Outcome Evaluation of a Campus-Based Quit and Win Contest

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Abstract

This study examined abstinence outcomes of a provincial, campus-based Quit and Win contest relative to contestants’ assessments of the prize, buddy support, social support network, and emails. Of the 288 participants providing baseline data, 201 self-reported their smoking and quitting behaviours, use of quit aides, and perceptions of contest components. On 5-point scales, perceived values of the contest prize, buddy support, social support network and email were 4.42, 3.95, 3.89, and 3.46 respectively. Intention to treat analysis showed 27.8% of participants achieved 6-week contest-period abstinence; 19.8% achieved 3-month sustained abstinence. Odds of achieving 3-month abstinence were influenced by age (OR = 1.10, CI =1.03, 1.18) and use of pharmacological quit aides (OR = 0.42, CI = 0.20, 0.88), but not smoking behaviours or contest components. Contest prizes and support were valued, but played an uncertain role in quitting success. Future research might examine their roles in contestant recruitment or retention.

Key Words: smoking; students; tobacco; contest; incentives
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Chapter 1: Introduction

Tobacco use is the leading cause of preventable death world-wide and is responsible for immeasurable social, economic, and personal burdens among smokers. In Canada, federal and provincial governments, in partnership with health professionals and public health advocates, have committed to reduce these burdens and work towards a smoke-free lifestyle for all Canadians. This will certainly require attention to cigarette smoking given that it is the most prevalent form of tobacco use among North Americans. Looking at this form of tobacco use, Health Canada reports that the prevalence of cigarette smoking among citizens 15 years of age and older has decreased from 25% in 1999 to 17% in 2010, representing 14 million fewer smokers [Canadian Tobacco Use Monitoring Survey (CTUMS), 2011]. Although these reductions illustrate the encouraging work that is being done on this crucial health issue, Canadian young adults have consistently had the highest prevalence of cigarette use among all age groups for more than a decade (CTUMS, 2011).

It is estimated that 21% of young adults currently smoke cigarettes, a rate that is significantly higher than the 12% of youth aged 15-19 and 17% of the general adult population aged 25 years and older who smoke (CTUMS, 2011). Although quitting smoking at any age reduces the impact of tobacco-related illnesses and lightens the social and economic burden of tobacco use, the greatest health benefits are seen amongst those who quit early in their smoking career (Doll, Peto, Boreham & Sutherland, 2004; Frosch, Dierker, Rose & Waldinger, 2009). In fact, quitting smoking before age 30 appears to eliminate most, if not all, of the increased health risks associated with continuing
smoking. Therefore, the greatest return on investment in tobacco control can be achieved by helping young adults to quit.

The majority of young adult cigarette smokers report a desire to quit, and most make several quit attempts each year. However, interest in quitting and attempts to quit do not necessarily translate into high rates of successful quitting. The most recent CTUMS data, for example, revealed that only 7% of young adults were identified as former smokers in 2009. This discouraging statistic points to an additional gap in tobacco control: a lack of effective, appealing smoking cessation strategies for this age group. Indeed, research consistently shows that young adult smokers are the least likely of all age groups to use evidence-based methods of quitting (i.e., methods with empirical evidence to support their effectiveness; Curry, Sporer, Pugach, Campbell & Emrey, 2007; Fiore et al., 1990). In interactions with healthcare providers, young adults are also the least likely of all age groups to be asked about their smoking status and to be offered a proven method of smoking cessation (Curry et al., 2007; Solberg, Asche, Boyle, McCarty & Thoele, 2007a). In non-clinical settings, there are very few cessation programs targeted specifically to young adult smokers (Murphy-Hoef e, Aldert & Higbee, 2004; Travis & Lawrance, 2009). Instead, traditional assumptions about tobacco use have typically led to a focus on smoking prevention programs for youth and smoking cessation programs for adults with little or no consideration of the needs of young adults (Hammond, 2005; Lawrence, Fagan, Backinger, Gibson & Hartman, 2007). Research regarding the quitting preferences of young adult smokers reveals that these smokers prefer do-it-yourself, easily accessible and free interventions that involve social support from their peers (Bader, Travis & Skinner, 2007; Curry et al., 2007; Solberg et al., 2007a; Solberg, Boyle,
McCarty, Asche & Theole, 2007b). Quit and Win contests have been suggested as a way to meet these preferences by allowing smokers to quit “on their own” while simultaneously offering real or implied support and the chance to win a prize. These features of contests, along with the fact that contests can be used easily and free of charge, are all consistent with young adult smokers’ preferred approaches to quitting smoking.

