 2013). These findings indicate that policies attempting to impact quitting behavior by increasing the price of cigarettes may need to be accompanied with policies controlling cost subsidization of cigarettes occurring through vehicles such as free coupons.

Appendix

Table A4-1 Characteristics of California Tobacco Control Program anti-tobacco television commercials

Title, Dates Aired, and Rating Points	Still Frame of Advertisement	Description of advertisement
"Stages" 1/10/11-5/1/12 800 rating points		This ad shows a young Debi Austin as we hear the real Debi speaking from the present. She explains how the tobacco industry targeted her early on, when she started smoking cigarettes at just 13 years old. The ad transitions to modern Debi after a stoma appears in the mirrored reflection of young Debi – a health effect from cancer surgery caused by smoking – and she warns viewers not to be the tobacco industry's next victim. LINK to video: http://tobaccofreeca.com/ads/tv/?type=english&src=stages
"Secondhand Sally" 11/12/12- 3/10/13 700 rating points		A woman is seen smoking outside on her balcony. As she exhales her secondhand smoke slowly takes on anamorphic characteristics and travels to the neighboring apartment above her. The smoky figure enters the patio doors, past a couple on the couch, wafts down the hall and enters the baby's room. The announcer explains that, "Millions are still exposed to secondhand smoke...and some of them...can't do anything about it."
"Don't Stop Fighting" 5/23/11-8/5/12 200 rating points		The internal struggle of a smoker is depicted by two identical-looking men sitting on a sofa in a living room. The first man eyes a pack of cigarettes across the living room, as the second man watches. The first man lunges for the cigarette pack and is immediately tackled by the second man trying to keep him from reaching the cigarettes. While the two men wrestle, a woman reading nearby is oblivious to the struggle. The viewer is told: "Quitting is a fight you can't let yourself lose. It can take many tries, but keep trying and you will

Table A4-1 Characteristics of California Tobacco Control Program anti-tobacco television commercials

beat smoking."

Continued on next page

"Trapped" 11/1/10- 6/27/12 150 rating points		(Only in Spanish): This is a representation of how people who are addicted to cigarettes are literally trapped. No matter how hard they try to escape, they just simply cannot do it. The screen is white. It is a Lycra limbo from which we see forms emerging, first one hand, then another. Then we notice the shape of a person's head and torso, desperately trying to escape. The camera zooms back and we discover that the person is trapped inside a gigantic cigarette, with an enormous smoke-filled black background. We continue pulling back and we discover more people in the same situation. We see a landscape made of cigarettes with people trapped inside. We hear an announcer asking the viewer if they are trapped and unable to escape their addiction to cigarettes. The light at the end of the tunnel is the Helpline.
"The Emerging Man" 1/10/11- 6/12/12 975 rating points	Not available	The ad's spokesperson describes California's successes in reducing the harm caused by tobacco as he walks through settings that illustrate his points. He explains that, "California should be proud. We were the first to ban smoking on airplanes, and the first to have smoke-free bars and restaurants, all while saving over $86 billion in health care costs and over one million lives." The ad ends with the man cradling a baby in a hospital nursery while stating: "But even if you were born today, you'd still grow up in a world where tobacco kills more people than AIDS, drugs, alcohol, murder and car crashes combined. We have a lot more work to do."

Table A4-2 Assessing the association between baseline exposure to advertisement, reported price influence and attempting to quit smoking for > 1 day (vs Not quitting >1 day) by follow up after 1 year, among Adults (>18 years) in the California Smokers Cohort 2011 (n =1000)

Variable	n	%	OR†	CI		AOR‡	CI	
Total Reporting Quitting >1 day	474	100	--	--	--	--	--	--
Noticed a message against smoking on TV/ Radio /Billboards in the past 60 days								
A lot of messages against smoking	107	22.7	1.23	0.95	1.75	1.19	0.87	1.64
A few or no messages against smoking	365	77.3	--	--	--	--	--	--
Has seen "any" anti-tobacco commercials on TV								
Yes	370	78.1	1.16	0.86	1.55	1.12	0.83	1.52
No	104	21.9	--	--	--	--	--	--
Saw or heard about a Tobacco promotional in the past 30 Days								
Did not see a Tobacco advertisement	150	31.7	--	--	--	--	--	--
Saw or heard any type of Tobacco advertisement	323	68.3	1.12	0.86	1.46	1.08	0.82	1.42
Saw or heard about coupons for free cigarettes in the past 30 days								
Yes	228	48.1	1.05	0.82	1.35	0.95	0.73	1.22
No	246	51.9	--	--	--	--	--	--
Saw Tobacco posters or promos in stores in the past 30 days								
Yes	172	36.3	1.17	0.90	1.51	1.18	0.90	1.54
No	302	63.7	--	--	--	--	--	--
Price of Cigarettes has influenced how much you smoke								
Yes	238	50.4	1.50*	1.16	1.92	1.47*	1.13	1.90
No	234	49.6	--	--	--	--	--	--
Price of Cigarettes has influenced your desire to quit								
Yes	274	58.6	2.25**	1.75	2.91	2.35**	1.81	3.06
No	194	41.5	--	--	--	--	--	--

NOTE: Percent or count may not add to total due to rounding or missing values
NOTE2: Crosstabs of covariates available in Appendix Table A4-5
*p-value < 0.05
**p-value < 0.001

†Estimated using univariate logistic regression

‡Model specified as event = Yes; Separate multivariate models for each predictor that adjust for Age, Gender, Ethnicity, Education Level, and Addiction (Time to first Cigarette).

Table A4-3 Assessing the association between baseline exposure to advertisement, reported price influence and quitting smoking > 1 month (vs Not quitting >1 month by follow up after 1 year, among Adults (>18 years) in the California Smokers Cohort 2011 (n =1000)

Variable	n	%	OR†	CI		AOR‡	CI	
Total	883	100	--	--	--	--	--	--
Noticed a message against smoking on TV/ Radio /Billboards in the past 60 days								
A lot of messages against smoking	18	19.4	0.93	0.54	1.57	0.92	0.52	1.59
A few or no messages against smoking	75	46.8	--	--	--	--	--	--
Has seen "any" anti-tobacco commercials on TV								
Yes	77	81.9	1.42	0.82	2.45	1.44	0.83	2.50
No	17	18.1	--	--	--	--	--	--
Saw or hear about a Tobacco promotional in the past 30 days								
Yes	35	37.2	--	--	--	--	--	--
No	59	62.8	0.82	0.53	1.27	0.80	0.51	1.26
Saw or heard about coupons for free cigarettes in the past 30 days								
Yes	29	30.9	0.46**	0.29	0.73	0.43**	0.27	0.68
No	65	69.1	--	--	--	--	--	--
Saw posters or promos in stores in the past 30 days								
Yes	34	36.2	1.08	0.70	1.69	1.11	0.71	1.74
No	60	63.8	--	--	--	--	--	--
Price of Cigarettes has influenced how much you smoke								
Yes	42	45.2	1.00	0.65	1.54	1.03	0.67	1.60
No	51	54.8	--	--	--	--	--	--
Price of Cigarettes has influenced your desire to quit								
Yes	413	47.2	1.29	0.84	1.98	1.33	0.86	2.05
No	462	52.8	--	--	--	--	--	--

NOTE: Percent or count may not add to total due to rounding or missing values
NOTE2: Crosstabs of covariates available in Appendix Table A4-5
**p-value < 0.001

†Estimated using univariate logistic regression

‡Model specified as event = Yes; Separate multivariate models for each predictor that adjust for Age, Gender, Ethnicity, Education Level, and Addiction (Time to first Cigarette).

Table A4-4 Univariate and multivariate exploring associations between exposure to five advertisements developed by the California Tobacco Control Program and quitting behavior, 2012 (n = 1000)

	Made a Quit Attempt		Quit Longer than One Month	
Ad Description	**OR (CI)**	**AOR (CI)**	**OR (CI)**	**AOR (CI)**
"Stages": Shows a little girl playing in front of a mirror with a cigarette and an older lady with a hole in her throat	1.30* (1.01, 1.68)	1.33* (1.02, 1.75)	1.58* (1.00, 2.50)	1.56 (0.97, 2.39)
"Secondhand Sally": Shows how secondhand smoke can travel into an apartment and ends up in a baby's crib	1.23 (0.96, 1.57)	1.29 (0.98, 1.69)	1.36 (0.89, 2.08)	1.40 (0.89, 2.19)
"Don't Stop Fighting": Shows two men wrestling on the floor while a woman reading a magazine ignores them	1.08 (0.81, 1.43)	1.04 (0.78, 1.40)	0.96 (0.59, 1.55)	0.90 (0.53, 1.51)
"Trapped": Shows people trapped inside a giant cigarette trying to get out	1.18 (0.88, 1.58)	1.41 (0.83, 1.56)	1.30 (0.81, 2.09)	1.22 (0.73, 2.03)
"The Emerging Man": Shows a man pop out of a pizza oven and jump out of a fish tank while talking about California laws	0.86 (0.64, 1.14)	0.91 (0.67, 1.22)	0.56* (0.32, 0.98)	0.54* (0.30, 0.97)

*p-value < 0.05
NOTE: AOR adjusted for: age, education, sex, ethnicity time to first cigarette in the morning, living with other smokers, living with children under 18, time spent watching television, diagnosis with a chronic physical illness, and diagnosis with a chronic mental illness.
NOTE2: Covariate cross tabulations available in Appendix Table A4-5

Table A4-5 Frequency of covariates used in multivariate model in baseline population of Daily and Non-Daily Smokers, California Longitudinal Study of Smokers (*n =1000*)

Variable	n	%
Total	1000	100
Gender		
Male	478	47.8
Female	522	52.2
Age		
18 - 24	45	4.5
25 - 44	257	25.7
45 - 59	698	69.8
Ethnicity		
Non-Hispanic White	726	72.6
All others	27	27.4
Education		
<=12 years	348	34.8
Some College/College	571	57.1
Postgraduate	81	8.1
Time to first Cigarette in the Morning		
Within 5 minutes	253	25.3
6 – 30 minutes	362	36.2
From more than 30 minutes to 1 hour	202	20.2
After more than 1 hour	183	18.3
Lives with other smokers in household †		
Yes	510	51.0
No	490	49.0
Number of Children <18 yrs old in home †		
None	713	71.3
1	156	15.6
2 or more	131	13.1
Number of hours daily spent watching TV or online †		
None to about 1 hour	120	12.2
About 2 hours	166	16.8
About 3 hours	162	16.4
About 4 hours	149	15.1
5 hours or more	389	39.5
Reported any diagnosis with chronic physical illness †		
Yes (None Specific)	451	45.3
No	545	54.7
Reported any diagnosis with chronic mental illness †		
Yes (None Specific)	151	15.3
No	839	84.8

Note: percent and frequencies, may not add to 100% due to rounding or missing

† Denotes co-variates used only in secondary analysis involving assessment of exposure to Anti-Tobacco television commercials (Appendix Table A4-4)

Table A4-6 Univariate and multivariate logistic models exploring associations between reporting that price influenced desire to quit and awareness of coupons for tobacco products, 2012 (n = 1000)

	Aware of Coupons for Tobacco Products ("Yes")	
	OR (CI)	**AOR (CI)**
Saw or heard about free coupons for cigarettes or other tobacco products from tobacco companies (vs. Did not see or hear…)	1.36* (1.06, 1.75)	1.39* (1.07, 1.78)

*p-value < 0.05
NOTE: AOR adjusted for: age, education, sex, time to first cigarette in the morning

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Chapter 5

Change in Anti-Smoking Attitudes and Smoking Cessation

Chapter 5

KEY FINDINGS

Change in Anti-Smoking Attitudes and Smoking Cessation

In this chapter, we focus on the impact of anti-tobacco attitude on changes in quitting and cutting down on smoking among a sample of smokers interviewed at baseline and their subsequent tobacco behaviors one year after baseline.

- The smokers who agreed with the statement of *"taking a stand against smoking is important to you"* were more likely than the smokers who disagreed with this statement to have made a quit attempt (56.5% vs 33.0% a 2.6 higher odds), quit for month or longer (12.4% vs 7.1%, 1.8 odds higher), and reduced cigarette consumption (38.2% vs 30.4%, 1.4 odds higher) after one year.
- The smokers who agreed with the statement of *"you want to be involved in efforts to get rid of smoking"* were more likely than the smokers who disagreed with this statement to have made a quit attempt (64.0% vs 36.3% nearly 3 higher odds), quit for month or longer (14.2% vs 7.7%, 1.9 odds higher), and reduced cigarette consumption but not statistically significant (39.6% vs 31.4%) after one year.
- The smokers who agreed with the statement of *"there should be a total ban on smoking everywhere in your city or town, except in one's home,"* were more likely than the smokers who disagreed with this statement to have made a quit attempt (62.8% vs 41.1%, 2.49 odds), quit for month or longer (13.0% vs 8.9%), and reduced cigarette consumption (43.4% vs 32.5%) after one year.
- The smokers who agreed with the statement of "*You would like to see tobacco companies go out of business"* were more likely than the smokers who disagreed with this statement to have made a quit attempt (56.5% vs 37.0%, 2.1 higher odds), quit for month or longer (11.8% vs 7.9%), and reduced cigarette consumption (35.5% vs 32.8%) after one year.
- The smokers who agreed with the statement of "*Tobacco companies have been punished enough*" were less likely than the smokers who agreed with this statement to have made a quit attempt (36.6% vs 49.6%, 0.6 odds), quit for month or longer (8.2% vs 10.4%), and reduced cigarette consumption (31.9% vs 34.9%) after one year.
- The selected strong attitudes all point in the expected direction of predicting quitting behavior. Quitting attempt was most strongly predicted by these views, and prolonged quitting of one month or more the least predicted. This is expected given that prolonged quitting is a more strict criteria for quitting behavior
- The two questions with the strongest prediction and consistency across the three outcomes was taking a stand against tobacco and wanting to get involved to get rid of smoking. The more strong attitudes of wanting tobacco companies to be out of business or tobacco companies punishment has not been enough were not strongly predicted, except for quit attempts. This is also expected since this is a population of smokers whom some are still not ready to ban tobacco.
- The implication of this view is that persons who hold intensive attitudes about tobacco control issues are more likely to live in a social environment that is hostile to tobacco, which in turn can help smokers quit.

Chapter 5

Change in Anti-Smoking Attitudes and Smoking Cessation

Introduction

Attitudes may influence behaviors and behaviors may influence attitudes (Festinger, 1957: Olson & Zanna, 1993). Smokers may contemplate quitting due to health information from healthcare personnel, social pressure from significant others (Turner, L., Mermelstein, Flay, 2006; Simons, Morton & Farhat, 2010), and reprimands from friends and strangers for smoking in public places (Hofstetter, Reprimand Paper; Avenevoli, Merikangas, 2003; Hu et al., 2006; Hofstetter et al., 2010a). Conversely, discomfort from quitting may in turn lead to hostile attitudes about tobacco (Johnson, & Eagly, A. H., 1989). Consistency of social criticism in one's immediate social environment may also pose a social barrier to smoking (Landrine and Klonoff, 2004; Bandura, 1986).

Intensity is also related to the organization of other attitudes concerning tobacco use (Pomerantz, Chaiken & Tordesillas, 1995). On the other hand, when peers smoke the smokers serve both as models of behavior and reinforce smoking as an approved behavior (Ajzen, 2001; Jaccard, Becker, 1985; Sherif, M & Sherif, C, 1953; Hofstetter et al., 2004; Sherif, M & Sherif, C, 1953.

In this chapter, we focus on the impact of attitude on changes in quitting and cutting down on smoking among a sample of smokers interviewed at baseline and their subsequent tobacco behaviors one year after baseline. We measure change in what are particularly "intense" attitudes assumed to organize other, more peripheral attitudes in the general population and increase the likelihood of quitting and cutting down (Zaller, 1992). We assume that "strong attitudes," attitudes that place greater demand on survey participants, are more likely to be linked to tobacco behaviors.

Anti-Tobacco Attitudes

The items used to measure intense attitudes in this chapter were:

> *"Please tell me if you agree or disagree with each of the following statements. 1) "Taking a stand against smoking is important to you," 2) "You want to be involved in efforts to get rid of smoking," 3) "You would like to see tobacco companies go out of business," 4) "Tobacco companies have been punished enough," and 5) "…there should be a*

total ban on smoking everywhere in your city or town, except in one's home,".

We compared the relationship of these attitudes to 12- month follow up report of quit attempt during the prior year and being quit for one month, and reductions in smoking. Reduction of 20% or more in the number of cigarettes smoked was based on number of cigarettes reported smoking at follow up minus the number of cigarettes smoked at baseline among smokers at both times. The variable was formed by dichotomizing reduced number of cigarettes into 20% or more reduction versus all other (did not reduce cigarettes, reduced less than 20% cigarettes, and increased cigarette use).

Demographic variables were measured by self- report, and included age (years), education (years completed), gender. Religious attendance was measured by responses to "During the past 12 months, how many times did you attend religious services? Please do not include special occasions such as wedding, funerals, or other special events."

In this sample, 50.1% were male and 49.9% female, and 26.6% were 19-45 years of age, 39.6% were 46-55 years of age, and 33.8% were 56-62 years of age. Educational status was distributed as 27.7% had completed high school or less, 62.0% some college or college, and 10.3% had exposure to graduate or professional education. Participants reported a mean rate of attendance at religious services of 2.34 times.

Overall Attitudes about Tobacco Control

Overall distributions of opinion concerning baseline and follow up support for the five statements mask substantial change among survey participants between baseline and follow up measurements but the marginal distributions hide existing change when looking at individual change. At baseline, 45.1% reported disagreeing that they wanted to take a stand against smoking compared to 44.7% disagreeing at follow up, a non-significant difference.

A total of 70.0% disagree with wanting to get involved in activities to get rid of tobacco at baseline vs. 70.9% holding that view at follow up. Not surprisingly, most survey participants disagree that there should be a total ban against smoking everywhere, 82.1% at baseline and 81.9% at follow. A comparable 59.5% of participants at baseline and 60.1% at follow up also disagreed with wanting to drive cigarette companies out of business. Minor change was involved in the attitude that tobacco companies had been punished enough as 55.5% disagreed that companies had been punished enough at baseline versus 51.2% at follow up. These findings suggest that virtually no substantial change occurred between interviews in the sample between baseline and follow up. However, individual responses at baseline vs. follow up measures clarify that there is switching where a percentage of those disagreeing with the statement at baseline agreed at follow up, and another percentage of those agreeing with the statement at baseline disagreed at follow up.

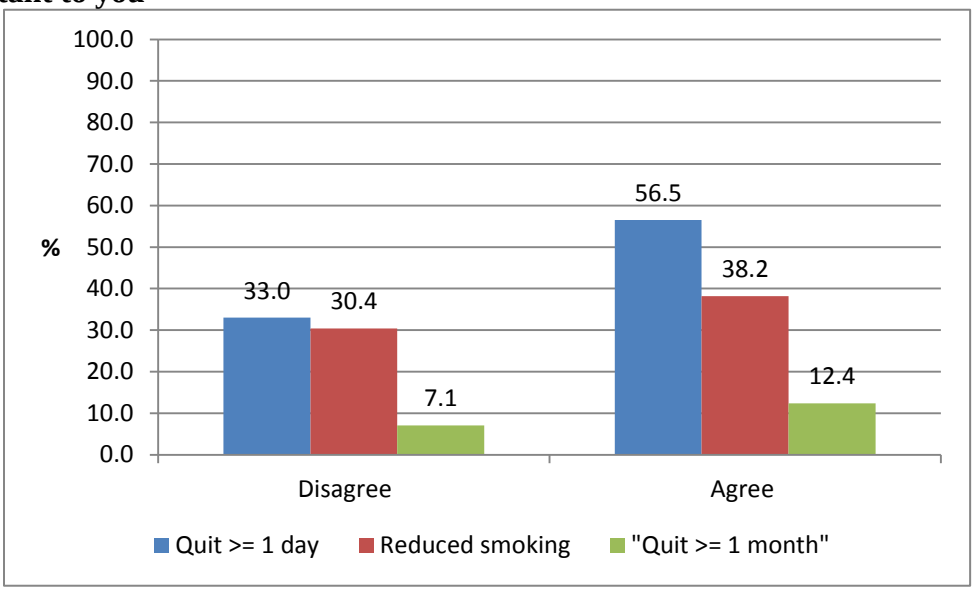
The shifts reflect changes in opinion, suggesting considerable fluidity in the five attitudes about tobacco among California adults. Two counterbalancing considerations may also reflect change in measures: 1) Random response error as documented by Zaller (1992) and 2) autocorrelation, the tendency of persons to repeat attitudes because personal characteristics and the social environments in which people live that are related to the

attitudes do not change within short intervals. The test of this lays in how systematically changes in opinion are related to behavior. The analyses relate each of the five attitudes to measures of quitting and a measure of change in the number of cigarettes smoked.