To date, there have been no studies of Quit and Win contests with Canadian post-secondary students. Furthermore, although evaluations of Quit and Win contests hosted in the general community have offered some evidence that social support may increase the odds of quitting successfully, no contest targeted to young adult smokers has included social support. Considering the substantial health, economic, societal, and personal costs of tobacco use, the lack of research into an intervention that may have potential to reach a significant proportion of the young adult population and effectively convert smokers to non-smokers is a troubling omission in the literature. The current study begins to address this gap by examining young adult smokers’ responses to a Quit and Win contest offered on post-secondary campuses across Ontario. Given the high prevalence of cigarette use in this population and the general lack of appealing, effective, age-tailored interventions for young adults, this study could be an important step in determining whether and how Quit and Win contests can be used to meet young adults’ cessation preferences and reduce the prevalence of smoking in this population.
Chapter 2: Literature Review

2.1 Tobacco Use

Tobacco use has been linked with a wide range of physical illnesses, including: cancers of the lung, larynx, pancreas, stomach, liver, and kidney (Sasco, Secretan & Straif, 2004) coronary heart disease and stroke (Cofta-Woerpel, Wright & Wetter, 2006); and chronic lung disease and emphysema (Cofta-Woerpel et al., 2006; Doll, 1998). Annually, over 45,000 Canadians die of tobacco-related illness (Health Canada, 2006). In fact, tobacco industry-produced cigarettes cause premature death in 50% of long-term consumers when used precisely as intended by the manufacturer (Peto, 1994). Thus, tobacco use is currently the leading cause of preventable death and life-years lost worldwide and is expected to cause a global annual death toll of 8 million by 2030 (World Health Organization, 2010).

Tobacco use has economic costs as well as health consequences. It is estimated that compared to non-smokers, the health care cost per active smoker in the United States is an additional $3,036 annually, or $6.88 per pack of cigarettes smoked (Centers for Disease Control and Prevention, 2008; Lightwood, Dinno & Glantz, 2008). Furthermore, workplaces incur costs related to absenteeism stemming from tobacco-related illnesses (Halpern, Shikiar, Rentz & Khan, 2001), smokers’ greater use of employee health benefit plans (Penner & Penner, 1990) and lower productivity among smokers compared to non-smokers (Halpern et al., 2001).

Finally, there is evidence that production of cigarettes can have detrimental effects on land use practices—particularly in developing countries (Geist, Chang, Etges & Abdullah, 2009). Improper disposal of cigarette butts contributes to land and water
pollution, with cigarette butts representing the bulk of non bio-degradable garbage collected on the shores of waterways (Novotny, Lum, Smith, Wang & Barnes, 2009). Statistics showing that most residential fires are caused by unattended cigarettes point to another negative consequence of smoking (Health Canada, 2007).

Overall, these many negative consequences of tobacco use are well-documented through empirical evidence and reveal the tremendous personal, economic and social burden of tobacco use. Despite the widespread knowledge of these consequences and the ongoing efforts by researchers and public health professionals to control tobacco use, many Canadians continue to smoke and struggle to achieve long-term cessation. There is still room for progress in determining how we can reach and support Canadian smokers to achieve healthy, smoke-free lifestyles.

2.2 Tobacco Use Among Young Adults

In Canada, young adults 20-to-24 years old represent the age group with the highest smoking prevalence. It is estimated that 21% of young adults are current tobacco users, a rate that is significantly higher than the 12% of youth aged 15-to-19 and 17% of the general adult population aged 25 years and older who smoke (CTUMS, 2011). The higher prevalence of smoking among young adults has been persistent over the past several decades. Despite being raised in a generation that understood the consequences of tobacco use, smoking among young adults increased significantly during the 1990s (Johnston, O’Malley & Bachman, 2001; Lantz, 2003; Rigotti, Lee & Wechsler, 2000; Wechsler, Rigotti & Glendhill-Hoyt, 1998). Wechsler et al. (1998) reported data from 130 U.S. college campuses demonstrating that the prevalence of smoking among young adults increased by 27% between 1993 and 1997. In another study of American young
adults, Johnston et al. (2001) found that, between 1993 and 1999, the prevalence of smoking rose by 25% among college students, and by 21% among young adults not in school. Likewise, Canadian data from multiple surveillance surveys used to estimate tobacco use show that after steady declines in the 1980s, the prevalence of smoking increased among this age group in the early 1990s. Data from the Canadian Tobacco Use Monitoring Survey (CTUMS) show that smoking prevalence experienced a plateau in the early 2000s before dropping slowly but steadily over the better part of the last decade. Although these reductions reflect positively on the success of tobacco control policies and practises in Canada, the prevalence of smoking among young adults remains unacceptably high.

Young adults who smoke are at serious risk of lifetime addiction to tobacco and the negative sequelae associated with that addiction. Gilpin, White and Pierce (2005) used a modelling procedure to estimate what percentage of the young adult population between the ages of 18 and 29 years is at risk for future smoking based on the current understanding of smoking trajectories throughout the lifespan. Based on data showing that 27% of young adults were current or daily smokers, 29% were current or former occasional smokers, and 43% were never smokers, the authors estimated that 86% of current or former daily smokers were at risk of future smoking along with 52% of occasional smokers and 9% of never-smokers. Overall, they concluded that 43% of the total population of young adults are at risk of future smoking and thus the devastating consequences associated with tobacco use.
2.3 Smoking Cessation

2.3.1. Rationale for directing cessation interventions at young adults. Given the burden that tobacco use imposes, the necessity of reducing (or even eliminating tobacco use) is apparent. To this end, it has been suggested that the largest “return on investment” in tobacco control can be achieved by promoting cessation among current smokers as opposed to preventing uptake among current non-smokers (Fagan et al., 2007). Although quitting smoking at any age reduces the impact of tobacco-related illnesses and lightens the social and economic burden of tobacco use, the greatest health benefits are seen amongst those who quit early in their smoking career (Doll et al., 2004; Frosch et al., 2009). For example, in their decades-long study of smoking and disease trajectories across the adult lifespan, Frosch et al. (2009) followed a group of 232 male graduates of Harvard University from young adulthood through old age. They found that men who quit smoking early in life (at the average age of 40) were less likely to develop lung disease and were more likely to live significantly longer lives compared to men who quit smoking later (at the average age of 56), or much later (at the average age of 69). These findings are consistent with those of Doll and colleagues (2004) who reported that smokers who quit before age 30 have almost the same life expectancy as non-smokers. These data imply that smokers who quit earlier in life have the lowest risk of future tobacco-related morbidity and mortality. Thus, while it is important to help all smokers quit, it may be especially important to help young adult smokers to quit.

In addition to improving their personal health outcomes, assisting young adults to quit will also reduce the social and economic costs associated with tobacco use. Lightwood, Dinno and Glatz (2008) confirm that lower cigarette consumption in the
population is related to significantly lower health care expenditures. The authors used complex regression analyses of time series data on smoking, health care expenditures, and exposure to tobacco control programs between the years of 1989 and 2004 in order to compare California, a state that has comprehensive tobacco control programs, to a control group of 38 states without these programs. Total personal health care costs were measured as were the differences in per capita cigarette consumption between California and the control states. The authors concluded that due to the comprehensive tobacco control program, 3.6 billion fewer cigarettes were sold in California, resulting in a savings of $86 billion dollars in health care expenditures over 15 years of tobacco control programming. Promoting smoking cessation has also been shown to reduce the financial losses experienced by workplaces due to the higher absenteeism and lower productivity seen among employees who smoke. For example, Halpern and colleagues (2001) found that former smokers were 4.5% more productive than current smokers, and absenteeism among former smokers declined significantly in the years following cessation in their sample of 300 co-workers at a large U.S. airline.

Overall, the sooner smokers can quit, the greater the health benefits to them and the cost savings to society. These findings, combined with data showing that young adults have proportionately more smokers than any other age cohort, suggest that it may be especially important to help young adult smokers to quit.