"Taking a stand against smoking is important to you"

Figure 1 shows the distribution of the quitting outcomes according to the response of the question: taking a stand against smoking is important to you". Those who agreed with this statement were much more likely to have made a quit attempt at follow up (56.5%) compared to those who disagreed with this statement (33.0%). Quitting for one month or more among those who agree that taking a stand against smoking is important was 12.4% compared to 7.1% among those who disagreed. The reduction in smoking consumption for the two groups was less substantial (38.2% vs 30.4%).

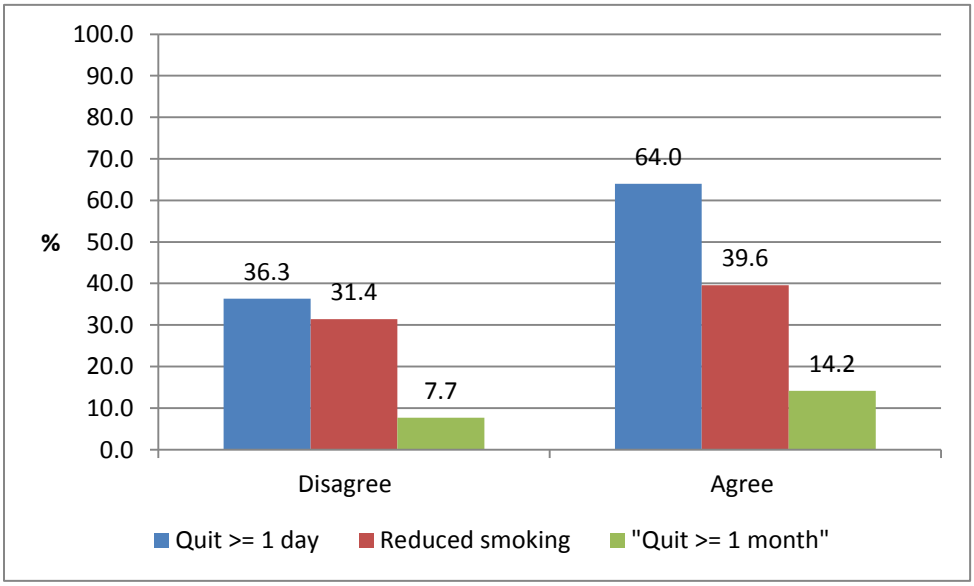
Figure 1: Quit attempt, smoking reduction, and quitting for one month or more according to responses to the statement "Taking a stand against smoking is important to you"



"You want to be involved in efforts to get rid of smoking"

Figure 2 shows the quitting behavior at follow up according to whether smokers agreed with the statement: you want to be involved in efforts to get rid of smoking. There was a clear almost two fold higher percentage of quit attempts and prolonged quitting for one month or more among those who agreed about the statement compared to those who did not. Among those who agreed to want to be involved to get rid of smoking compared to those who disagreed, percentage of quit attempts was 64.0% vs 36.3% and percentage of quitting for one month or more was 14.2% vs 7.7%. The reduction in smoking was higher among those who agreed (39.6%) vs those who disagreed (31.4%).

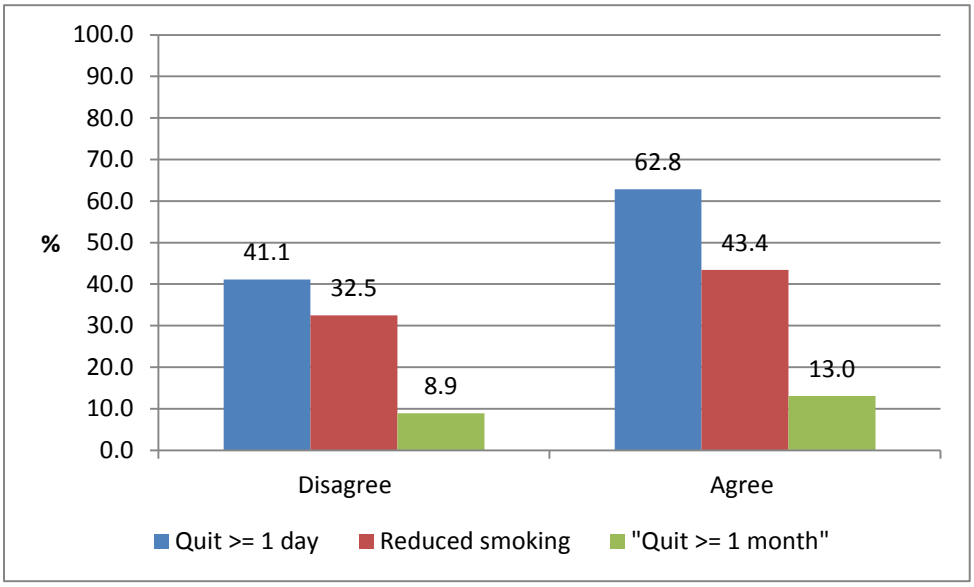
Figure 2: Quit attempt, smoking reduction, and quitting for one month or more according to the statement "You want to be involved in efforts to get rid of smoking"



"…there should be a total ban on smoking everywhere in your city or town, except in one's home"

Figure 3 shows the distribution of the quitting outcomes according to the response of the question: "there should be a total ban on smoking everywhere in your city or town, except in one's home." This represents a very strong social norm view supportive of comprehensive smoking bans beyond the exiting smoking bans in California. Those who agreed were more likely to have a quit attempt at follow up (62.8%) compared to quit attempts among smokers who disagreed (41.1%). The percent of smokers who reduced smoking (43.4%) or quit smoking for a month or more (13%) among those who agreed with this statement were higher than those who did not agree with it (8.9% for quitting for one month or more, and 32.5% for reduction of smoking).

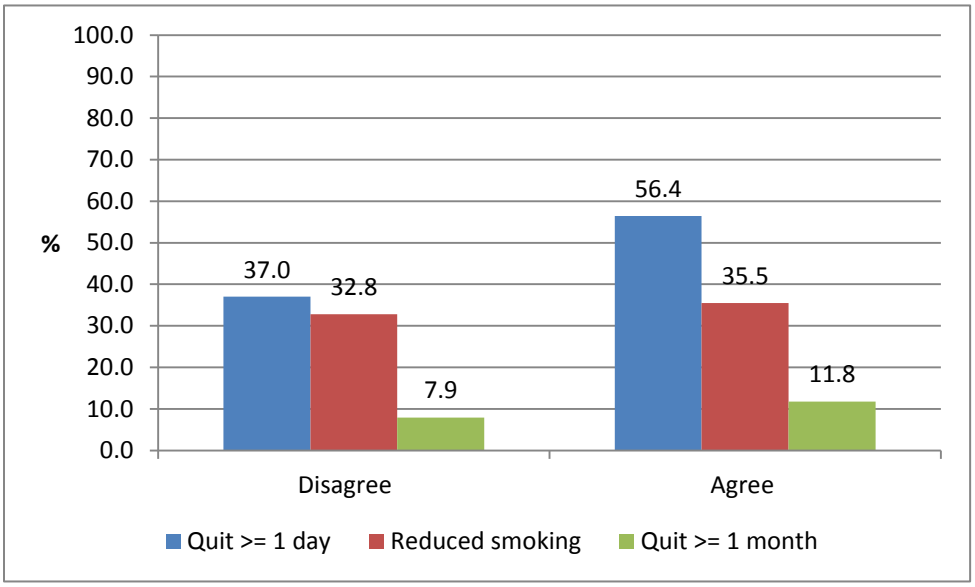
Figure 3: Quit attempt, smoking reduction, and quitting for one month or more according to frequency of responses to the statement "There should be a total ban on smoking everywhere in your city or town, except in one's home"



"You would like to see tobacco companies go out of business"

Figure 4 shows the quitting behavior according to agreeing or not to the question: you would like to see tobacco companies go out of business. Similar to the other questions of social norm, those who agreed with the statement against tobacco companies were more likely than those who did not agree to have a quit attempt (56.4% vs 37.0%), prolonged quit (11.8% vs 7.9%) and reduction in cigarette consumption (35.5% vs 32.8%).

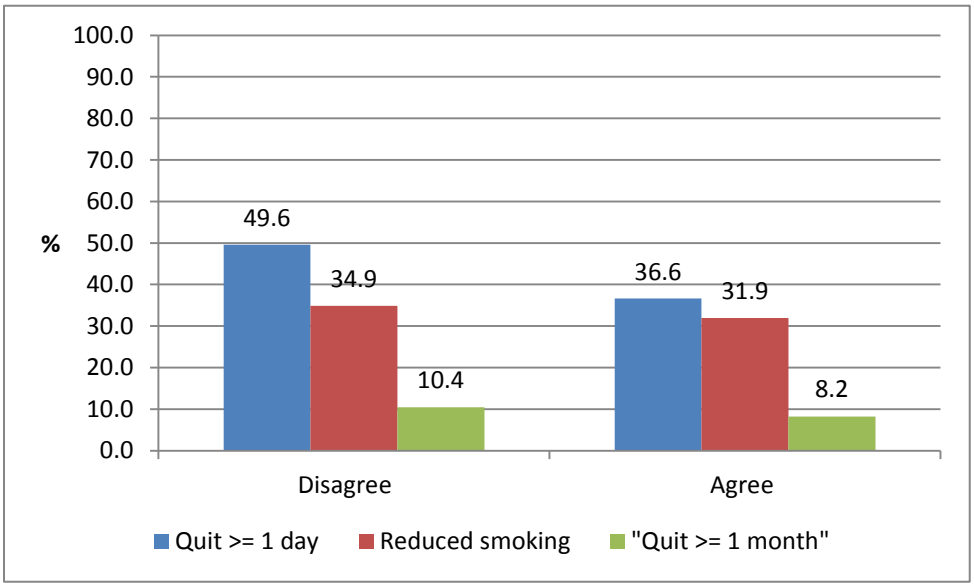
Figure 4: Quit attempt, smoking reduction, and quitting for one month or more according to the statement "You would like to see tobacco companies go out of business"



"Tobacco companies have been punished enough"

The final question that we included for social norm against tobacco was regarding the tobacco companies: *"Tobacco companies have been punished enough."* Those who disagreed and therefore believe there needs to be further action against these companies were more likely that those who agreed that they have been punished enough and therefore believe there should be no more actions against them was 49.6 % vs 36.6% for quit attempts, 10.4% vs 8.2% for prolonged quitting, and 34.9% vs 31.9% for reduction in cigarette consumption. (See Figure 5)

Figure 5: Quit attempt, smoking reduction, and quitting for one month or more according to the statement "Tobacco companies have been punished enough"



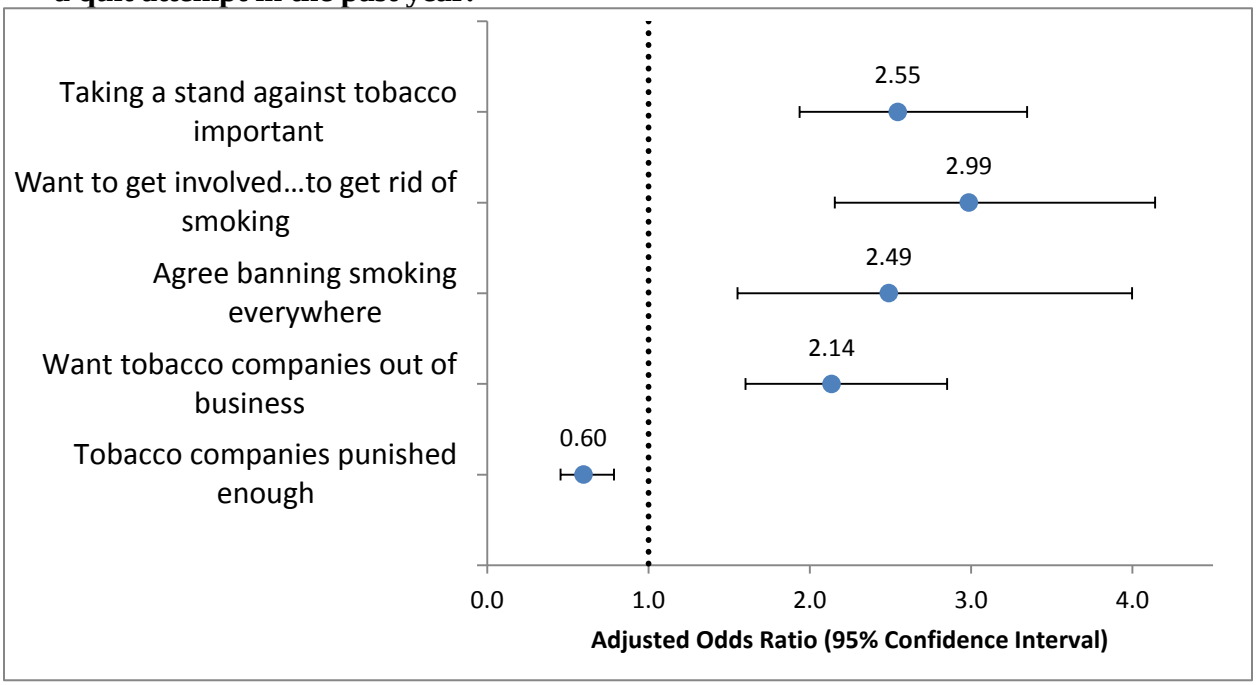
As shown in the above analyses there was a clear positive impact of anti-tobacco sentiments and social norms by smokers on their quitting and smoking reduction habits. Most impact has been consistently higher for quit attempts, but also to prolonged quitting, and less so in relation to smoking reduction. These questions can serve as good indicators of quitting behavior in future studies.

Multivariate Analyses of Attitudes and Tobacco Behaviors

While the preceding analyses have generally supported the associations between attitudes about tobacco and tobacco behaviors, it is also possible that the associations are spurious, that other social and demographic characteristics of survey participants influence findings (Hovell, Wahlgren & Adams, 2009; Glass & McAtee, 2006). The analysis below will demonstrate the extent to which tobacco attitudes measured at baseline predict tobacco behaviors measured at follow up after controlling for participant education, age, gender, and religious participation as measured by self-reports.

Quitting attempt during last year at the time of follow up

Figure 6: Relationship between attitudes and tobacco behavior and odds of making a quit attempt in the past year.



(See also Appendix Table A5-1)

Taking a Stand Against Tobacco. The odds of reporting at least one quit attempt during the prior year were nearly 2.6 times the odds of not making such a report among those who said that taking a stand against tobacco was important to them (OR=2.55, 95% CI=1.94-3.35) after controlling for education, age, gender, and frequency of attendance at a religious institution. Religious attendance significantly increased the odds of a quit attempt (OR=1.16, 95% CI=1.07-1.27).

Want to Get Involved in Efforts to Get Rid of Smoking. Reports of wanting to "be involved in efforts to get rid of smoking" were also associated with increased odds of making a quit attempt at follow up. The odds among those who agreed were nearly three times greater to report a quit attempt than among those who disagreed with the statement (OR=2.99, 95% CI=2.15-4.14).

Banning Smoking Everywhere. Those who agreed with a desire to "ban smoking everywhere except in the home" were more likely to report quit attempts during the prior year than those who supported banning smoking everywhere (OR=2.49, 95% CI=1.55-4.00).

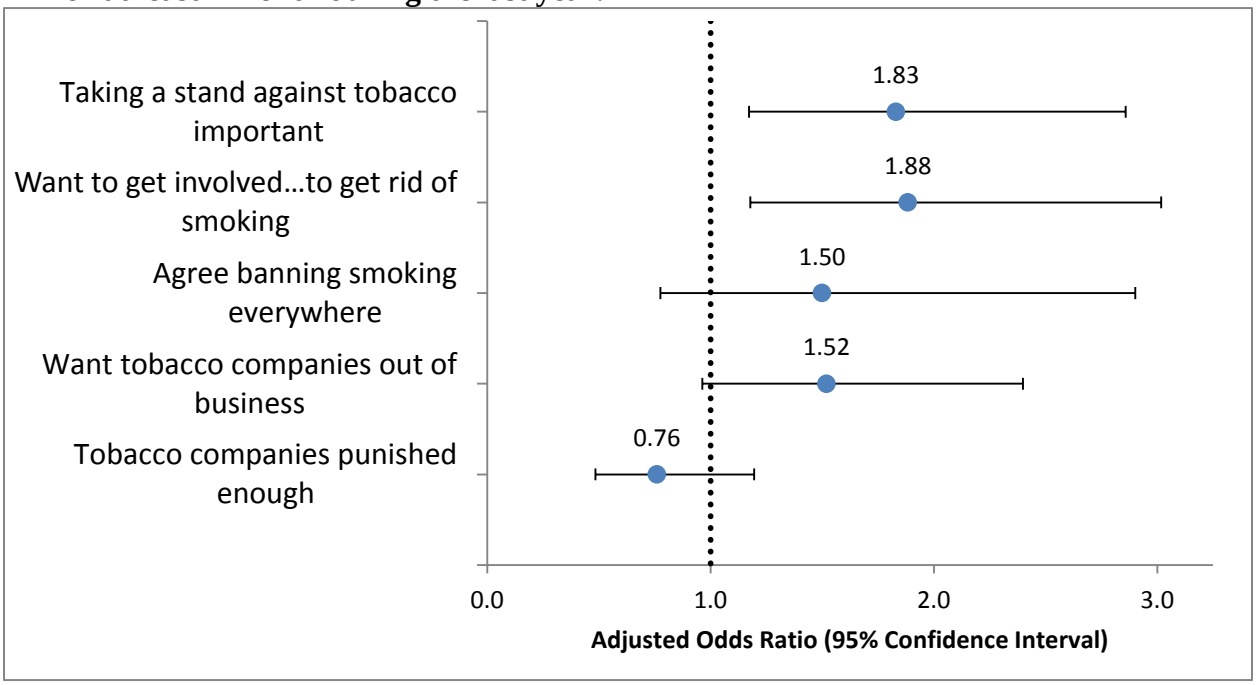
Want Tobacco Companies to Go Out of Business. A similar pattern emerged when desire to drive tobacco companies out of business was assessed in relation to quitting attempt while adjusting for other covariates. Those who agreed about the above statement were more likely to report quit attempts at follow up (OR=2.14, 95% CI=1.60-2.85) than those who disagreed.

Tobacco Companies Punished Enough. Persons who felt that the tobacco companies had been "punished enough" at baseline were less likely to report quit attempts during the prior year at follow up (OR=0.60, 95% CI=0.45-0.79).

Thus, the pattern that emerged from this analysis was that attitudes at baseline in each case predicted tobacco behaviors at follow up even after controlling for education, age, gender, and religious participation.

Quitting for at least one month at the time of follow up

Figure 7: Relationship between attitudes and tobacco behavior and odds of quitting for at least 1 month during the last year.