2.3.2 Smoking behaviours and quitting intentions of young adults

2.3.2.1. Changeable nature of young adults tobacco use. To help young adults quit smoking, it is important to recognize that young adulthood is characterized by a series of life transitions including leaving home for the first time, attending post-
secondary education or entering the workforce, and experiencing greater personal freedoms and responsibilities (Arnett, 2000). Changes in social, personal, and economic circumstances are typical in this age group. Not surprisingly, changes in health behaviours are also common. For some young adults, this includes the adoption or rejection of tobacco use (Backinger, Fagan, Matthews & Grana, 2003; Biener & Albers, 2004; Hammond, 2005; Lantz, 2003). Stromberg, Nichter and Nichter (2007) have shown that some young adults smoke almost exclusively in social situations, and thus remain occasional smokers during young adulthood. However, there is also evidence that occasional smoking leads to more regular smoking for at least some young adult smokers (Lantz, 2003; Staten et al., 2007; Thompson et al., 2007). Indeed, research from the tobacco control literature indicates that, during this life stage, young adults go through multiple transitions between non-smoking, daily smoking, and non-daily smoking (Cairney & Lawrance, 2002; Hammond, 2005; Kenford et al., 2005; Lantz, 2003; Solberg et al., 2007a; Wechsler et al., 1998; Wetter et al., 2004). For example, Lantz (2003), Hammond (2005), and Cairney and Lawrance (2001) all reported that up to 20% of young adult smokers initiated tobacco use after the age of 18. Harris, Schwartz and Thompson (2008) indicated that 39% of the 2,254 college students they surveyed reported increasing the amount that they smoked since starting college. Similarly highlighting the transitional nature of young adult tobacco use, Wetter and colleagues (2004) conducted a 4-year cohort study of college students to examine how tobacco consumption changes during time in school. They found that 14% of students who smoked occasionally during first year progressed to daily smoking and 35% remained occasional tobacco users. Among students who were already daily smokers when they
entered college, 28% reduced their tobacco use but 59% continued to smoke on a daily basis. In another study of 809 young adults, Solberg et al. (2007a) similarly reported that among those who were occasional smokers at baseline, 17.6% had progressed to daily smoking 1 year later and 57% were still smoking on some days. Among those who were smoking daily at baseline, 14% reduced their tobacco use but 75% continued to smoke daily. Commenting on the onset of daily smoking, both Hammond (2005) and Lantz (2003) concluded that regardless of when they started to smoke, the majority of young adult smokers became regular smokers after the age of 18, a finding that is exhibited by the fact that only 6% of Canadian youth ages 15-to-19 report daily smoking whereas 14% of young adults between the ages of 20-to-24 do so (CTUMS, 2011). These data highlight that young adulthood is the life stage when smoking behaviours go through a series of transitions, and when they often become fixed for adulthood.

2.3.2.2. Young adult smokers’ interest in quitting. While uptake and escalation of tobacco use may occur during young adulthood, there is also evidence that the majority of young adult smokers want to quit smoking, and that many of them do attempt to quit (Black, Loftus, Chatterjae, Tiffany & Babrow, 1993; Everett et al., 1999; Messer, Trinidad, Al-Delaimy & Pierce, 2008; Ott, Cashin & Altekruse, 2005; Rooney, Silha, Gloyd & Kreutz, 2005; Solberg et al., 2007b; Solberg et al., 2007a; Wechsler et al., 1998). Table 1 provides a summary of selected studies addressing young adults’ quitting intentions and behaviours. These studies are described in more detail below.
<table>
<thead>
<tr>
<th>Authors</th>
<th>Population</th>
<th>Sample</th>
<th>% who plan to quit</th>
<th>% who made a quit attempt in past year</th>
</tr>
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<tr>
<td>Green et al. (2007)</td>
<td>U.S. young adults, 18-24</td>
<td>$N = 16,395$ (nationally representative)</td>
<td>40% in next 30 days</td>
<td>44% and 54% (no college and college-educated, respectively)</td>
</tr>
<tr>
<td>Hammond et al. (2005)</td>
<td>Canadian young adults, 18-29</td>
<td>$N = 10,559$ (nationally representative)</td>
<td>56% in next 6 months; 31% of these in next 30 days</td>
<td>64.6% (in past 2 years)</td>
</tr>
<tr>
<td>Messer et al. (2008)</td>
<td>U.S. young adults, 18-24</td>
<td>$N = 3,778$ (nationally representative)</td>
<td>--</td>
<td>84%</td>
</tr>
<tr>
<td>Ott et al. (2005)</td>
<td>U.S. post-secondary students</td>
<td>$N = 1,279$ (convenience sample)</td>
<td>89% before graduation</td>
<td>--</td>
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<tr>
<td>Solberg et al. (2007b)</td>
<td>U.S. health plan members, 18-24 and 25-65</td>
<td>$N = 2,935$ current or former smokers from a convenience sample of 10,000</td>
<td>--</td>
<td>60.6% daily young adult smokers vs. 49.6% daily older adult smokers</td>
</tr>
<tr>
<td>Solberg et al. (2007a)</td>
<td>U.S. health plan members 18-24 of different educational backgrounds</td>
<td>$N = 1,352$ current or former smokers from a convenience sample of 5,580</td>
<td>59%, 60%, and 69% in next 6 months (young adults with high school education or less, 2-year college, and 4-year university respectively)</td>
<td>55.8%, 62.6%, and 56.5% (young adults with high school education or less, 2-year college, and 4-year university respectively)</td>
</tr>
</tbody>
</table>
Using nationally representative data from the 2003 CTUMS survey, Hammond et al. (2005) reported that 56% of all young adults were seriously considering quitting smoking within the next 6 months, 31% of whom wanted to quit in the next 30 days. These findings are mirrored by Green et al. (2007) who used nationally representative data from the U.S. to report that 40% of young adults between the ages of 18 and 24 intended to quit within the 30 days following the survey. Specific to young adults pursuing post-secondary education, Ott et al. (2005) reported that over 89% of the undergraduate student smokers they surveyed at a mid-western urban U.S. university wanted to quit smoking before graduation.

There is also some evidence suggesting that young adults may have a stronger desire to quit compared to adult smokers. In their study of cessation behaviours among a nationally-representative sample of 30,000 U.S. adults from the ages of 18 to 64, Messer et al. (2008) found that young adult smokers 18-to-24 years old were twice as likely as adult smokers to want to quit. Young adults were also more likely to report seriously attempting to quit: 84% of young adults compared to 66% of adults had made a serious attempt to quit in the 1-year prior to the study. This finding is consistent with results reported by Solberg and colleagues (2007b), who examined smoking and quitting behaviours in a sample of 10,000 individuals from Minnesota. They determined that 60.6% of young adults had made a quit attempt over the course of the 1-year study period, compared to 49.6% of adults 25-to-65 years old. In Canada, data from the Canadian Tobacco Use Monitoring Survey (CTUMS, 2009) similarly showed that a majority of young adults have made recent quit attempts. According to the report from 2007, 65.3% of 20-to-24 year old smokers made at least one quit attempt in the year prior
to the survey, with approximately one quarter (23.6%) of them attempting to quit two to three times in the 1-year period. On post-secondary campuses, quitting behaviours are equally common. In their survey of over 5,500 U.S. young adults, Solberg et al. (2007a) reported quit attempts among 62.6% of young adults who had attended a 2-year college, and 55.8% among those who had attended a 4-year college. Wechsler et al. (1998) reported that half of the young adult smokers enrolled in post-secondary education in their nationally representative sample had made a quit attempt in the past year.

Young adults’ interest in quitting and attempts to quit do not necessarily translate into high rates of successful quitting. The most recent CTUMS data, for example, revealed that only 7% of young adults were identified as former smokers in 2011. In the U.S., Solberg and colleagues (2007b) collected data using mail surveys and follow-up phone calls to 5,580 health plan members between the ages of 18 and 24. They reported that 11.4% of young adults who were smoking daily at baseline had quit upon follow-up one year later. Likewise, in their 4-year study of U.S. college students, Wetter et al. (2004) found that 13% of students who began college as daily smokers had quit by the time they graduated. Of interest, both Solberg et al. and Wetter et al. found greater proportions of quitters among the young adults who were occasional smokers: 25.9% of young adult health plan members and 51% of college students had quit in the 1-year study period. These findings suggest that smokers who smoke occasionally are more likely to quit compared to those who smoke regularly. In a similar vein, there is also evidence that smokers who begin to smoke later in life may be more likely to quit compared to those who initiated earlier. For example, Breslau and Peterson (1996) used a sample of 1,007 young adults randomly selected from a large health maintenance
organization in southeast Michigan to determine the relationship between smoking cessation and age of initiation of cigarette smoking. The authors found that the likelihood of cessation was significantly higher in smokers who began to smoke after the age of 13 compared to those who initiated at or before 13.