(See also Appendix Table A5-2)

Taking a Stand Against Tobacco. The odds of quitting at least once during the prior month at follow up was 1.83 times greater among those who said that taking a stand against tobacco was important to them at baseline than among those who disagreed (OR=1.83, 95% CI=1.17-2.86). More educated survey participants were also more likely to agree with the statement than less educated participants (OR=1.49, CI=1.01-2.20). Older participants, women, and religious attendance were less likely to report quitting, although these associations did not reach statistical significance.

Want to Get Involved in Efforts to Get Rid of Smoking. Those who reported they wanted to get involved to get rid of smoking at baseline were also significantly more likely to say that they had quit at least once during the prior month at follow up than those who disagreed (OR=1.88, 95% CI=1.18-3.02).

Banning Smoking Everywhere. Smokers who agreed with banning smoking everywhere at baseline were more likely to report a quit attempt at follow up (OR=1.50, 95% CI=0.78-2.90) than those who agreed with the statement but the association was not statistically significant. Older persons, women, more educated and attendance of

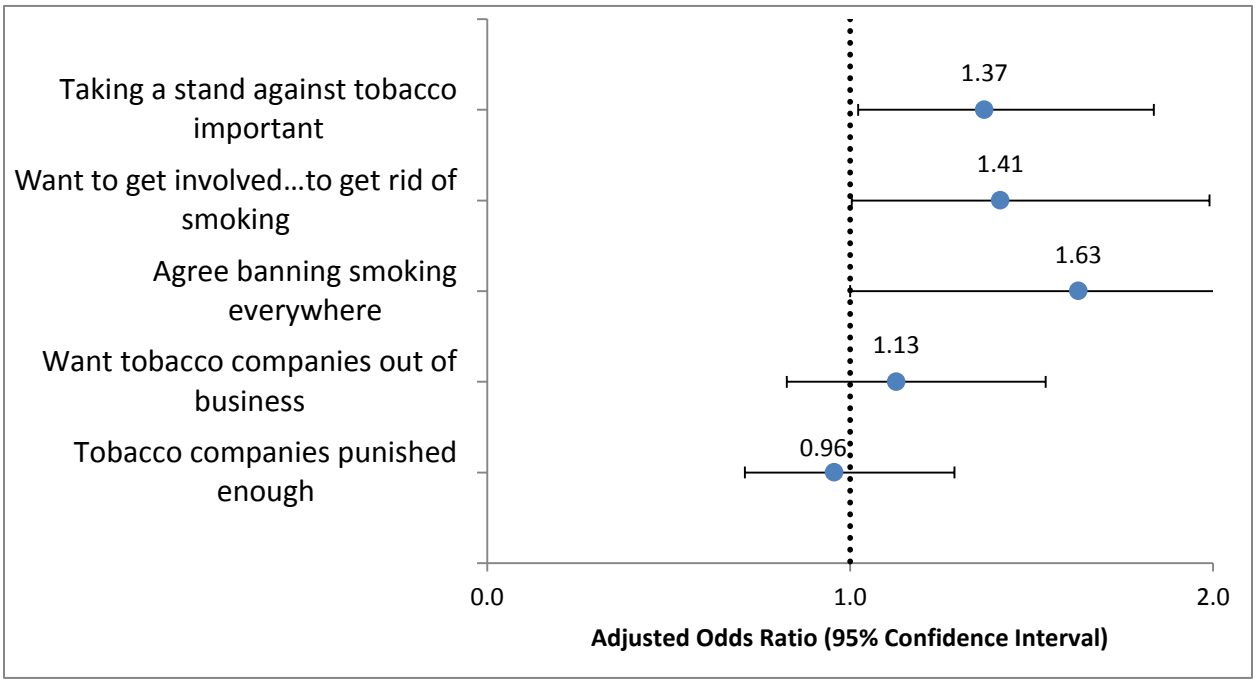
religious events were factors of smokers more likely to report at least one month quit but none of the associations were statistically significant.

Want Tobacco Companies to Go Out of Business/ Tobacco Companies Punished Enough. Neither wanting tobacco companies to go out of business nor the view that tobacco companies had been punished enough were significantly related to at least one month quit at follow up.

Reduction in smoking at follow up

Cutting back on smoking was measured by comparing the number of cigarettes reported smoked by smokers on the average day in both baseline and follow up surveys. Analyses were based on logistic regression and are reported in Figure 8, below. The results are not consistent with expectations based on findings reported above, nor did associations have large effect sizes. Three of the baseline attitudes, wanting to take a stand against tobacco, getting involved to get rid of smoking, and banning smoking everywhere, were related to cutting back on smoking at follow up.

Figure 8: Relationship between attitudes and tobacco behavior and odds of making a 20% reduction in cigarette consumption in the past year
(See also Appendix Table A5-3)



Taking a Stand Against Tobacco. Those who wanted to take a stand against tobacco at baseline were more likely to report reductions in cigarettes smoked (OR=1.37, 95% CI=1.02-1.84). However, none of the other covariates were significantly related to cutting down in smoking in this analysis.

Want to Get Involved in Efforts to Get Rid of Smoking. Those who wanted to get involved in efforts to get rid of smoker were more likely to report having cut down on the number of cigarettes smoked (OR=1.41, 95% CI=1.00-1.99), as were those who reported

a higher frequency of attendance of religious events (OR=1.11, 95% CI=1.02-1.22). However, associations with the other covariates were not statistically significant.

Banning Smoking Everywhere. Those who supported banning smoking everywhere were more likely to report cutting down on their smoking than others (OR=1.63, 95% CI=1.00-2.65). But, except for attendance of religious events which was associated with support for the ban (OR=1.10, 95% CI=1.01-1.21), this attitude was the only one of the covariates to be related to cutting back to a statistically significant extent.

Want Tobacco Companies to Go Out of Business: Only frequency of attendance of religious events was related to cutting back on smoking (OR=1.10, 95% CI=1.01-1.20). None of the other predictors, including wanting tobacco companies to go out of business were related to cutting back on smoking, at least to a statistically significant extent.

Tobacco Companies Punished Enough. Again, attendance of religious events was associated with cutting back on smoking (OR=1.12, 95% CI=1.03-1.23)

Summary

The most important finding in this study is that attitudes at baseline predict future tobacco behaviors, including intentional quit attempts, intentional quit for at least a month, and cutting down on the number of cigarettes smoked. We demonstrated that attitudes expressed to interviewers about a year prior to the measurement of quitting smoking and reducing the number of cigarettes smoked were related to attitudes measured a year later.

But not all the attitudes were related to all tobacco behaviors in similar ways. The strength of association between attitudes and tobacco related behaviors depends on the type of action for which attitudes were assessed (Allport, 1935; Banaji & Heiphetz, 2010). Attitudes about what may be regarded as more extreme actions, such as complete smoking bans everywhere except in one's home, and driving tobacco companies out of business are not as highly correlated with smoking behaviors at a later time. Second, it is likely that non-tobacco attitudes, such as the typical American cultural view that government should be limited in regulating the private sector in the county coupled with the attitude that individuals should be free to do what they wish, may reduce associations involving complete bans and what may be perceived as incursions into the domains of private businesses.

Our data also illustrate the difference between comparing aggregate tabulations reported for populations in summaries at different times. These data indicated little aggregate changes in approval or disapproval among public attitudes regarding smoking during the year between baseline and follow up surveys among smokers. Yet substantial change in attitudes was found, and this change was clearly related to individual tobacco behaviors, once individuals were tracked from baseline to follow up interview. This finding should alert observers to follow individuals through time rather than relying on aggregate grouped data when describing change of the lack of change.

Attitudes make a difference in behaviors reported by smokers and tend to be effected by characteristics of the environmental, including social norms, peer influences, and an atmosphere of social propriety when it comes to smoking (Allport, 1935; Hovell et al.,

2009; Banaji & Heiphetz, 2010; Hofstetter et al., 2010; Borzai & Carey, 2003; Etcheverry & Agnew, 2008; Glass & McAtee, 2006). It appears that media campaigns, such as those mounted by the California Tobacco Control Program, should be continued, since repeated messages that are designed to engage public response, may have a direct impact on perceptions and attitudes when broadcast frequently (See chapter 4 for more details). Efforts in public schools (Alexander, Piazza, Mekos, & Valente, 2001), and other institutions, concerning smoking can also continue to be effective in preventing initiation and in the formation of attitudes hostile to smoking.

Since we find that many intense attitudes are most consistently related to smoking behavior and to other attitudes, strong attitudes provide a target for informational tobacco control efforts in an attempt to modify tobacco use in the desired direction. Zaller (1992) has demonstrated that expressions of attitudes are probabilistic and that probability is a function of the intensity of the attitude and the situation in which it is expressed. We assume that "strong attitudes," attitudes that place greater demand on survey participants, are more likely to be linked to tobacco behaviors. The effects of attitudes that may be mitigated to some extent by other attitudes are less likely to be linked to behaviors. The implication of this view is that persons who hold intensive attitudes about tobacco control issues are more likely to live in a social environment that is hostile to tobacco, and perceive support for these views within social relationships will also tend to articulate attitudes hostile to tobacco.

Appendix

Table A5-1: Logistic Regression of Attitudes and Selected Covariates at Baseline on Quit Smoking at Least Once During Prior Year.			
	Quit at Least Once Prior Year		
		95% CI	
Baseline:	**OR**	**Lower**	**Upper**
Taking a stand against tobacco important	2.546	1.936	3.347
Education	1.067	0.843	1.351
Age	0.83	0.69	0.998
Sex	1.039	0.791	1.365
Religious Frequency	1.162	1.066	1.266
Constant	0.167	0.076	0.369
	$\chi 2$=69.8, P<.001		
Want to get involved…to get rid of smoking	2.986	2.154	4.141
Education	1.1	0.868	1.394
Age	0.822	0.683	0.988
Sex	0.979	0.744	1.287
Religious Frequency	1.161	1.066	1.266
Constant	0.174	0.079	0.384
	$\chi 2$=67.2, P<.054		
Agree banning smoking everywhere	2.490	1.551	3.998
Education	1.052	0.835	1.324
Age	0.81	0.676	0.97
Sex	1.025	0.786	1.337
Religious Frequency	1.18	1.086	1.282
Constant	0.635	0.329	1.223
	$\chi 2$=37.4, P<.001		
Want tobacco companies out of business	2.135	1.6	2.85
Education	1.089	0.862	1.377
Age	0.768	0.638	0.924
Sex	1.013	0.773	1.328
Religious Frequency	1.162	1.067	1.264
Constant	0.276	0.129	0.591
	$\chi 2$=50.4, P<.001		
Tobacco companies punished enough	0.597	0.454	0.786
Education	1.123	0.885	1.425
Age	0.798	0.662	0.962
Sex	1.028	0.782	1.352
Religious Frequency	1.193	1.095	1.299
Constant	1.321	0.609	2.865
	$\chi 2$=38.6, P<.001		
Numbers in cells are odds ratios computed using multivariate logistic regression. Chi square statistics indicate extent to which model decreases deviance over the null model.			

Table A5-2: Logistic Regression of Attitudes and Selected Covariates at Baseline on Quit Smoking at Least one Month at follow up.			
	Quit at Least Once During Prior Month		
		95% CI	
Baseline:	**OR**	**Lower**	**Upper**
Taking a stand against tobacco important	1.83	1.172	2.858
Education	1.49	1.012	2.198
Age	0.83	0.616	1.119
Sex	1.23	0.791	1.911
Religious Frequency	1.09	0.962	1.242
Constant	0.01	0.004	0.066
	$\chi 2$=16.7, P<.005		
Want to get involved…to get rid of smoking	1.884	1.177	3.017
Education	1.571	1.067	2.314
Age	0.814	0.602	1.102
Sex	1.281	0.819	2.003
Religious Frequency	1.089	0.957	1.24
Constant	0.016	0.004	0.061
	$\chi 2$=17.3, P<.004		
Agree banning smoking everywhere	1.500	0.775	2.902
Education	1.469	1.002	2.154
Age	0.82	0.609	1.104
Sex	1.329	0.855	2.067
Religious Frequency	1.11	0.979	1.259
Constant	0.036	0.011	0.111
	$\chi 2$=11.6, P<.041		
Want tobacco companies out of business	1.52	0.963	2.398
Education	1.598	1.083	2.357
Age	0.805	0.594	1.09
Sex	1.232	0.787	1.928
Religious Frequency	1.074	0.943	1.223
Constant	0.022	0.005	0.083
	$\chi 2$=12.6, P<.021		
Tobacco companies punished enough	0.76	0.484	1.195
Education	1.646	1.111	2.44
Age	0.833	0.614	1.131
Sex	1.235	0.787	1.937
Religious Frequency	1.117	0.983	1.27
Constant	0.048	0.013	0.179
	$\chi 2$=13.1, P<.022		
Numbers in cells are odds ratios computed using multivariate logistic regression. Chi square statistics indicate extent to which model decreases deviance over the null model.			

Table A5-3: Logistic Regression of Attitudes and Selected Covariates at Baseline on Reduction in Smoking.			
	Reduction in Smoking Since Baseline		
		95% CI	
Baseline:	**OR**	**Lower**	**Upper**
Taking a stand against tobacco important	1.37	1.022	1.837
Education	0.909	0.707	1.17
Age	0.883	0.726	1.076
Sex	1.13	0.845	1.51
Religious Frequency	1.082	0.989	1.184
Constant	0.334	0.144	0.776
	$\chi 2$=11.4, P<.044		
Want to get involved…to get rid of smoking	1.414	1.004	1.99
Education	0.901	0.699	1.162
Age	0.871	0.715	1.062
Sex	1.096	0.818	1.468
Religious Frequency	1.11	1.015	1.215
Constant	0.489	0.236	1.01
	$\chi 2$=13.2, P<.021		
Agree banning smoking everywhere	1.629	1.00	2.65
Education	0.902	0.701	1.16
Age	0.876	0.72	1.066
Sex	1.116	0.836	1.49
Religious Frequency	1.104	1.011	1.207
Constant	1.313	0.418	4.127
	$\chi 2$=12.0, P<.036		
Want tobacco companies out of business	1.127	0.825	1.539
Education	0.878	0.681	1.131
Age	0.884	0.725	1.078
Sex	1.078	0.806	1.442
Religious Frequency	1.1	1.006	1.204
Constant	0.49	0.215	1.119
	$\chi 2$=7.8, P<.166		
Tobacco companies punished enough	0.956	0.71	1.287
Education	0.933	0.721	1.208
Age	0.85	0.693	1.041
Sex	1.115	0.828	1.5
Religious Frequency	1.122	1.025	1.229
Constant	0.535	0.231	1.243
	$\chi 2$=9.2, P<.099		
Numbers in cells are odds ratios computed using multivariate logistic regression. Chi square statistics indicate extent to which model decreases deviance over the null model.			

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Chapter 6

Smoking Bans and Quitting Behavior

Chapter 6

KEY FINDINGS

Smoking Bans and Quitting Behavior

This chapter focuses on assessing the relationship between baseline smoking ban policies (e.g., home smoking ban, perceived city/community ban and working smoking ban, etc.) and three quitting-related outcomes at the follow-up: quit attempts in the past 12 months, smoking reduction in the past 12 months, and quitting more than a month at follow-up.

- Smokers with either a total home ban or partial home ban were more likely to make a quit attempt compared to smokers with no home smoking ban (46.3% and 39.9% vs 30.6% respectively). However, only total ban was significantly and independently associated with an increased 1.7 odds of having a quit attempt in the multivariate adjusted analyses.

- Smokers with a total home ban were more likely to reduce cigarette consumption by 20% or more after one year compared to the smokers without such a ban (38.4% vs 26.9%). The odds of reducing cigarette consumption among smokers who had a total ban compared to smokers without such a ban was 1.7.

- Smokers with total home ban were also more likely to be quit at follow up for one month or more (13.8%) than smokers without such bans (3.7%). In the multivariate analyses, there was an odds of 2.95 for such smokers to quit for one month or more compared to smokers without any bans. Partial bans had not influence on quitting.

- Smokers who perceived that there was a city/community smoking ban were more likely to report a quit attempt than smokers who didn't have such a perception (43.9% vs 32.8%).

- Smokers who at baseline reported they reduced the number of cigarettes they smoked as a result of a home smoking ban were significantly more likely to make quit attempt at follow-up than those who didn't reduce the number of cigarettes as a result of a home smoking ban (50.7% vs 39.6%). This was a significantly consistent association with a 1.82 odds of having a quit attempt among this group of smokers in the multivariate analyses.

- Smokers who allowed smoking in their car were significantly less likely to make a quit attempt than those who didn't (35.8% vs 54.0%) and less likely to have a prolonged quit of one month or more (6.8% vs 17.5%). The odds of making a quit attempt was 0.56 and for a prolonged quit of one month or more it was 0.51 among those who smoked in their cars and allowed it compared to those who did not.

- Smokers who agreed SHS causes lung cancer in non-smokers were significantly more likely to make a quit attempt (44.8%) than those who disagreed (31.6%) which translated into an odds of 1.43 in the multivariate analyses. This was similar for odds of reducing cigarette consumption among this group of smokers.

Chapter 6

Smoking bans and quitting behavior

Introduction

Secondhand smoke (SHS) is defined as an involuntary exposure to a combination of diluted cigarette side stream smoke and the exhaled smoke from smokers (Nelson, 2001; Naiman, et al., 2011). The health consequences of SHS have been well documented and summarized (CDC Fact Sheets 2011; CDC MMWR, 2011; USDHHS, 2007). Exposure to SHS increases the risk of heart disease by 25-30% and increases the risk of developing lung cancer by 20-30% (NCI Fact Sheet 2011). There is no safe level of exposure to cigarette smoke and there is no safe level of exposure to SHS (NCI Fact Sheet, 2011). While more than two-thirds of nonsmokers and half of all smokers believe that smoking is hazardous to the nonsmoker's health (WHO, 2013), exposure of nonsmokers to SHS is common and remains an important public health risk. The only way to fully protect nonsmokers from SHS and reduce the risk of tobacco-related disease and death is to eliminate smoking (NCI Fact Sheet, 2011; USDHHS, 2010), and increasing the rate of successful smoking cessation has become a key strategy to improve the health of the population (Biener, et al., 2010; Levy, et al., 2000).

The immediate social environment of the smoker is expected to play an important role in predicting smoking cessation (Biener, et al., 2010). Considerable evidence suggests that having a smoke-free home may be associated with increased successful quitting and reduced daily consumption levels among adult smokers (Mills, et al., 2009; Messer, et al., 2008). Having children in the home may increase motivation to quit (Borland, et al., 2006), and workplace smoking restriction may increase cessation rates and decrease consumption in continuing smokers (Longo, et al., 2001; Farkas, et al., 1999). Cars are also important environments for tobacco control (Matt, et al., 2013). While factors associated with car smoking rules are similar to those reported for home smoking bans (King, et al., 2005; Kegler & Malcoe, 2002; Norman, et al., 1999), smoking bans in smokers' cars are less common than in their homes (Matt, et al., 2013; Halterman, et al., 2006; Kegler & Malcoe, 2002). Public smoking bans are also important and related to home bans. Borland, et al. (2006) found evidence that policies that limit smoking in public may stimulate adoption of home bans, suggesting that the effect of public bans on smoking reduction or cessation may in part be mediated by the adoption of home bans. Furthermore, previous studies have suggested that a total smoking ban (either public or home) promoted stronger and more consistent effects on smoking reduction and cessation than a partial smoking ban (Naiman et al., 2011; Borland et al., 2006; Pizacani et al., 2004).