Finally, research suggests that successful quitting is related to nicotine dependence. Besides showing a relationship between age of initiation and cessation, Breslau and Peterson’s (1996) study also revealed that young adults who were nicotine dependent smokers were 40% less likely to quit compared to non-dependent smokers. Using data from a 2003 population survey of 7,912 individuals 18 to 30 years old, Fagan et al. (2007) reported that young adults who were nicotine dependent (defined as smoking 20 or more cigarettes a day and smoking their first cigarette within 30 minutes of waking) were less likely to make one or more quit attempts over the period of a year compared to non-dependent smokers. Other studies of cessation reveal that lighter, less nicotine-dependent smokers are more likely to succeed at quitting than heavier, more nicotine-dependent smokers (Agrawal, Sartor, Pergadia, Huikink & Lynkskey, 2008; Harris et al., 2008; Zhu, Sun, Billings, Choi & Malarcher, 1999).

2.3.3 Quitting preferences of young adults

2.3.3.1 Overview. Although the less-established, briefer smoking history of young adults may make it easier for them to quit (Agrawal et al., 2008; Breslau & Peterson, 1996; Fagan et al., 2007; Zhu et al., 1999), research consistently shows that young adult smokers are the least likely of all age groups to use “proven” methods of quitting (i.e., methods with empirical evidence to support their effectiveness) (Curry et al., 2007; Fiore et al., 1990). In interactions with healthcare providers, young adults are the least likely of
all age groups to be asked about their smoking status and to be offered a proven assisted-method of smoking cessation (Curry et al., 2007; Solberg et al., 2007a). In non-clinical settings, there are very few cessation programs targeted specifically to young adult smokers (Murphy-Hoefe et al., 2005; Travis & Lawrance, 2009). Instead, traditional assumptions about tobacco use have typically led to a focus on prevention programs for youth and cessation programs for adults with little or no consideration of the needs of young adults (Hammond, 2005; Lawrence et al., 2007). In the following sections, literature about young adults’ use of existing smoking cessation interventions will be reviewed and factors that may be important for effective, age-tailored cessation programming for young adult smokers will be highlighted.

2.3.3.2 Pharmacotherapy and professional interventions. Curry et al. (2007) examined the use of evidence-based cessation aids using a sample of 6,511 smokers who had attempted to quit in the past 1 year. They found that young adult smokers infrequently used behavioural therapy including counselling or calling a quit-line (4%), and the proportion using pharmacotherapy, including nicotine replacement products and medications, was significantly lower among young adults (18%) compared to older smokers (32%). They and others (Solberg et al., 2007b; Wetter et al., 2004) argue that young adults’ infrequent use of evidence-based cessation aides does not occur because young adults have less interest in quitting or because they make fewer quit attempts than adult smokers, but as a result of a persistent failure to address young adult smokers’ characteristics, needs and desires in the development and delivery of cessation interventions. For example, young adults’ reservations about the safety, efficacy and cost of pharmaceutical aids are rarely addressed in conventional intervention strategies.
(Bansal, Cummings, Hyland & Giovino, 2004; Etter & Perneger, 2001; Mooney, Leventhal & Hatsukami, 2006). As shown in a study of young adult health plan members, even though they had access to evidence-based cessation aides through the health plan, 73% of the young adults who attempted to quit did so “cold turkey” without any form of pharmacotherapy or behavioural counselling support (Solberg et al., 2007a).

**2.3.3.3 Social support for cessation.** While young adults infrequently use pharmacological or professional assistance for quitting, the idea of social support does seem to appeal to young adults as a component of “independent” quitting (An et al., 2007; Bader et al., 2007; Curry et al., 2007; Haug, Meyer, Schorr, Bauer & John, 2009; Klatt et al., 2008; Riley, Obermeyer & Jean-Mary, 2008). In their in-depth investigation of young adults’ cessation preferences—including a comprehensive review of the existing literature, analysis of the opinions of a panel of experts, and data from six focus groups of young adult smokers—Bader et al. (2007) concluded that a social support component would be an important feature of a cessation intervention for young adult smokers. Indeed, social support from the smoker’s natural support system of family, friends, colleagues or peers who encourage and assist cessation efforts is commonly used by young adults. Using data from a nationally representative sample of U.S. smokers, Curry et al. (2007) determined that young adult smokers were more likely to use social support than any other cessation aid during a quit attempt. Specifically, 34% of young adults reported accessing support from family or friends. Social support is considered to be evidence-based behavioural treatment (Fiore, Bailey & Cohen, 2000), and studies have shown that cessation is more likely to occur among smokers who do (versus do not)
receive support and encouragement from friends, family members, and peers (Chen, White & Pandena, 2001; Fiore et al., 2000).

Capitalizing on the potential effectiveness of social support, supportive messages and services have sometimes been built into population-based interventions. Examples include: email support messages (An et al., 2008; Klatt et al., 2008); proactive phone calls (Rabius, McAlister, Geiger, Huang & Todd, 2004); online message board (Simmons & Brandon, 2007) and text-messaging (Haug et al., 2009; Riley et al., 2008). Like the support of natural networks of family friends, young adults appear to respond favourably to these more structured forms of social support. For example, in their evaluation of a campus-based cessation intervention that included a self-directed quit kit and social support email messages (sent daily for the first month then monthly for the remaining 5 months of the program), Abroms et al. (2007) reported that the vast majority of the young adult participants found the social support emails appealing: 91% reported that they read all of the emails, and over half reported that they wrote back to the emails three or more times over the intervention period. A study by Klatt et al. (2008) revealed that social support is not only appealing to young adult smokers, but increases their likelihood of cessation. Among post-secondary smokers who received weekly personalized email support messages from a trained peer-support student as part of a larger web-assisted tobacco intervention, there was a positive relationship between perceived support from the peer and smoking abstinence. Additionally, greater engagement in the support emails (i.e., writing back more often) was independently associated with greater odds of smoking abstinence.
2.3.3.4. **Incentives for cessation.** Similar to social support, cash and prize incentives for cessation may appeal to young adults because they align with young adults’ preference for flexible, inexpensive interventions (Bader et al., 2007). Research has shown the use of incentives can enhance young adults’ enrollment in web-assisted tobacco control interventions (Crutzen, Nooijer, Brouwer, Oenema & de Vries, 2011) and use of telephone quitlines (Maher et al., 2007). Likewise, there is evidence that young adults are more likely to be retained in smoking cessation interventions when incentives are offered (Davidson et al., 2009).

It is less clear whether incentives facilitate smoking cessation among young adults. In a rigorous, comprehensive review of incentives for smoking cessation, Cahill and Perera (2009) concluded that incentives increase short term (1-month) cessation relative to no incentive, but do not appear to impact longer term (1-year) cessation rates. Other studies with samples drawn from the general population of smokers reveal similar findings (Ashbury et al., 2006). Unfortunately, there are no studies with exclusively young adult samples.

2.3.3.5. **Summary.** Overall, the research suggests that young adult smokers strongly prefer self-directed approaches to quitting. Even when pharmacological aides are readily accessible and inexpensive (or free), young adults may not use them (Thomas et al., 2010; Solberg et al., 2007a). Young adults’ reluctance to use many of the evidence-based cessation methods, along with their unique psychosocial characteristics related to emerging adulthood, point to the need for interventions that are specifically tailored to the needs and preferences of this population. These interventions must be both appealing and effective in order to have an optimal impact on the prevalence of tobacco use in the
young adult population. Including social support appears to be one way to enhance the efficacy of smoking cessation interventions while meeting young adults’ preferences for self-directed quitting. Offering incentives may also hold appeal, though this is less clear.

2.3.4. Responding to young adults’ smoking patterns and cessation preferences. Given young adults’ patterns of tobacco use and their cessation preferences, Quit and Win contests may be an especially appealing and effective method of smoking cessation method for young adult smokers. As described by O’Connor et al. (2006), Quit and Win contests have two main goals: (1) to motivate many smokers to initiate quit attempts; and (2) to provide incentives for abstinence in the weeks immediately following the quit date, when relapse is most likely. Rooney et al. (2005) note that smoking cessation contests have the additional goal of creating an implied network of social support among the many people who are attempting to quit at the same time. This latter goal is sometimes made explicit with social support being provided to contestants during the contest period by offering support emails (van Osch et al., 2009), and encouraging or mandating the use of ‘buddies’ (Ashbury et al., 2006; Gomez-Zamudio et al., 2004; van Osch et al., 2009). Overall then, contests allow smokers to quit “on their own,” offer the chance to win a prize, include a real or implied social support component, and can be used easily and cost-free. These features are all consistent with young adult smokers’ preferred approaches to quitting smoking.