The California Comprehensive Tobacco Control Program, established in 1989 (Bal, et al., 1990), was the first large, state run tobacco control program to particularly aim at protecting nonsmokers from exposure to SHS, support school and community initiatives against smoking, and provide smoking cessation service (Al-Delaimy, et al., 2007). The current study, the California Smokers Cohort (CSC) survey, is a prospective study to evaluate factors that predict smoking/quitting behaviors among adult cigarette smokers in California. This chapter focuses on

assessing the relationship between baseline smoking ban policies (e.g., home smoking ban, perceived city/community ban and working smoking ban, etc.) and three quitting-related outcomes at the follow-up: quit attempts in the past 12 months, smoking reduction in the past 12 months, and quitting more than a month at follow-up. Percentages are reported for the relevant variables, as are multivariate summaries controlling for demographic and baseline smoking behavior variables.

Smoking Bans and Quitting-related Outcomes

Cross-tabulation summaries of each of the three outcomes at follow-up versus baseline demographic variables and additional potential baseline predictors (including smoking ban policies, and baseline smoking behaviors) are displayed in Appendix Tables A6-1 to A6-3. Percentages and odds ratio (OR) from univariate logistic regression analyses are presented below. These were used to test for association between baseline predictors and outcome measures. Univariate summaries are followed by multivariate logistic regression analyses. All multivariate analyses controlled for five demographic variables (gender, age, ethnicity, education, and living in a household with children yes/no). In addition, baseline characteristics observed to be associated with smoking behavior at follow-up in univariate at the $p < 0.05$ were included in the final model. Results for each smoking behavior at follow-up are summarized in turn below.

Home smoking bans

For smoking bans in home (both total and partial bans) in relation to quit attempts at follow up we found that smokers with either a total home ban or partial home ban were more likely to make a quit attempt compared to smokers with no home smoking ban (46.3% and 39.9% vs 30.6% respectively) (Figure 6.1).

Among all smokers who had a home ban at baseline, smokers who at baseline reported they reduced the number of cigarettes they smoked as a result of a home smoking ban were significantly more likely to make quit attempt at follow-up than those who didn't reduce the number of cigarettes as a result of a home smoking ban (50.7% vs 39.6%).

The variable of "working ban" was not significantly associated with future quit attempts as both groups of smokers who worked indoor in a place with a smoking ban and those working indoor in a place with no smoking bans had 44.4% of them report a quit attempt at follow up.

The second behavior we determined as an outcome at follow up was the reduction of the number of cigarettes a smoker smoked. As described in the earlier chapters, this represented the group of smokers who decreased the number of cigarettes they smoked between baseline and follow up after 12 months by 20% or more. Many smokers who attempt to quit but fail, might decrease their consumption level (Al-Delaimy et al 2007). There is evidence that before completely quitting, smokers first decrease the number of cigarettes they smoked and their addiction to nicotine (Farkas et al 1999).

Similar to the other outcomes, smokers with total home smoking bans were significantly more likely to reduce the number of cigarettes they smoked at follow up (38.4%) compared to those

without a home ban (26.9%). Among smokers working indoor, those who had smoking ban at workplace were less likely to smoke less at follow up (27.4 vs 55.6%). This result was against the previous knowledge that work smoking ban was associated with the decreased cigarette consumption. In contrast, the association between work ban and the other 2 outcomes (quit attempt in past 12 month and quit more than a month) did not reach any statistical significance. The small numbers in our sample are the likely explanation for these results.

Having a total home smoking ban at baseline led to higher likelihood of smokers having a prolonged quitting at follow-up (13.8%) compared to not having a home ban (3.7%).

City/community smoking ban

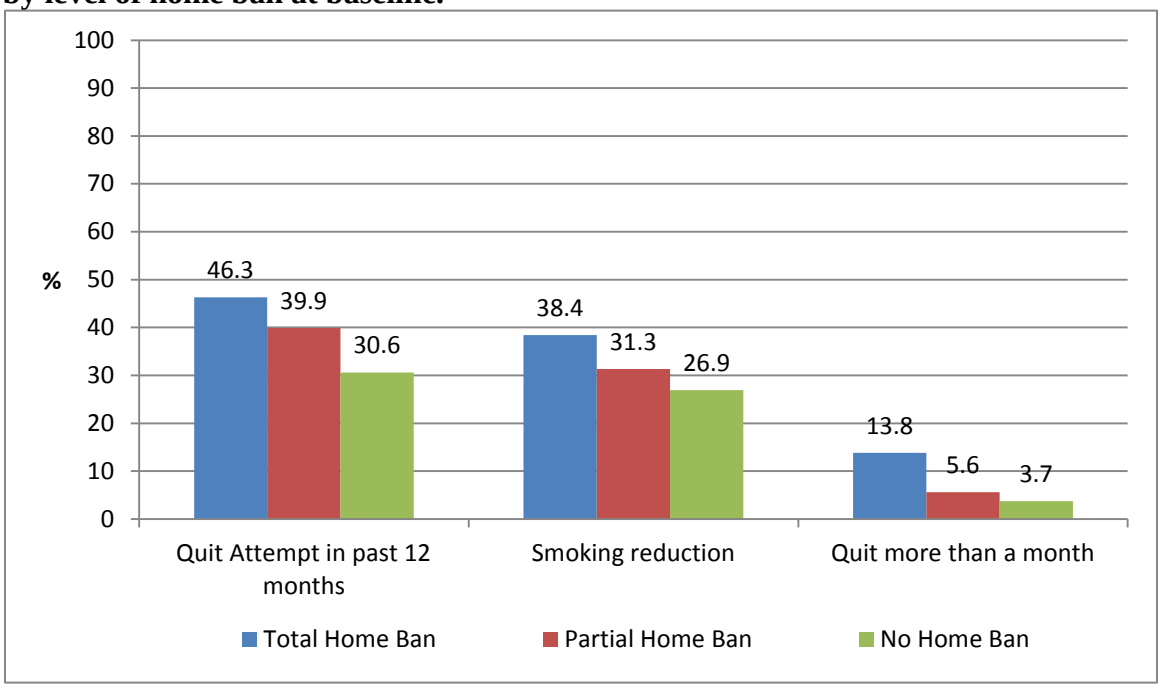
This variable was created by including anyone who reported a smoking ban in outdoor restaurant areas, in parks and playgrounds, in beaches, or a complete city ban on smoking as reporting such a ban, and smokers were considered reporting no city/community ban if they reported none of the above places had a smoking ban in their city/community.

Smokers who perceived that there was a city/community smoking ban were more likely to report a quit attempt than smokers who didn't have such a perception (43.9% vs 32.8%). All subcategories of this question regarding bans in beaches, parks, outdoor restaurant areas and total city bans had more smokers reporting such bans than not reporting such bans (Appendix Table A6-1).

For reduction of cigarette consumption at follow up according to reported city/community ban by smokers at baselines, the difference in reduction was minimal and not significant where 34.3% of smokers who reported such bans reduced cigarette consumption and 31.3% of smokers who did not report such a ban reduced their cigarette consumption (Appendix Table A6-2).

The more significant measure of quitting behavior is being quit for at least one month at follow up. The smokers who reported a city/community ban were less likely to quit for one month or more at follow up (8.7%) compared to the smokers who do not report such a ban (11.5%). However this was not statistically significant and the numbers were small (Appendix Table A6-3).

Figure 6.1 Frequency of quit attempts, smoking reduction, and prolonged quitting at follow up by level of home ban at baseline.



Car smoking ban

California passed a law in 2008 that would punish an adult car occupant up to $100 if an adult was smoking while there was a minor inside it. We asked the question to smokers if they had a car, and if they did, they would be asked if smoking was allowed in their car or not. It is expected that most of those who report smoking in their car do not have minors travelling with them, but it will be relevant to smokers who have created a smoke-free environment at home, work, and the car. As shown in Appendix Table 6-1, not allowing smoking in the car increased the likelihood that a smoker would make a quit attempt. Among smokers having car/cars, those who allowed smoking in their car were significantly less likely to make a quit attempt than those who didn't (35.8% vs 54.0%). A similar direction is seen when using reduction in consumption as the outcome, where smokers who did not have a car smoking ban and allowed smoking in it were less likely to report reducing cigarette consumption (30.7%) compared to those who did not allow it (36.6%) but this difference was not statistically significant.

Among smokers having car/cars, those who allowed smoking in the car were less likely to quit for one month or more than those who didn't allow it (6.8% vs 17.5%).

In addition to protection of adult and children occupants of cars if smoking did not take place in them, it also protects future occupants from third hand smoke (Matt, et al., 2013). Further, our data suggest the car smoking ban would also help smokers quit and reduce their cigarette consumption.

Belief that secondhand smoke causes cancer

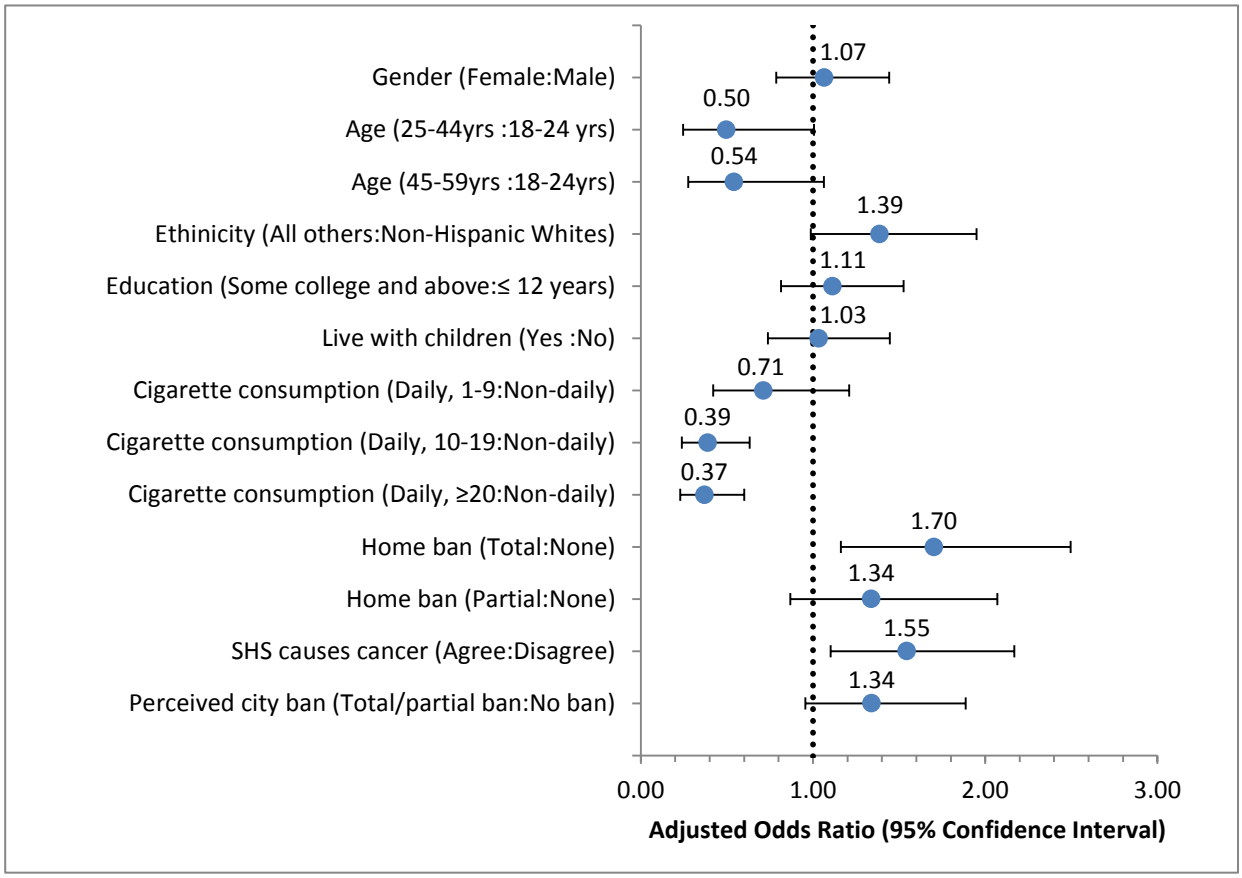
The belief that SHS causes lung cancer among nonsmokers made them more likely to make a quit attempt.Those who agreed SHS causes lung cancer in nonsmokers were significantly more likely to make a quit attempt (44.8%) than those who disagreed (31.6%).
Those smokers who agreed SHS causes lung cancer in nonsmokers were significantly more likely (36.2%) to smoke less than those who disagreed (27.1%). For the prolonged quitting outcome of one month or more at follow up, the smokers who believed SHS causes cancer among nonsmokers were more likely to have a prolonged quit attempt at follow up (10.7%) compared to the smokers who did not believe it can cause lung cancer (7.2%). The consistency of results for correct belief about harmfulness of SHS and quitting attempt, cigarette reduction and prolonged quitting has important future tobacco control applications about the role of education about harmfulness of SHS and their impact on smokers themselves and their smoking habits.

Multiple Regression Analyses

Smoking bans in relation to quit attempts after 12 months

The 5 variables significantly associated with quit attempts were entered into a multivariate logistic regression model controlling for demographic covariates. Results are summarized in Figure 6.2. Findings from Figure 6.2 show that cigarette consumption level and agreeing that SHS causes lung cancer in nonsmokers remained significantly related to more likely having a quit attempt at follow up after controlling for other covariates. For home ban policy variables, when compared to smokers with no home smoking bans, total smoking home ban was still significantly related to making a quit attempt at follow up (AOR 1.70 95% CI 1.16-2.50), but having only a partial smoking home ban did not. Perceived city/community smoking ban policy was no longer significantly predicting the outcome, although it was still in the positive direction. Experimental analyses replaced the 1st definition of the outcome "quit attempt in last 12 months" with the 2nd definition (inclusion of successful quitter with those who made a quit attempt) but the variables of perceived city/community smoking ban policy still didn't show significant association with the quit attempt. Hence, it was removed from the model.

Figure 6.2 AOR (95% CIs) from multiple logistic regressions of outcome "quit attempt in past 12 months" (step 1) among baseline & follow-up smokers (n=887).

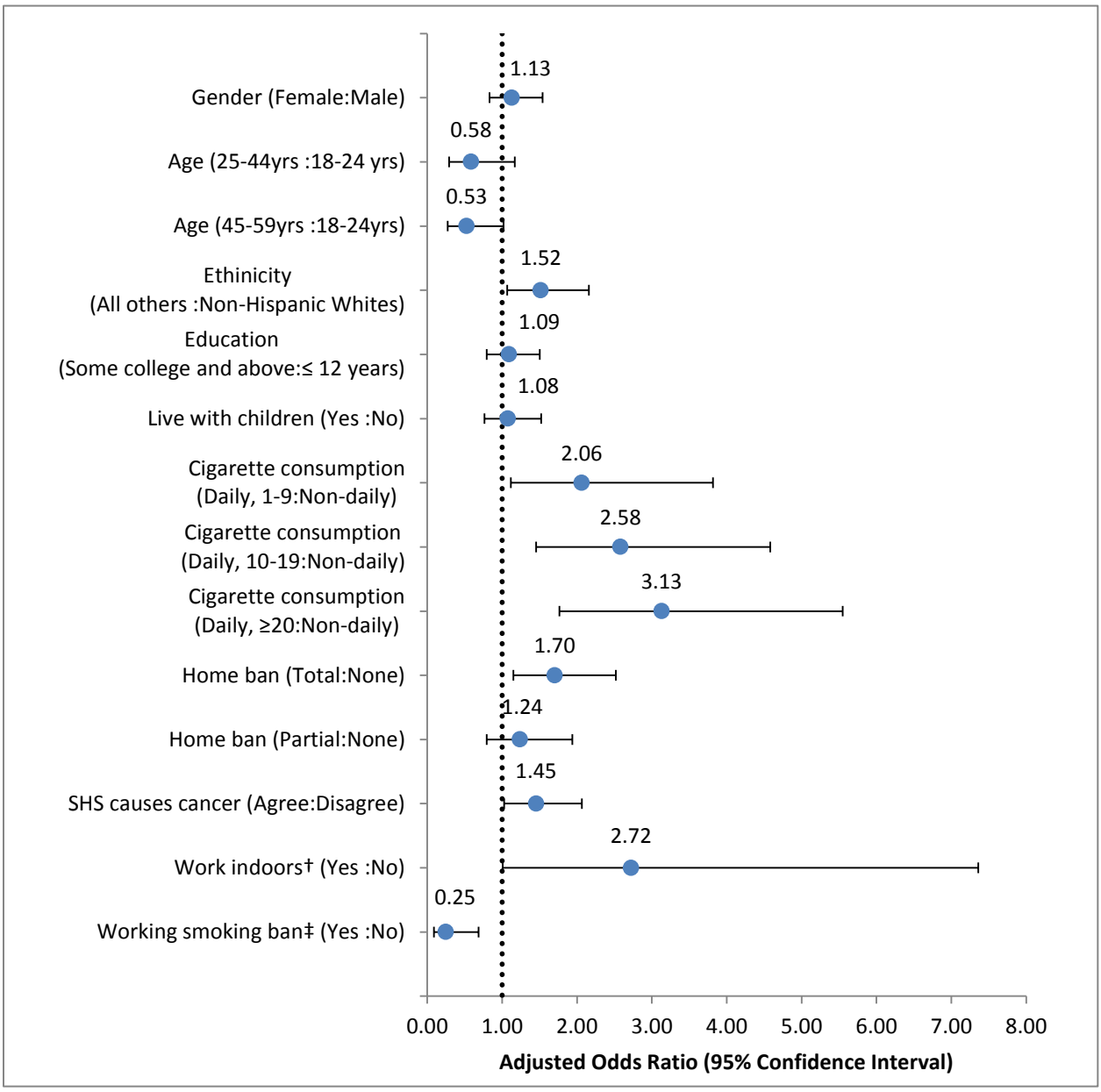


Two additional covariates available only on a subset of subjects were added to the multivariate model in turn. Among persons living in a home with a total home smoking ban, those reported that they had reduced the number of cigarette smoked because of home ban were more likely to have made a quit attempts at follow-up (AOR=1.82, 95% CI: 1.24 – 2.68). Those who agreed SHS causes lung cancer in nonsmokers were more likely to make quit attempt than those who disagreed (AOR=1.43, 95% CI: 1.02 – 2.01). Among persons with a car, those who allowed smoking in the car were less likely to have made a quit attempt (AOR=0.56, 95% CI: 0.39 – 0.79).

Smoking bans and reduced smoking consumption at follow up

Figure 6.3 shows the results from multiple regression analyses after controlling for all other variables. Those who agreed that SHS causes lung cancer among nonsmokers at baseline were more likely to smoke less compared to those who didn't (AOR=1.45, 95% CI: 1.03 – 2.06). Compared to smokers with no smoking ban, smokers with total home ban at baseline reduced smoking at follow-up (AOR=1.70, 95% CI: 1.15-2.52), but smokers with partial home ban didn't. Among smokers working indoor, those who had smoking ban at workplace were less likely to reduce their smoking (AOR=0.25, 95% CI: 0.09 – 0.69).

Figure 6.3 AOR (95% CIs) from multiple logistic regressions of outcome "smoking reduction" among baseline & follow-up smokers (n=887).

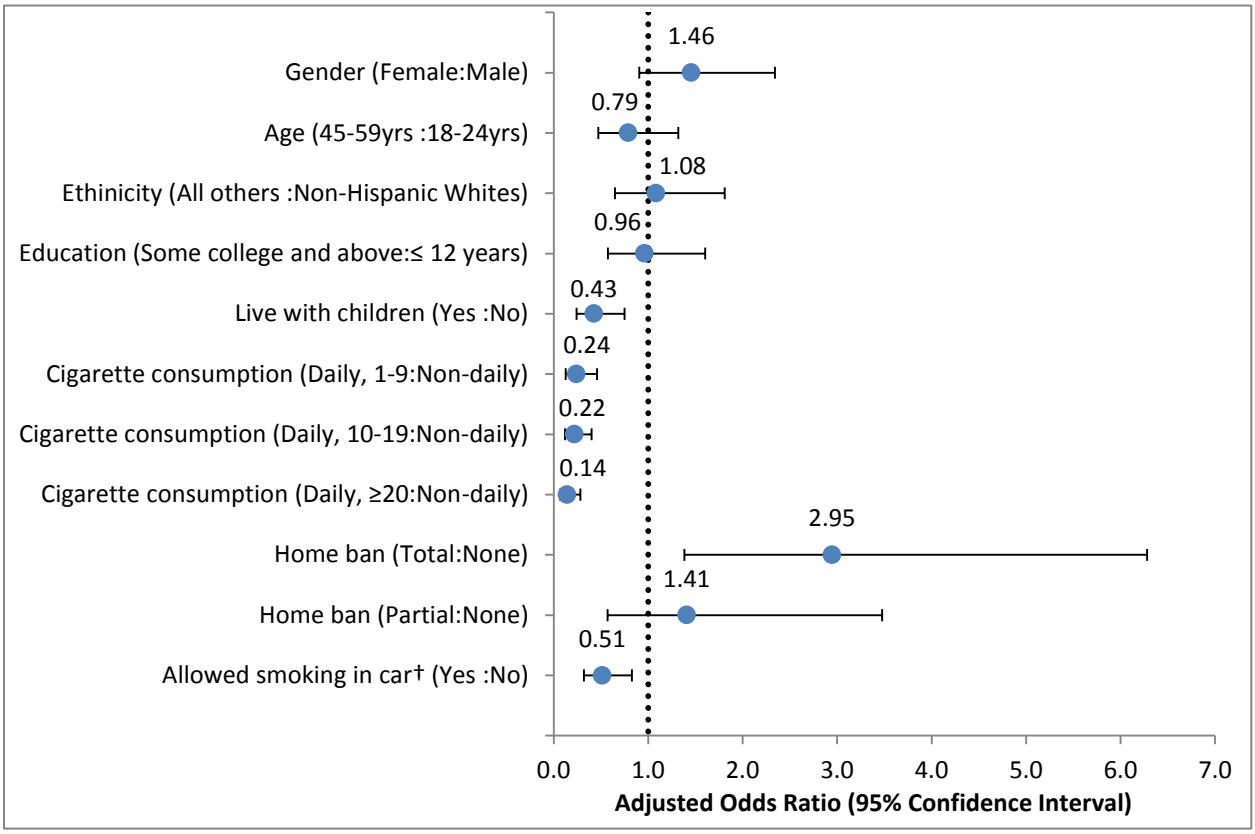


† "Work indoors" was defined as: currently work for money in an indoor setting outside of the home. The purpose of having this variable in the model was to control the samples of the "Working smoking ban". It (itself) was not the predictor of interest. ‡ Yes vs. No: indoor workers with a workplace ban relative to indoor workers with no workplace ban.

Smoking bans and quitting for at least one month at follow up

Three baseline predictors were significantly associated with the outcome in univariate regression. Figure 6.4 shows the results of these predictors after controlling for all other variables. Daily smokers at baseline were less likely to quit more than a month compared to non-daily smokers; heavier consumption level in daily smokers was associated with less likelihood of quitting (for daily smokers consuming 1 – 9 cigarettes/day, AOR=0.24, 95% CI: 0.13 – 0.46; for daily smokers consuming 10 -19 cigarettes/day, AOR=0.22, 95% CI: 0.12 – 0.40; for daily smokers consuming ≥ 20 cigarettes/day AOR=0.14, 95% CI: 0.07 – 0.28). Compared to not having a ban, total home ban at baseline predicted quitting for 1 month at follow-up (AOR=2.95, 95% CI: 1.38 – 6.28), but not partial home ban. Among smokers having car/cars, those who allowed smoking in cars were less likely to quit than those who didn't allow (AOR=0.51,95% CI: 0.32 – 0.83).

Figure 6.4 AOR* (95% CIs) from multiple logistic regressions of outcome "Quit more than a month" at follow-up among baseline smokers (N=1000).



* Multiple logistic regression with all the variables in the table as well as gender, age, ethnicity, education and "live with children under age 18". †The variable "Have car/cars" (AOR=11.81; CI: 1.54-90.36; not displayed in figure due to range) was included in the model to control the samples of the "Allowed smoking in car". It (itself) is not the predictor of interest. Smokers having car/cars and allowing smoking in car relative to smokers having car/cars and not allowing smoking in car.

Summary

The prospective longitudinal design of this study is intended to provide a better understanding of what makes smokers continue to smoke or decide to quit, and therefore to better inform tobacco prevention efforts. The current chapter focuses on smoking bans and perception of SHS and their impacts on the outcomes (quitting behaviors) at follow-up from a sample of California adult smokers.

Our results confirmed some but not all of prior findings related to smoking bans and smoking behavior. Smokers living in a home with a total home ban were more likely to make a quit attempt, reduce consumption and quit. However, smokers living in a home with a partial home were no more likely to exhibit these behaviors than smokers living in a home with no ban, as consistently observed by others (Naiman, et al., 2011; Pizacani, et al., 2004). In addition, we found that "reduced number of cigarettes smoked" at baseline due to complete home ban was associated with increased likelihood of making quit attempt at follow-up.

We found that smokers with a car smoking restriction at baseline were more likely to make a quit attempt and more likely to have quit more than a month at follow-up. While direct causation cannot be inferred from this association, it is reasonable to expect that public health interventions leading to car smoking bans would reinforce attempts by smokers to make quit attempt or quit directly. Regardless, car smoking bans serve to protect nonsmokers from exposure to SHS in cars.

It is generally known that smoking and exposure to SHS causes lung cancer, although only just more than half of the smokers believed SHS is harmful to the health of nonsmokers (NCI Fact Sheet, 2011; WHO, 2013). In our study, smokers who agreed that SHS causes lung cancer at baseline were more likely to make quit attempt or reducing cigarette consumption at follow-up. This finding suggests that increasing knowledge of the health effect of smoking and SHS is an effective tobacco control strategy.

Finally, the other two smoking ban policy variables at baseline, perceived city/community smoking ban and working smoking ban, didn't show consistent associations with the outcomes at the follow-up. There was a non-significant trend suggesting that smokers who perceived that there was a city/community smoking ban at baseline were more likely to make quit attempt at follow-up in multiple regression analysis (AOR= 1.34, 95% CI: 0.96 – 1.89). The lack of significance could be due to the power issue and/or the fact that follow-up period was not long enough to show the effect. As for the workplace smoking ban, the current study showed an opposite association with the outcomes. This finding is supported by previous studies that also suggested that workplace smoking restrictions in California may not be as effective as home smoking restrictions at reducing consumption and increasing cessation (Farkas, et al., 1999; Pierce, et al., 1998). Further, among smokers working indoor, vast majority of them (94%) had smoking ban at workplace which left the sample size of smokers without workplace smoking ban extremely small. Therefore, the impact of the working ban on smoking reduction in current study should be interpreted with caution given the limitations above. Larger sample sized long-term prospective studies are necessary to further address these issues.

Table A6-1 Characteristics of smokers at baseline according to reported quit attempts at follow-up.

QUIT SMOKING INTENTIONALLY FOR A DAY OR LONGER IN PAST 12 MONTHS (F_Quitone_imp)	(Baseline and Follow-up smokers)	YES n(%)	NO n(%)
Overall		361(40.7)	525(59.3)
Gender	Male	172(40.1)	257(59.9)
	Female	189(41.4)	268(58.6)
Age	18 - 24	26(60.5)	17(39.5)
	25 - 44	96(44.0)	122(56.0)
	45 - 59	239(38.2)	386(61.8)
Ethnicity	Non-Hispanic White	241(37.1)	409(62.9)
	All others	120(50.8)	116(49.2)
Education	<=12 years	120(38.0)	196(62.0)
	Some College and Above	241(42.3)	329(57.7)
ANY CHILDREN UNDER AGE 18 THAT LIVE WITH YOU	Yes	120(45.5)	144(54.5)
	No	241(38.7)	381(61.3)
Daily average cig. consumption level	Non daily	68(60.7)	44(39.3)
	Daily,1-9	85(54.8)	70(45.2)
	Daily,10-19	100(35.8)	179(64.2)
	Daily,>= 20	108(32.0)	229(68.0)
SMOKE FROM SOMEONE ELSE'S CIGS CAN CAUSE LUNG CANCER IN A NONSMOKER	Agree	261(44.8)	322(55.2)
	Disagree	77(31.6)	167(68.4)
ANYONE EVER SMOKE INSIDE YOUR HOME	Yes	152(35.8)	273(64.2)
	No	209(45.3)	252(54.7)
HAS SMOKING BEEN BANNED INSIDE YOUR HOME	Yes	246(46.1)	288(53.9)
	No	113(32.8)	231(67.2)
REDUCED # OF CIGS SMOKED BECAUSE OF HOME SMOKING BAN (ONLY among SMOKING BEEN BANNED IN HOME = YES)	Yes	154(50.7)	150(49.3)
	No	90(39.6)	137(60.4)
HAVE CAR?	Yes	328(40.9)	473(59.1)
	No	31(37.3)	52(62.7)
ALLOWS SMOKING IN CAR(ONLY among HAVE CAR = YES)	Yes	206(35.8)	369(64.2)
	No	122(54.0)	104(46.0)
Home Ban	Total Home Ban	202(46.3)	234(53.7)
	Partial Home Ban	87(39.9)	131(60.1)
	No Home Ban	70(30.6)	159(69.4)

QUIT SMOKING INTENTIONALLY FOR A DAY OR LONGER IN PAST 12 MONTHS (F_Quitone_imp)	(Baseline and Follow-up smokers)	YES n(%)	NO n(%)
IN YOUR CITY / TOWN - THERE IS A COMPLETE BAN ON SMOKING OUTSIDE	Yes	18(45.0)	22(55.0)
	No	327(40.4)	483(59.6)
IN YOUR CITY / TOWN - SMOKING IS ALLOWED IN OUTDOOR RESTAURANT AREAS	Yes	178(39.9)	268(60.1)
	No	141(43.9)	180(56.1)
IN YOUR CITY / TOWN - SMOKING IS ALLOWED IN PARKS AND PLAYGROUNDS	Yes	133(37.5)	222(62.5)
	No	170(46.1)	199(53.9)
IN YOUR CITY / TOWN - SMOKING IS ALLOWED ON BEACHES	Yes	86(35.4)	157(64.6)
	No	170(46.6)	195(53.4)
Perceived City Ban (combined)	Total/Partial Ban	276(43.9)	352(56.1)
	No Ban	80(32.8)	164(67.2)
Work Indoor	Yes	132(44.4)	165(55.6)
	No	227(38.7)	359(61.3)
Work Ban (ONLY among Work Indoor = YES)	Yes	124(44.4)	155(55.6)
	No	8(44.4)	10(55.6)
AT PLACE OF WORK - ALLOW SMOKING ADJACENT TO ENTRANCE (ONLY among Work Indoor = YES)	Yes	90(49.2)	93(50.8)
	No	41(37.3)	69(62.7)
AT PLACE OF WORK - ALLOW SMOKING IN SPECIAL AREA(ONLY among Work Indoor = YES)	Yes	74(50.7)	72(49.3)
	No	56(37.8)	92(62.2)
AT PLACE OF WORK - ALLOW SMOKING IN OTHER PLACE OUTSIDE BLDG (ONLY among Work Indoor = YES)	Yes	61(39.1)	95(60.9)
	No	65(50.0)	65(50.0)
AT PLACE OF WORK - ALLOW SMOKING IN ANY OF ABOVE PLACE (ONLY among Work Indoor = YES)	Yes	111(43.0)	147(57.0)
	No	20(54.1)	17(45.9)

Table A6-2 Characteristics of smokers at baseline according to reported reduction in average consumption at follow-up.

Smoke less (>=20% reduction on total num of cig last month) comparing to baseline? (F_SMKLESS)	(Baseline and Follow-up smokers)	YES n(%)	NO n(%)
Overall		294(33.6)	581(66.4)
Gender	Male	136(32.3)	285(67.7)
	Female	158(34.8)	296(65.2)
Age	18 - 24	20(46.5)	23(53.5)
	25 - 44	73(34.4)	139(65.6)
	45 - 59	201(32.4)	419(67.6)
Ethnicity	Non-Hispanic White	204(31.8)	437(68.2)

Smoke less (>=20% reduction on total num of cig last month) comparing to baseline? (F_SMKLESS)	(Baseline and Follow-up smokers)	YES n(%)	NO n(%)
	All others	90(38.5)	144(61.5)
Education	<=12 years	109(34.7)	205(65.3)
	Some College and Above	185(33.0)	376(67.0)
ANY CHILDREN UNDER AGE 18 THAT LIVE WITH YOU	Yes	96(36.9)	164(63.1)
	No	198(32.2)	417(67.8)
Daily average cig. consumption level	Non daily	23(21.5)	84(78.5)
	Daily,1-9	53(34.2)	102(65.8)
	Daily,10-19	94(33.8)	184(66.2)
	Daily,>= 20	124(37.0)	211(63.0)
SMOKE FROM SOMEONE ELSE'S CIGS CAN CAUSE LUNG CANCER IN A NONSMOKER	Agree	209(36.2)	369(63.8)
	Disagree	65(27.1)	175(72.9)
ANYONE EVER SMOKE INSIDE YOUR HOME	Yes	125(29.9)	293(70.1)
	No	169(37.0)	288(63.0)
HAS SMOKING BEEN BANNED INSIDE YOUR HOME	Yes	195(36.9)	333(63.1)
	No	95(28.0)	244(72.0)
REDUCED # OF CIGS SMOKED BECAUSE OF HOME SMOKING BAN (ONLY among SMOKING BEEN BANNED IN HOME = YES)	Yes	112(37.3)	188(62.7)
	No	81(36.0)	144(64.0)
HAVE CAR?	Yes	256(32.4)	535(67.6)
	No	37(45.1)	45(54.9)
ALLOWS SMOKING IN CAR(ONLY among HAVE CAR = YES)	Yes	174(30.7)	393(69.3)
	No	82(36.6)	142(63.4)
Home Ban	Total Home Ban	166(38.4)	266(61.6)
	Partial Home Ban	68(31.3)	149(68.7)
	No Home Ban	60(26.9)	163(73.1)
IN YOUR CITY / TOWN - THERE IS A COMPLETE BAN ON SMOKING OUTSIDE	Yes	13(32.5)	27(67.5)
	No	265(33.2)	534(66.8)
IN YOUR CITY / TOWN - SMOKING IS ALLOWED IN OUTDOOR RESTAURANT AREAS	Yes	144(32.6)	298(67.4)
	No	108(34.1)	209(65.9)
IN YOUR CITY / TOWN - SMOKING IS ALLOWED IN PARKS AND PLAYGROUNDS	Yes	114(32.8)	234(67.2)
	No	123(33.5)	244(66.5)
IN YOUR CITY / TOWN - SMOKING IS ALLOWED ON BEACHES	Yes	76(31.9)	162(68.1)
	No	132(36.5)	230(63.5)
Perceived City Ban (combined)	Total/Partial Ban	213(34.3)	408(65.7)
	No Ban	75(31.3)	165(68.8)
Work Indoor	Yes	85(29.1)	207(70.9)

Smoke less (>=20% reduction on total num of cig last month) comparing to baseline? (F_SMKLESS)	(Baseline and Follow-up smokers)	YES n(%)	NO n(%)
	No	208(35.9)	372(64.1)
Work Ban (ONLY among Work Indoor = YES)	Yes	75(27.4)	199(72.6)
	No	10(55.6)	8(44.4)
AT PLACE OF WORK - ALLOW SMOKING ADJACENT TO ENTRANCE (ONLY among Work Indoor = YES)	Yes	53(29.8)	125(70.2)
	No	30(27.3)	80(72.7)
AT PLACE OF WORK - ALLOW SMOKING IN SPECIAL AREA(ONLY among Work Indoor = YES)	Yes	43(29.7)	102(70.3)
	No	40(27.8)	104(72.2)
AT PLACE OF WORK - ALLOW SMOKING IN OTHER PLACE OUTSIDE BLDG (ONLY among Work Indoor = YES)	Yes	44(28.8)	109(71.2)
	No	35(27.3)	93(72.7)
AT PLACE OF WORK - ALLOW SMOKING IN ANY OF ABOVE PLACE (ONLY among Work Indoor = YES)	Yes	77(30.4)	176(69.6)
	No	6(16.2)	31(83.8)

Table A6-3 Characteristics of smokers at baseline according to reported quitting for one month or more at follow-up.

Baseline smokers who quit more than 1 month at follow-up? (F_QT1M)	(Baseline smokers)	YES n(%)	NO n(%)
Overall		94(9.4)	906(90.6)
Gender	Male	41(8.6)	437(91.4)
	Female	53(10.2)	469(89.8)
Age	18 - 24	1(2.2)	44(97.8)
	25 - 44	33(12.8)	224(87.2)
	45 - 59	60(8.6)	638(91.4)
Ethnicity	Non-Hispanic White	62(8.5)	664(91.5)
	All others	32(11.7)	242(88.3)
Education	<=12 years	27(7.8)	321(92.2)
	Some College and Above	67(10.3)	585(89.7)
ANY CHILDREN UNDER AGE 18 THAT LIVE WITH YOU	Yes	21(7.3)	266(92.7)
	No	73(10.2)	640(89.8)
Daily average cig. consumption level	Non daily	44(27.0)	119(73.0)
	Daily,1-9	16(9.1)	159(90.9)
	Daily,10-19	20(6.6)	284(93.4)
	Daily,>= 20	13(3.7)	341(96.3)
SMOKE FROM SOMEONE ELSE'S CIGS CAN CAUSE LUNG CANCER IN A NONSMOKER	Agree	72(10.7)	600(89.3)
	Disagree	19(7.2)	246(92.8)
ANYONE EVER SMOKE INSIDE YOUR HOME	Yes	25(5.5)	432(94.5)
	No	69(12.7)	474(87.3)

Baseline smokers who quit more than 1 month at follow-up? (F_QT1M)	(Baseline smokers)	YES n(%)	NO n(%)
HAS SMOKING BEEN BANNED INSIDE YOUR HOME	Yes	71(11.5)	549(88.5)
	No	22(5.9)	349(94.1)
REDUCED # OF CIGS SMOKED BECAUSE OF HOME SMOKING BAN (ONLY among SMOKING BEEN BANNED IN HOME = YES)	Yes	35(10.1)	313(89.9)
	No	35(13.1)	233(86.9)
HAVE CAR?	Yes	93(10.2)	820(89.8)
	No	1(1.2)	84(98.8)
ALLOWS SMOKING IN CAR(ONLY among HAVE CAR = YES)	Yes	43(6.8)	585(93.2)
	No	50(17.5)	235(82.5)
Home Ban	Total Home Ban	72(13.8)	448(86.2)
	Partial Home Ban	13(5.6)	221(94.4)
	No Home Ban	9(3.7)	234(96.3)
IN YOUR CITY / TOWN - THERE IS A COMPLETE BAN ON SMOKING OUTSIDE	Yes	4(9.1)	40(90.9)
	No	89(9.7)	830(90.3)
IN YOUR CITY / TOWN - SMOKING IS ALLOWED IN OUTDOOR RESTAURANT AREAS	Yes	52(10.2)	457(89.8)
	No	32(8.9)	327(91.1)
IN YOUR CITY / TOWN - SMOKING IS ALLOWED IN PARKS AND PLAYGROUNDS	Yes	37(9.3)	363(90.8)
	No	40(9.6)	375(90.4)
IN YOUR CITY / TOWN - SMOKING IS ALLOWED ON BEACHES	Yes	29(10.3)	253(89.7)
	No	33(8.3)	367(91.8)
Perceived City Ban (combined)	Total/Partial Ban	61(8.7)	638(91.3)
	No Ban	33(11.5)	254(88.5)
Work Indoor	Yes	25(7.6)	304(92.4)
	No	67(10.1)	599(89.9)
Work Ban (ONLY among Work Indoor = YES)	Yes	24(7.7)	286(92.3)
	No	1(5.3)	18(94.7)
AT PLACE OF WORK - ALLOW SMOKING ADJACENT TO ENTRANCE (ONLY among Work Indoor = YES)	Yes	18(8.9)	185(91.1)
	No	7(5.7)	115(94.3)
AT PLACE OF WORK - ALLOW SMOKING IN SPECIAL AREA(ONLY among Work Indoor = YES)	Yes	11(6.9)	148(93.1)
	No	13(7.8)	153(92.2)
AT PLACE OF WORK - ALLOW SMOKING IN OTHER PLACE OUTSIDE BLDG (ONLY among Work Indoor = YES)	Yes	15(8.7)	157(91.3)
	No	10(6.9)	135(93.1)

Baseline smokers who quit more than 1 month at follow-up? (F_QT1M)	(Baseline smokers)	YES n(%)	NO n(%)
AT PLACE OF WORK - ALLOW SMOKING IN ANY OF ABOVE PLACE (ONLY among Work Indoor = YES)	Yes	22(7.7)	262(92.3)
	No	3(7.0)	40(93.0)

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Chapter 7

Physical & Mental Health and Tobacco Use

Chapter 7

KEY FINDINGS

Physical & Mental Health and Tobacco Use

This chapter presents a description of the intersections among physical health, mental health, health behaviors and changes in tobacco use as a means of continued surveillance of the cumulative health risk that smokers may carry due to multiple unhealthy lifestyle behaviors.

- At baseline, current daily smokers reported significantly lower levels of perceived health (2.9±1.1) than non-daily smokers (3.1 ± 1.0), however perceived health did not predict any quitting behavior at follow up
- Smokers with respiratory disease were more likely than smokers without respiratory illness to make a quit attempt (54.9% vs 45.6%) and reduction in cigarette consumption (40.6% vs 31.7%). Having diabetes, a heart disease or hypertension was not related to any quitting behavior.
- Having depressive symptoms was related to reduction of cigarette consumption (42.6% vs 31.2%) at follow up but not making a quit attempt or prolonged quitting.
- Smokers with anxiety were more likely than smokers without anxiety to make a quit attempt (51.5% vs 45.2%), and smoking reduction (38.2% vs 30.4%) but not prolonged quitting.
- Having comorbid conditions of anxiety and depression led to higher odds of making quit attempts among those with mild (1.57 odds) and moderate severe (1.53 odds) compared to smokers with no such comorbid conditions. Similarly the odds for those with these comorbid conditions to reduce consumption was 1.48 for mild and 1.46 for moderate/severe depression/anxiety compared to smokers without such conditions. There was no difference in prolonged quitting for one month or more.
- Obesity was not related to any quitting or smoking behavior at follow up. However, physically inactive smokers were less likely to make a quit attempt at follow up compared to more physically active smokers (0.69 odds). Sedentary smokers with more than 4 hours of TV and online time were more likely to make a quit attempt (1.34 odds), and reduce their smoking (1.43) compared to non-sedentary smokers.
- Having one or more chronic medical conditions was associated with significantly higher odds (1.42 odds) of reduced smoking over the year of follow-up. There was no relation to quit attempts or prolonged quitting.
- There was a higher odds (2.03) of making a quit attempt after receiving advice to quit by a health care provider among smokers with moderate/severe mental health problems.

Chapter 7

Physical & Mental Health and Tobacco Use

Introduction

Cardiovascular diseases, respiratory diseases, and diabetes are all health consequences of smoking that contribute to premature mortality among smokers. Persistent smoking among those with chronic diseases such as obesity can exacerbate illness, complicate treatments, and further increase premature mortality. Tobacco consumption is exceptionally high among smokers with mental health problems (CDC, 2013). In addition to higher rates of smoking, mental illness is associated with higher prevalence of chronic diseases such as cardiovascular disease, respiratory disease, and diabetes, as well as obesity and negative health behaviors such as physical inactivity, sedentariness, and heavy alcohol use. High levels of tobacco use have contributed to this disproportionate disease burden among smokers with mental health problems. Monitoring the impact of mental and physical health conditions on the tobacco use trajectories of smokers is a high priority for tobacco control efforts to reduce tobacco-related diseases in California.

The combination of mental illness and negative health behaviors such as smoking, heavy alcohol use, physical inactivity, and sedentary time substantially increases individuals' risk of chronic diseases and premature death. Statewide surveillance of multiple health outcomes and behavioral risk factors is critical to understanding the relationship between the smoking behavior of Californians and their physical and mental health. In 2011, the California Smokers Cohort (CSC) surveys incorporated items enabling examination of co-occurring diseases and unhealthy lifestyle behaviors. New to the 2011 questionnaire compared to previous surveys were questions assessing depressive and anxiety symptoms and sedentary behavior patterns among smokers. The longitudinal assessment of this important cohort of smokers provides prospective evaluation of individual mental health vulnerabilities, co-occurring diseases, and other health behaviors that may be associated with changes in tobacco use over time.

With a longitudinal cohort, we can examine efforts to make changes in tobacco use, interactions with healthcare providers around tobacco use, and tobacco use outcomes among vulnerable populations of smokers with mental and physical health problems. Identification of sociodemographic and smoking characteristics predictive of efforts to change tobacco use can inform prevention and intervention efforts. Throughout this chapter we will relate 2011 reports at baseline of physical health, mental health, and health behaviors prospectively to 2012 follow-up assessment reports of serious quit attempts that lasted 24 hours or more, significant reductions in the quantity of cigarettes consumed (defined as a 20% or more reduction in the number of cigarettes smoked after 12 months), and reports of quitting tobacco use for 1 month or more. To describe relationships between health and tobacco use outcomes, we used a multivariable approach that adjusted for smoking characteristics (daily and non-daily smoking,

level of tobacco dependence) and sociodemographic characteristics including gender, age category (18-24; 25-44; or 44+), education level (≤12 years; Some college; Post-graduate) and ethnicity (Hispanic, non-Hispanic). This chapter presents a description of the intersections among physical health, mental health, health behaviors and changes in tobacco use as a means of continued surveillance of the cumulative health risk that smokers may carry due to multiple unhealthy lifestyle behaviors.

Physical Health

The health status of smokers was reflected in questions about perceived overall health status as well as reports of specific tobacco-related health conditions with which they had ever been diagnosed. Global perceptions of health and reports of tobacco-related diseases are presented for current daily smokers, current non-daily smokers, and quitters.

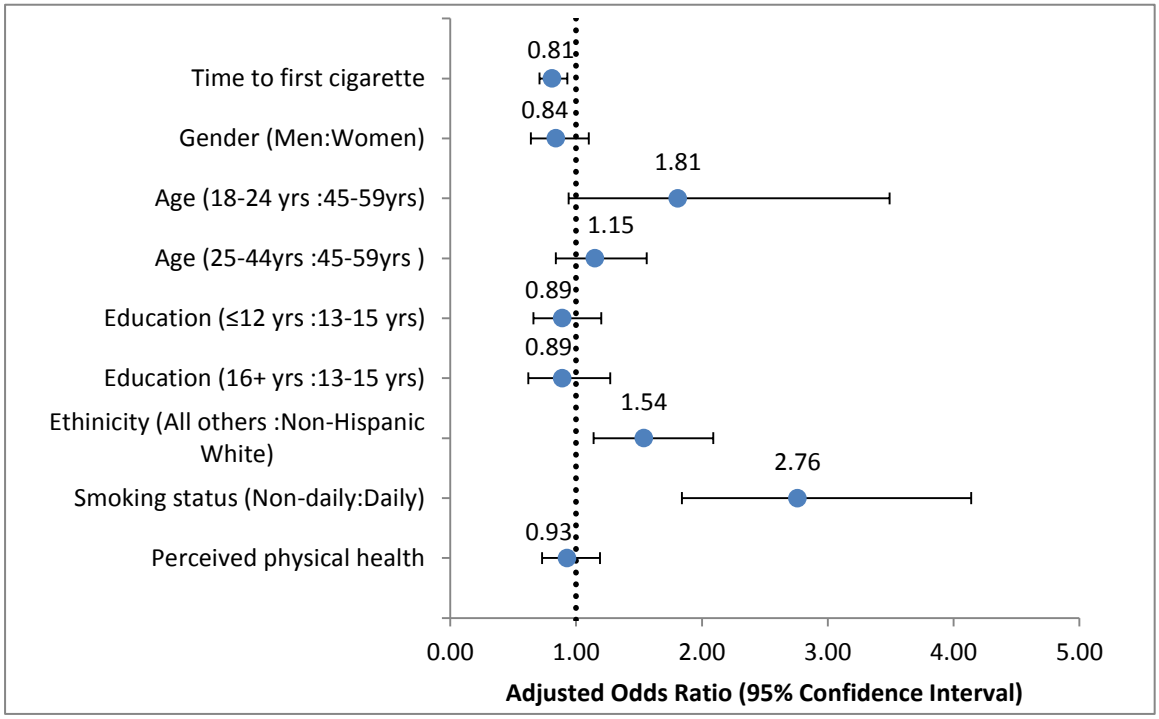
Perceptions of Personal Health

Levels of perceived physical health were rated from poor to excellent on a 5-point scale. Specifically, participants were asked the following question:

> *"Would you say that in general your health is: Excellent, Very good, Good, Fair, or Poor?"*

Average rating of health was coded 1-5 to reflect increasing levels of health (1=Poor to 5=Excellent). At baseline, current daily smokers reported significantly lower levels of perceived health (2.9±1.1) than non-daily smokers (3.1 ± 1.0). We examined whether perceptions of health at baseline were related to attempts to quit tobacco use by follow up. Self-reported health status was not related to likelihood of a past year quit attempt of a day or longer (OR= 0.93, 95% CI:0.73 -1.19) (Figure 7.1), smoking reduction (OR=0.82, 95% CI:0.62-1.07) or quitting for 1 month or more (OR=0.87, 95% CI:0.57-1.34) after adjusting for sociodemographic variables and levels of nicotine dependence.

Figure 7.1 Relationship between perceived physical health and odds of making a quit attempt over the year of follow-up.

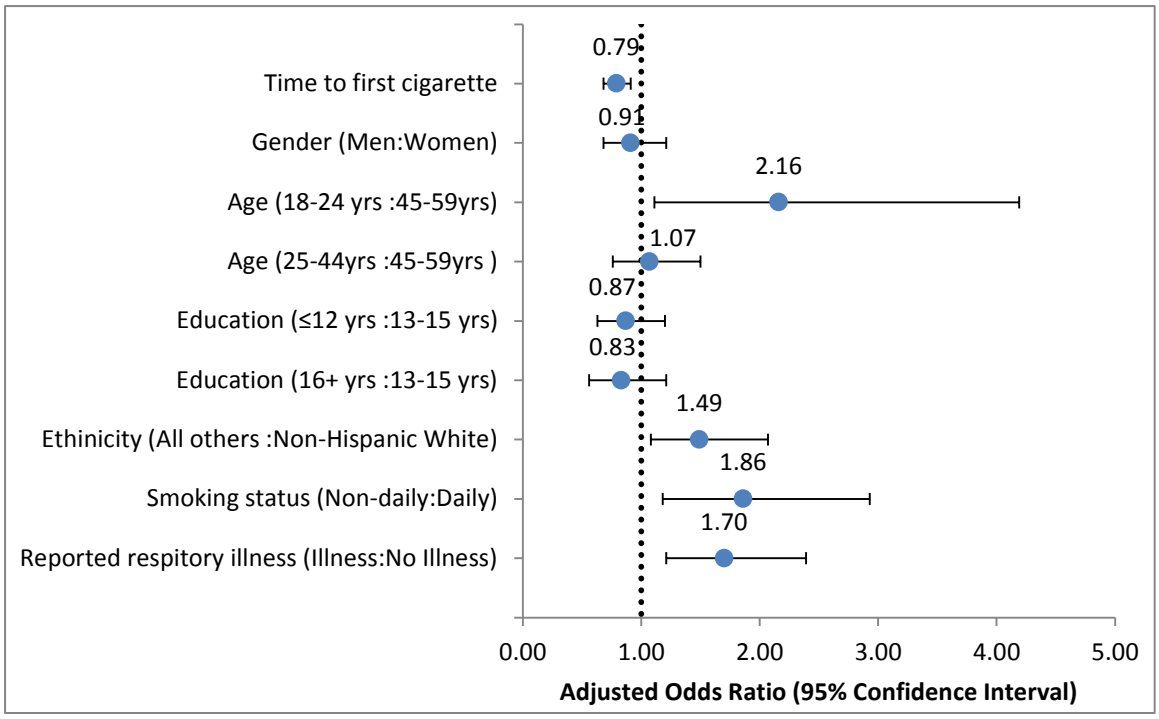


Reports of Tobacco-Related Disease

The survey asked respondents if a physician had ever told them that they had asthma, heart disease, or diabetes. Respondents were also given the option of reporting other physical illnesses, which were used to supplement definitions of self-reported lung disease and heart disease. Current daily smokers and non-daily smokers reported similar rates of respiratory disease including asthma, chronic obstructive pulmonary disease, emphysema, bronchitis and other lung ailments. Rates of self-reported respiratory disease were 21.7% and 14.7% among daily smokers and non-daily smokers, respectively, a difference that was not significant after adjusting for sociodemographic characteristics (OR=1.31, 95% CI:0.79-2.17). Asthma was the most commonly reported respiratory disease, with rates of 20.1% and 14.1% among daily smokers and non-daily smokers, respectively. Rates of asthma among smokers were higher than statewide estimates of the general California population, where approximately 11.7% of non-smoking adults reported being diagnosed with asthma at some point in their lives (Milet et al, 2007). Smokers with respiratory diseases reported significantly higher rates of a past quit attempt compared to smokers without respiratory disease (OR=1.70, 95% CI:1.21-2.39), with rates of 54.9% for those with respiratory disease and 45.6% for those without it. Percentages of smokers who report reduction of cigarette consumption were also higher among those with respiratory illnesses (40.6%) compared to those without such diseases (31.7%), but the difference was not statistically significant after adjusting for sociodemographic characteristics. Rates of quitting for a month or more were similar for smokers with and without respiratory disease (9.2%, 9.4%). As shown in Figure 7.2 the OR of making a quit attempt with adjustment

for demographic factors was higher among those who report a respiratory illness (OR =1.70, 95% CI: 1.21-2.39) compared to those with no respiratory illness.

Figure 7.2 Relationship between reports of respiratory disease and odds of making a quit attempt.



Rates of self-reported heart disease, including hypertension, did not vary according to current smoking status. Rates of heart disease were 14.6% and 14.2% among daily smokers and non-daily smokers, respectively. Among smokers with heart disease, 46% reported making a quit attempt of at least one day in the past year, whereas 47% of smokers without heart disease reported such a quit attempt. Similarly, 38.4% and 32.6% with and without heart disease reported a reduction in smoking and 6.2% and 9.9% reported quitting for one month or more. Multivariable assessment confirmed that heart disease was not significantly related to efforts to quit, reduce, or succeed in quitting smoking.

Although the prevalence of diabetes in California is lower than that in the US population, it has been on the rise, with 2012 estimates indicating that 9.8% of California residents report having received a diagnosis of diabetes (KFF, 2012). In this cohort, the prevalence of diabetes was 10.1% among current daily smokers and 8.6% among current non-daily smokers. Percentages of smokers with diabetes who reported making a quit attempt of at least one day in the past year were 50% and for those without diabetes it was 47.2%. Rates of smoking reduction after 12 months were comparable for those with diabetes (28.7%) and without it (34.0%) and reports of quitting for one month or more were also similar for those with and without diabetes (9.2% and 9.4% respectively). Thus, in multivariable models, smokers with diabetes were similarly likely to make a quit attempts, reduce smoking, and quit for one month or more compared with

smokers without diabetes. Efforts to promote cessation among those with diabetes are needed, as smoking increases the risk of diabetes-related complications and premature death.

Mental health

Surveillance of mental health problems typically focuses on depression and anxiety, two of the most common mental health disorders in the US. This survey included screenings for symptoms of depression and anxiety using the Patient Health Questionnaire for Depression and Anxiety (PHQ-4; Kroenke et al). The survey poses the overall question:

"Over the past 2 weeks have you been bothered by these problems?"

The two clusters of anxiety symptoms it assesses are:

1) feeling nervous, anxious, or on edge; and
2) not being able to stop or control worrying.

The two clusters of depression symptoms it assesses are:

1) feeling down, depressed, or hopeless; and
2) little interest or pleasure in doing things.

Respondents choose between the following four options for each of the four items:

1) not at all;
2) several days;
3) more days than not; and
4) nearly every day.

The PHQ-4 instrument scoring rules specify that ratings on the anxiety and/or depression portions of 3 or higher indicate significant depressive and/or anxiety symptoms. Various versions of the PHQ depression (PHQ-9; PHQ-8; PHQ-2) and anxiety (GAD-7; GAD-2) scales have been widely used in epidemiological studies in the US. Prevalence estimates of depression and anxiety among adults in the US are 8.2% (BRFSS) and 18.1% (Kessler et al.), respectively.

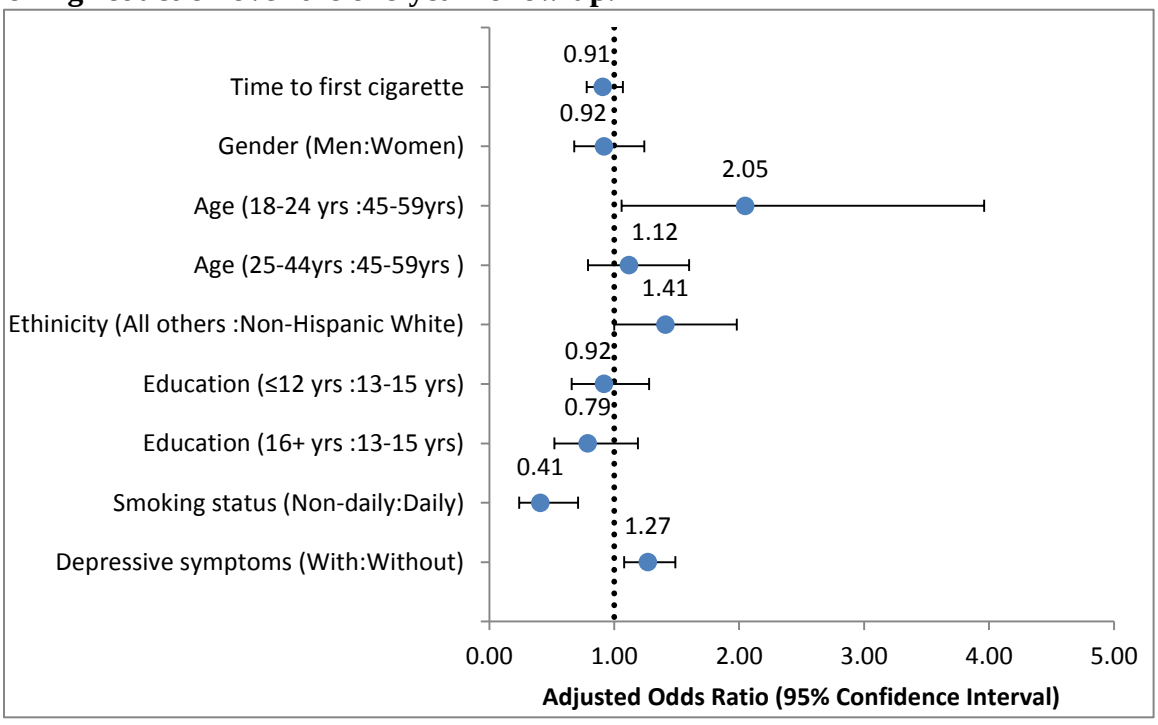
Established cut-off scores of 3 or higher on the depression and anxiety portions of the PHQ-4 were used to evaluate significant symptoms of each disorder. Given the high rate of comorbidity between depression and anxiety, total scores on the PHQ-4 were used to elaborate on combined risks associated with symptoms of these disorders. PHQ-4 scores were grouped into normal (0-2), mild (3-5), moderate (6-8), and severe (9-12) levels of current symptoms, according to established standards (Kroenke et al, 2009).

Depression

Rates of depression in the general population are usually higher among females than males (Gallant et al, 1996), but in our sample of smokers, there was no difference in depression according to gender. Among men in this sample, rates of significant depressive symptoms were 22.5% and 13.8% among daily smokers and non-daily smokers respectively. Corresponding rates among women were 23.7%, and 16.9%.

Survey results indicated that the percentage of women and men with significant depressive symptoms who reported making at least one quit attempt lasting one day or longer during the past year was similar (47.3%) to that of women and men without significant depressive symptoms (47.9%). Although the same pattern was apparent for quitting more than one month (9% vs. 9%), the difference in rates of smoking reduction (42.6% vs. 31.2%) between groups remained significant after adjusting for sociodemographic and smoking characteristics (see Figure 7.3). The OR of reducing cigarette consumption was significantly higher among those with depressive symptoms after adjusting for other factors compared to those without depressive symptoms (OR=1.27, 95% CI: 1.08-1.49). These results suggest that the presence of depressive symptoms does not reduce attempts to quit and may have particular influence in motivating smokers to cut down on the amount they are smoking.

Figure 7.3 Relationship between levels of depressive symptoms and odds of significant smoking reduction over the one-year follow-up.

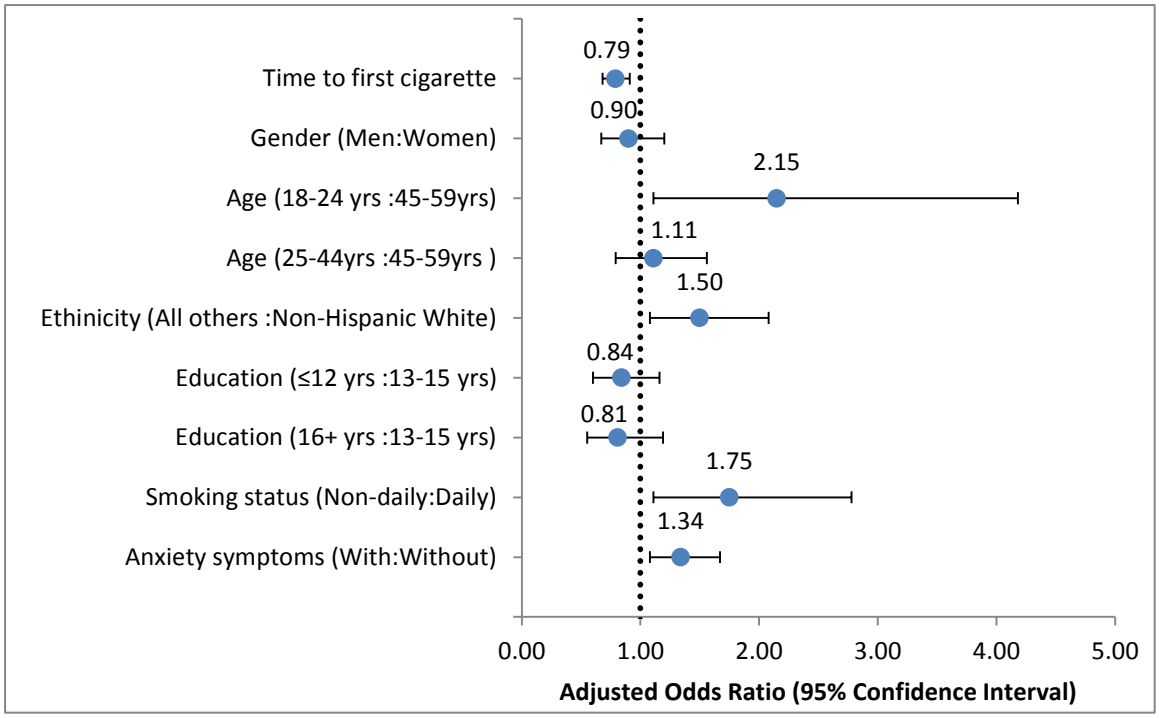


Anxiety

Among men in this sample, rates of significant anxiety symptoms were 31.4%, and 28.7% among daily smokers and non-daily smokers, respectively. Corresponding rates among women were 38.9%, 32.9%.

Survey results indicated that the percentage of women and men with significant anxiety symptoms who reported making at least one quit attempt lasting one day or longer during the past year was significantly higher (51.5%) than that of women and men without significant anxiety symptoms (45.2%). A similar pattern of higher rates of smoking reduction was apparent among women and men with significant anxiety, with percentages of 38.2% and 30.4%, respectively. Finally, smokers with or without significant anxiety had similar rates of being quit at least one month at follow up (9.2% vs. 9.5%). The higher rates of quit attempts (OR=1.34, 95% CI:1.08-1.67) (Figure 7.4), higher rates of smoking reduction (OR=1.30, 95% CI:1.04-1.63) and similar rates of cessation (OR= 0.98, 95% CI:0.68-1.41) are consistent with literature demonstrating that individuals with anxiety desire to quit but often relapse quickly, oftentimes in stressful situations that may provoke negative moods.

Figure 7.4 Relationship between having significant anxiety symptoms and odds of making a quit attempt over the year of follow-up.

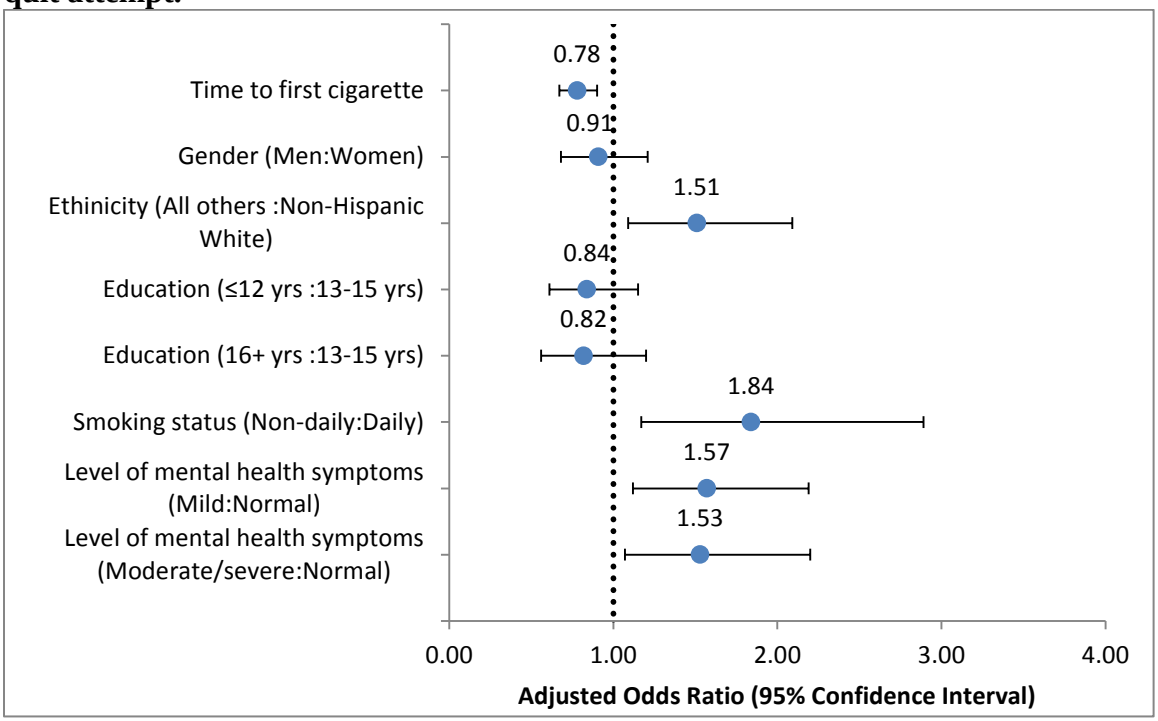


Comorbidity of Depression and Anxiety

Among men in this sample, 53.4% reported that they experienced no significant comorbid depression/anxiety symptoms, 25.6% reported mild levels of comorbid symptoms, and 21.0% reported moderate/severe comorbid depression/anxiety symptoms. The corresponding rates among women were 44.7%, 30.1%, and 25.1%. Increasing scores on the PHQ-4 corresponded

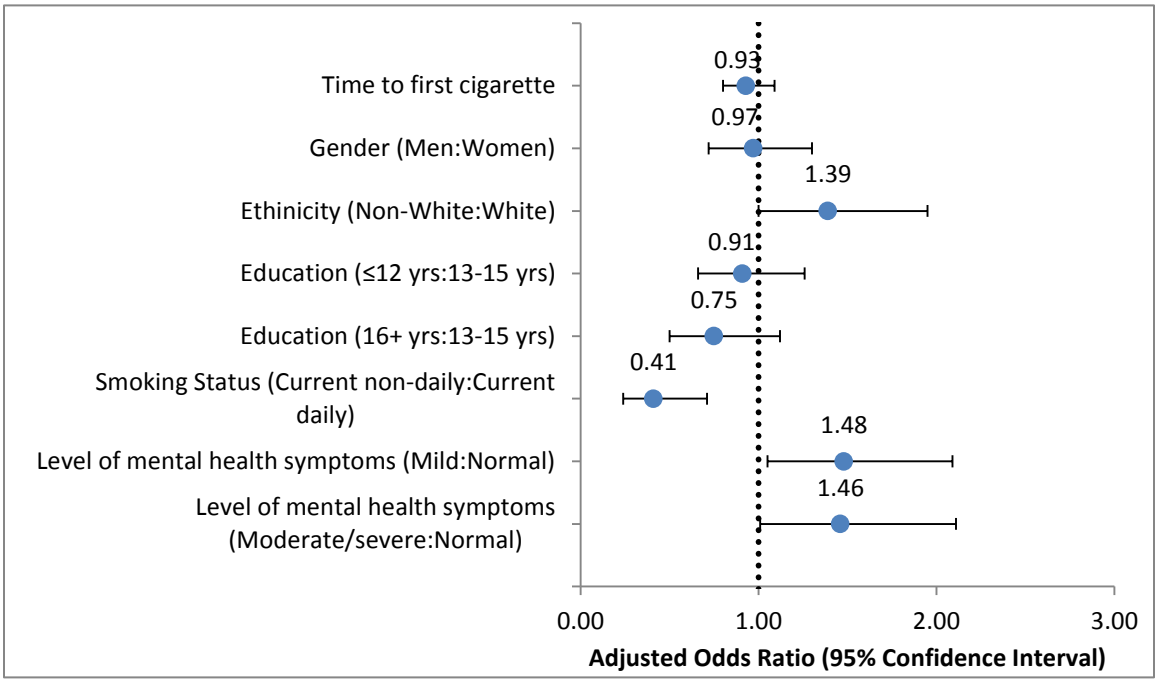
with statistically significant increases in rates of quit attempts (see figure 7.5: OR= 1.57, 95% CI: 1.12-2.19) for mild and OR= 1.53, 95% CI: 1.07-2.20) for moderate/severe comorbid depression/anxiety symptoms.

Figure 7.5 Relationship between levels of mental health symptoms and odds of making a quit attempt.



For smoking reduction after 12 months, the OR was equal to 1.48 (95% CI: 1.05-2.09) for mild, and 1.46 (95% CI: 1.01-2.11) for moderate/severe comorbid depression/anxiety symptoms (Figure 7.6). Rates of quitting for one month or more were similar across levels of PHQ-4 symptoms, with 9.4%, 9.7%, and 9.1% for normal, mild, and moderate/severe levels of anxiety/depression.

Figure 7.6 Relationship between levels of mental health symptoms and odds of significant reduction in smoking over the year of follow-up.



Obesity

Body mass index (BMI) was calculated using the standard formula weight (kg) / [height (m)] ^{2} for each individual based on his/her self-reported height and weight. Respondents were classified as obese (BMI ≥ 30), overweight (BMI 25-29.9), or normal weight (BMI 18.5-24.9) using guidelines from the Centers for Disease Control (CDC). In California, statewide prevalence of obesity was estimated at 23.8% by the CDC's 2011 Behavioral Risk Factors Surveillance System (BRFSS); this rate remains above the Healthy California 2010 goal of 15%. Obesity rates among daily smokers (30.3%) and non-daily smokers (34.8%) in California are much higher than the general California population's obesity rate.

Among all smokers in this sample, percentages reporting a quit attempt of one day or longer in the past year were 45.5% for smokers within the healthy weight range, 50.7% for smokers within the overweight range, and 48.2% among smokers within the obese range. We did not observe a prospective relationship between obesity and increased quit attempts (OR=1.14, 95% CI: 0.85-1.53) (Appendix Table A7-1), smoking reductions (OR=1.03, 95% CI: 0.76-1.39), or quitting for one month or more (OR=1.15, 95% CI: 0.70-1.90).

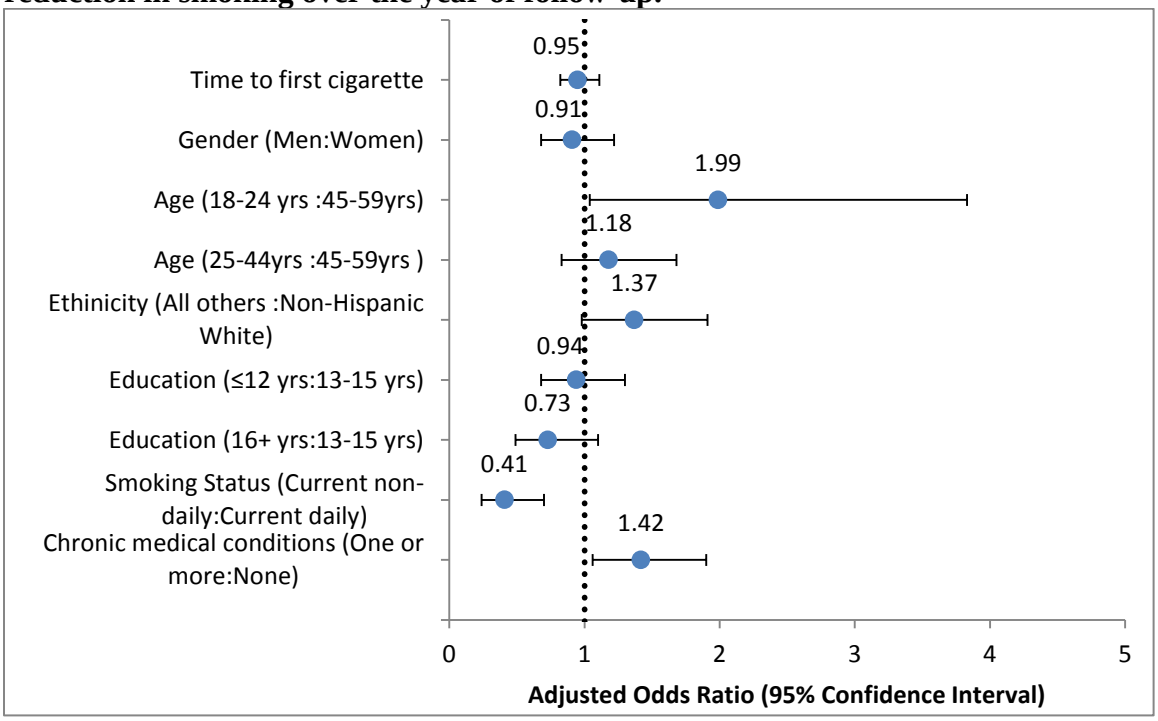
Multiple Physical and Mental Health Conditions

Evaluation of health outcomes among smokers must consider the high rates of multiple physical health, mental health and behavioral risk factors reported by smokers. Multiple chronic medical conditions including heart disease, respiratory disease, diabetes, and obesity

are associated with greater functional impairment, higher risk for premature mortality, and significantly higher medical expenditures (Katon, 2003). More than half of daily smokers and non-daily smokers reported one or more chronic medical conditions (53% and 50.3%, respectively). Having one or more chronic medical conditions was not associated with increased rates of quit attempts (46.1% vs. 48.7%) or quitting for one month or more (10.3% vs. 8.6%). After adjusting for demographic and smoking characteristics (see Figure 7.7), having one or more chronic medical conditions was associated with significantly higher odds of reduced smoking over the year of follow-up. The OR for reducing smoking among those with multiple health conditions compared to those without such conditions after adjusting for other factors was 1.42 (95% CI: 1.06-1.90; see Figure 7.7)

Given the high rates of multiple health risks among smokers, continued public health efforts are needed to target both the physical and mental health of current smokers to encourage efforts to change tobacco use and to reduce the disproportionate health impact from this high-risk group of smokers.

Figure 7.7 Relationship between chronic medical conditions and odds of significant reduction in smoking over the year of follow-up.



Physical Activity

The 2008 federal Physical Activity Guidelines for Americans recommend that adults engage in moderate physical activity for ≥150 minutes per week, vigorous physical activity for ≥110 minutes per week, or any combination of these two intensities and lengths of time. Despite the well-known benefits of regular physical activity, national surveys suggest that 38% of adults engage in no leisure time physical activity (Department of Health and Human Services, 2002), and in 2011, less than half of Americans met recommended physical activity guidelines (CDC, 2012). In our survey we examined responses to the question:

> *"During the past 7 days, how many days were you physically active for at least 10 minutes during your free time? By physically active, we mean brisk walking, jogging, playing sports, working out, aerobics, swimming or any other leisure time physical activity that made you breathe harder and your heart beat faster."*

Responses were organized into inactive (0 days per week), non-daily activity (1-6 days per week), and daily activity (7 days per week). Among daily smokers, 24.1% of women and 17.2% of men reported no physical activity in their free time. Among non-daily smokers, 16.9% of women and 10.1% of men reported no physical activity in their free time. Therefore non-daily smokers were more active than daily smokers.

Among all physically inactive smokers, 33.6% of women and 25.4% of men reported making a quit attempt for at least one day in the past year. These percentages of quit attempts were lower than the corresponding percentages among those who reported at least some leisure time physical activity (43.4% among women and 42.7% among men). Reports of smoking reduction were 43.1% among inactive women and 31.4% among inactive men. Among active smokers, rates were 30.7% for women and 35.1% for men. Rates of quitting for 1 month or more for inactive women were 10.9% and for inactive men they were 9.3%, while for active women quitting for 1 month was reported among 9.9% of them, 8.3% among men.

Overall rates of physical inactivity were higher among daily compared with non-daily smokers. After adjusting for sociodemographic and smoking characteristics, rates of quit attempts were lower among physically inactive smokers compared to physically active smokers. The OR for making a quit attempt among physically inactive smokers compared to physically active smokers with adjustment of socio-demographic factors was 0.69 (95% CI: 0.49-0.97). Rates of smoking reduction and quitting for 1 month or more were not different statistically.

Sedentary Behavior

Sedentary behavior is a risk factor for cardiovascular disease and other chronic health conditions, independent of and beyond the risk associated with insufficient physical activity/exercise. The California Smokers Cohort Survey inquired about sedentary behavior for the first time in this year's survey. Although sedentary behavior accumulates over the course of the entire day, including work hours, the survey only focused on time spent engaged in "screen time" behavior, which includes watching TV and going online, during leisure time.

Sedentary time was assessed with the question:

> *"During your free time, about how many hours per day do you watch TV or spend time online?"*

The median hours of screen time was 4 (Interquartile range= 2-6). Individuals were categorized as sedentary if they reported spending > 4 hours per day engaging in screen time behavior. Among women, rates of sedentariness were higher among daily compared to non-daily smokers (42.2% vs 28.2%). Corresponding rates of sedentariness among daily smoking and non-daily smoking men were comparable at 40.7%, and 29.2%. Percentages of smokers who reported at least one quit attempt lasting one day or longer in the past year were slightly higher among sedentary women (51.7%) and men (47.8%) than non-sedentary women (46.7%) and men (45.2%). After adjusting for sociodemographic characteristics and level of nicotine dependence in a multivariable model, sedentary smokers were more likely to report having made a quit attempt (OR=1.34, 95% CI:1.00-1.79) (Figure 7.8) and to have reduced their smoking during the year OR=1.43, 95% CI:1.06-1.92) (Figure 7.9). Multivariable models evaluating rate of reporting being quit for 1 month or more suggested rates were similar for sedentary and non-sedentary smokers.

Figure 7.8 Relationship between being sedentary and odds of making a quit attempt (over the year of follow-up).

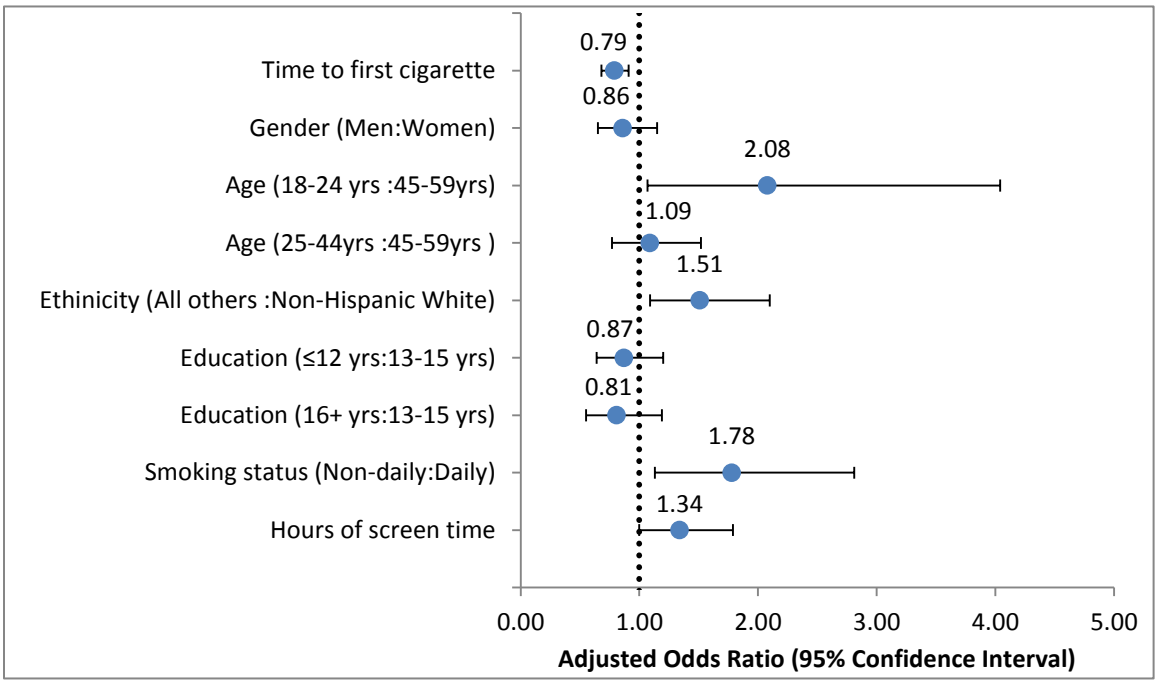
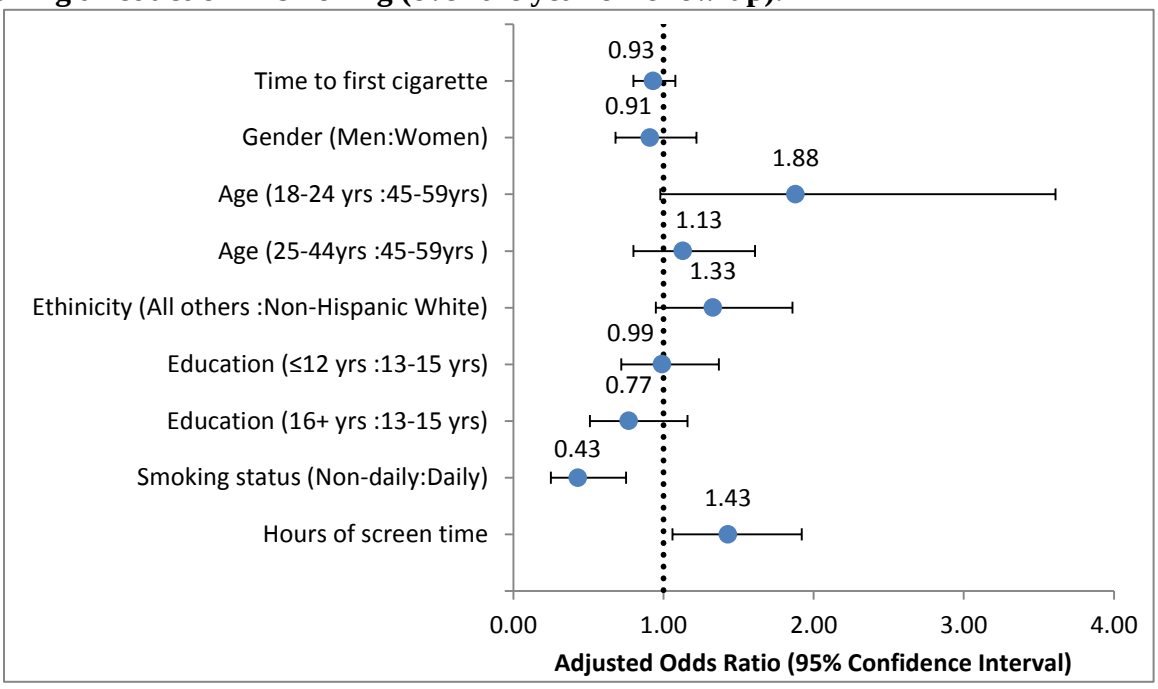


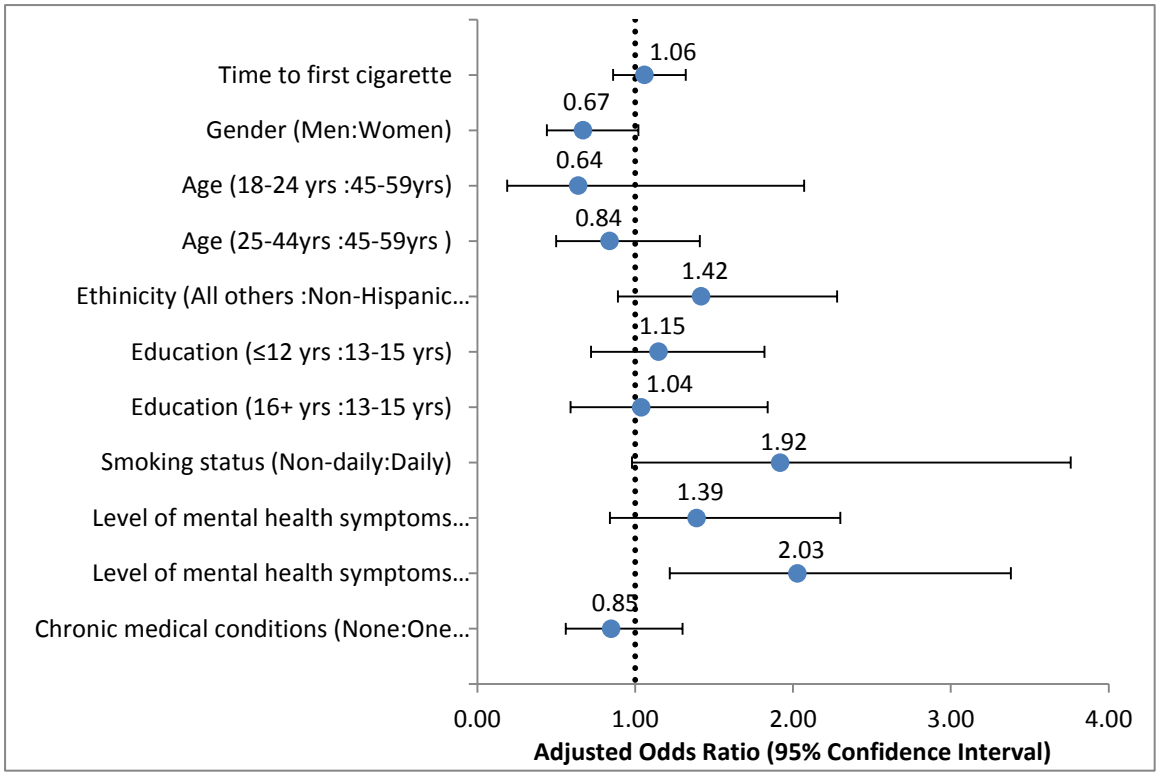
Figure 7.9 Relationship between being sedentary (hours of screen time) and odds of making a reduction in smoking (over the year of follow-up).



Interactions With Healthcare Providers

Visits to healthcare providers were common, with 69.7% of daily smokers and 62.5% of non-daily smokers reported visiting a doctor's office in the past 12 months. US Tobacco Treatment Guidelines suggest physicians universally screen patients and Ask about tobacco use, Advise identified smokers to quit, Assess smokers willingness to make a change in tobacco use, Assist smokers by referring them to cessation treatment, and Arrange for follow-up visits with smokers to support attempts at cessation. As evidence of the implementation of tobacco screening taking place throughout the healthcare system in California, 77.3% of smokers visiting a doctor in the past year reported receiving advice to quit smoking from their doctor or healthcare provider, and 30.3% of smokers reported making a quit attempt after receiving this advice from their doctor. However, only 39.5% of smokers visiting a doctor in the past year received referral or information about a smoking cessation program. In multivariable logistic regression models, we did not observe significant associations between mental health problems or having chronic medical condition and the odds of receiving physician-based intervention including either advice to quit and/or referral to cessation treatment (p's >0.08). However, we did observe higher odds of reporting making a quit attempt after receiving advice to quit among smokers with moderate/severe mental health problems. OR for making a quit attempt after receiving physician advice among those with severe and moderate mental health symptoms compared to normal mental health symptoms was 2.03 (95% CI:1.22-3.38). Daily smoking, levels of tobacco dependence, having a chronic medical condition and sociodemographic characteristics were not related to the odds of making an attempt after receiving advice from healthcare providers (See figure 7.10).

Figure 7.10 Logistic regression model showing the increased odds of making a quit attempt after receiving advice to quit from healthcare providers among smokers with moderate/severe mental health problems.



Summary

This chapter presented the prospective relationships between physical health, mental health, and health behaviors assessed during 2011 baseline survey on tobacco use behavior recorded during the first annual follow-up assessment of a cohort of smokers. In general, the prevalence of physical and mental health vulnerabilities was high in this cohort of smokers. Physical and mental health characteristics of smokers were associated with attempts to quit smoking or significantly reduce tobacco use. The positive association with efforts to change tobacco use by trying to quit or significantly reducing tobacco use also was related to smokers' reported levels of physical activity and sedentary behaviors.

We observed a majority of at-risk smokers making contact with health care providers each year, where 77% received advice to quit and 39% referral information about smoking cessation programs. There was significant willingness to try to quit smoking, and quitting after contact with physicians was highest among the most vulnerable smokers with moderate/severe mental health problems. Smokers with significant depression and anxiety symptoms appear more likely to make quit attempts, suggesting a need to address their unique needs in order to best help them achieve and maintain smoking abstinence. Physicians potentially play an important role, as they have knowledge about their smoking patients' comorbid health conditions and can take them into account when advising their patients to quit smoking and directing them to appropriate smoking cessation resources.

Smoking appears to go hand in hand with a cluster of unhealthy behaviors, including physical inactivity, sedentariness, and risky alcohol use. Not surprisingly then, smokers face higher rates of obesity than the general population, further increasing their risk of physical and mental health problems. Incorporating healthy lifestyle elements into traditional smoking cessation programs and messages may help address these negative health behaviors simultaneously and motivate smokers to adopt health behaviors that are incompatible with smoking in order to increase their chances of achieving and maintaining abstinence.

Future iterations of this survey will enable comparisons over time with regard to the relationships between smoking and physical and mental health and health behaviors. Clearly, smoking is highly associated with other negative health behaviors that together exacerbate the risk of multiple health problems.

Appendix

Table A7-1 Relationship between obesity and quit attempt of ≥24 hours.

Variable	OR	95% CI	
Time to first cigarette	0.74	0.64	0.85
Gender (Men:Women)	0.83	0.62	1.11
Age (18-24:45-59)	2.12	1.1	4.12
Age (25-44:45-59)	1.18	0.84	1.66
Ethinicity (Non-White:White)	1.51	1.09	2.11
Education (≤12 yrs:13-15 yrs)	0.83	0.6	1.14
Education (16+ yrs:13-15 yrs)	0.79	0.54	1.17
VAObesity - Overweight:Not Overweight	1.14	0.85	1.53
VAObesity - Obese:Not Overweight	1.14	0.85	1.53

Table A7-2 QUIT SMOKING INTENTIONALLY FOR A DAY OR LONGER IN PAST 12 MONTHS (F_Quitone_imp)

	Yes n	Yes %	No n	No %
Good Health				
Excellent	26	31.7%	47	57.3%
Very good	81	37.9%	106	49.5%
Good	135	37.2%	185	51.0%
Fair	81	34.9%	127	54.7%
Poor	37	35.2%	57	54.3%
Missing	1	25.0%	3	75.0%
Respiratory Disease				
Lung Disease	92	44.7%	93	45.1%
No Lung Disease	269	33.9%	432	54.4%
Missing	0		0	
Asthma				
Asthma	84	44.0%	88	46.1%
No Asthma	277	34.2%	437	54.0%
Missing	0		0	
Heart Disease				
Heart Disease	55	37.9%	78	53.8%
No Heart Disease	304	35.7%	446	52.3%
Missing	2	66.7%	1	33.3%
Diabetes				
Diabetes	40	40.8%	49	50.0%
No Diabetes	320	35.6%	474	52.7%

Missing	1	33.3%	2	66.7%
Anxiety				
GAD2 Neg	214	33.8%	347	54.7%
GAD2 Pos	136	40.5%	163	48.5%
Missing	11	36.7%	15	50.0%
Depression				
PHQ2 Neg	274	36.3%	397	52.6%
PHQ2 Pos	76	36.0%	110	52.1%
Missing	11	32.4%	18	52.9%
Mental Health				
Normal	158	32.4%	274	56.1%
Mild	115	41.2%	134	48.0%
Moderate/Severe	88	38.1%	115	49.8%
Missing	0	0.0%	2	100.0%
Obesity				
Obese	138	35.4%	212	54.4%
Not Obese	214	37.3%	290	50.6%
Missing	9	24.3%	23	62.2%
Number of Chronic Medical				
None	162	34.2%	255	53.8%
One or More	199	37.8%	270	51.3%
Missing	0		0	
Physical Inactivity				
Active	305	38.5%	399	50.3%
Inactive	52	26.8%	119	61.3%
Missing	4	30.8%	7	53.8%
Sedentary				
Not Sedentary	206	34.5%	322	53.9%
Sedentary	153	39.3%	195	50.1%
Missing	2	14.3%	8	57.1%

Table A7-3Smoke less (>=20% reduction on total num of cig last month) comparing to baseline? (F_SMKLESS)				
	Yes n	Yes %	No n	No %
Good Health				
Excellent	22	26.8%	49	59.8%
Very good	58	27.1%	125	58.4%
Good	98	27.0%	219	60.3%
Fair	79	34.1%	128	55.2%
Poor	35	33.3%	58	55.2%
Missing	2	50.0%	2	50.0%
Respiratory Disease				
Lung Disease	74	35.9%	108	52.4%
No Lung Disease	220	27.7%	473	59.6%
Missing	0		0	
Asthma				
Asthma	67	35.1%	103	53.9%
No Asthma	227	28.1%	478	59.1%
Missing	0		0	
Heart Disease				
Heart Disease	50	34.5%	80	55.2%
No Heart Disease	242	28.4%	500	58.7%
Missing	2	66.7%	1	33.3%
Diabetes				
Diabetes	25	25.5%	62	63.3%
No Diabetes	267	29.7%	518	57.6%
Missing	2	66.7%	1	33.3%
Anxiety				
GAD2 Neg	168	26.5%	385	60.7%
GAD2 Pos	113	33.6%	183	54.5%
Missing	13	43.3%	13	43.3%
Depression				
PHQ2 Neg	207	27.4%	456	60.4%
PHQ2 Pos	78	37.0%	105	49.8%
Missing	9	26.5%	20	58.8%
Mental Health				
Normal	123	25.2%	303	62.1%
Mild	95	34.1%	152	54.5%
Moderate/Severe	75	32.5%	125	54.1%

Missing	1	50.0%	1	50.0%
Obesity				
Obese	121	31.0%	227	58.2%
Not Obese	167	29.1%	329	57.4%
Missing	6	16.2%	25	67.6%
Number of Chronic Medical				
None	125	26.4%	291	61.4%
One or More	169	32.1%	290	55.1%
Missing	0		0	
Physical Inactivity				
Active	229	28.9%	468	59.0%
Inactive	60	30.9%	107	55.2%
Missing	5	38.5%	6	46.2%
Sedentary				
Not Sedentary	155	26.0%	366	61.3%
Sedentary	136	35.0%	209	53.7%
Missing	3	21.4%	6	42.9%

Table A7-4
Baseline smokers who quit more than 1 month at follow-up (F_QT1M)

	Yes n	Yes %	No n	No %
Good Health				
Excellent	6	7.3%	76	92.7%
Very good	23	10.7%	191	89.3%
Good	35	9.6%	328	90.4%
Fair	19	8.2%	213	91.8%
Poor	11	10.5%	94	89.5%
Missing	0	0.0%	4	100.0%
Respiratory Disease				
Lung Disease	19	9.2%	187	90.8%
No Lung Disease	75	9.4%	719	90.6%
Missing	0		0	
Asthma				
Asthma	17	8.9%	174	91.1%
No Asthma	77	9.5%	732	90.5%
Missing	0		0	
Heart Disease				
Heart Disease	9	6.2%	136	93.8%
No Heart Disease	85	10.0%	767	90.0%
Missing	0	0.0%	3	100.0%
Diabetes				
Diabetes	9	9.2%	89	90.8%
No Diabetes	85	9.5%	814	90.5%
Missing	0	0.0%	3	100.0%
Anxiety				
GAD2 Neg	60	9.5%	574	90.5%
GAD2 Pos	31	9.2%	305	90.8%
Missing	3	10.0%	27	90.0%
Depression				
PHQ2 Neg	69	9.1%	686	90.9%
PHQ2 Pos	20	9.5%	191	90.5%
Missing	5	14.7%	29	85.3%
Mental Health				
Normal	46	9.4%	442	90.6%

Mild	27	9.7%	252	90.3%
Moderate/Severe	21	9.1%	210	90.9%
Missing	0	0.0%	2	100.0%
Obesity				
Obese	33	8.5%	357	91.5%
Not Obese	57	9.9%	516	90.1%
Missing	4	10.8%	33	89.2%
Number of Chronic Medical				
None	49	10.3%	425	89.7%
One or More	45	8.6%	481	91.4%
Missing	0		0	
Physical Inactivity				
Active	72	9.1%	721	90.9%
Inactive	20	10.3%	174	89.7%
Missing	2	15.4%	11	84.6%
Sedentary				
Not Sedentary	55	9.2%	542	90.8%
Sedentary	35	9.0%	354	91.0%
Missing	4	28.6%	10	71.4%

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