In the following sections, research documenting the effectiveness of contests is presented and discussed in reference to characteristics, smoking patterns, and cessation preferences of young adult smokers. Key issues considered include: the reach and efficacy of Quit and Win contests; whether and how the use of social support and
incentives might affect the population impact of contests; and what other factors influence the success of contests. Finally, preliminary evidence regarding the effectiveness of such an intervention in this population is explored and a rationale for offering Quit and Win contests to young adult smokers is offered.

2.4. Quit and Win Contests

To facilitate the review of the literature related to Quit and Win contests, Table 2 offers a summary of the key studies that are discussed in this section.

2.4.1. Reach and efficacy of contests. The population impact of any cessation intervention is determined by both the efficacy of the intervention in terms of helping smokers to successfully quit, and the number of smokers in the population who are reached by (i.e., using) the intervention. Some interventions have excellent reach but have low efficacy, whereas some interventions are highly efficacious but reach only a small proportion of the population of smokers. Clinical interventions delivered by health professionals, for example, are highly efficacious at assisting smokers to quit, but are used by relatively few smokers. As a result, their population impact, i.e., the total proportion of the smoking population that quits smoking, is relatively small. Population interventions such as media campaigns and telephone quitlines, on the other hand, are less efficacious at producing cessation, but reach and are used by a larger proportion of smokers. Because of their greater reach, the population impact of less efficacious interventions can surpass the population impact of more efficacious interventions in terms of reducing the population prevalence of smoking. It has been suggested that contests have a high population impact because they reach many smokers and can be effective in helping them to quit.
### Table 2

*Summary of Quit and Win Contests’ Reach and Efficacy*

<table>
<thead>
<tr>
<th>Authors</th>
<th>Population</th>
<th>Registrants; % of Population</th>
<th>% Contestants who Quit</th>
<th>Contest Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ashbury et al. (2006)</td>
<td>Adult smokers residing in Ontario</td>
<td>15, 521; 1%</td>
<td>31.4% at 12 months</td>
<td>Annual community-based contest; 4-week duration; buddy support</td>
</tr>
<tr>
<td>Gomez-Zamudio et al. (2004)</td>
<td>Adult smokers residing in Quebec</td>
<td>20,400; 1.3%</td>
<td>66% at contest end; 36% at 6 months; 22% at 12 months</td>
<td>One-off event; 6-week duration; buddy support</td>
</tr>
<tr>
<td>Hahn et al. (2004)</td>
<td>U.S. adult low-income tobacco users</td>
<td>248; <em>not reported</em></td>
<td>7-day point prevalence estimates</td>
<td>One-off event; 4-week duration; buddy and postcard support</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23% at 3 months; 21% at 6 months; 23% at 12 months</td>
<td></td>
</tr>
<tr>
<td>Korhonen et al. (1997)</td>
<td>Adult smokers in Finland</td>
<td>1,419; 0.6%</td>
<td>46% at contest end; 19% at 6 months; 15% at 12 months</td>
<td>National contest as part of a Europe-wide intervention; 4-week duration</td>
</tr>
<tr>
<td>Tillgren et al. (1995)</td>
<td>Smokers 16 years + in Sweden</td>
<td>12,840; 6.4%</td>
<td>14% at 12 months</td>
<td>First annual national contest; 4-week duration</td>
</tr>
</tbody>
</table>
**2.4.1.1. Reach of contests.** For population health interventions such as public education campaigns, telephone quitlines, and web-assisted interventions, a population reach of 1% is considered good (Ashbury et al., 2006). Investigations of Quit and Win contests across the world reveal that contests attract 0.5% to 7% of all smokers in the target population (Ashbury et al., 2006; Gomez-Zamudio et al., 2004; Korhonen et al., 1992; O’Connor et al., 2006; Rooney et al., 2005; Schulze, Ehrmann, Schunk & Potschke-Langer, 2005; Thomas et al., 2010). For example, O’Connor et al. (2006) reported that Quit and Win contests implemented in 11 different communities in the state of New York motivated an average of 0.6% of the entire population of smokers in that state to register in a contest. Ashbury et al. (2006) reported that the 15,000 Ontario smokers who enrolled in the 2002 provincial contest represented about 1% of the total number of adult smokers in Ontario. Likewise, Gomez-Zamudio et al. (2004) estimated that 1.3% of all adult smokers in the province of Quebec registered for its provincial Quit and Win contest. Internationally, the first national Quit and Win contest in Sweden used intensive television advertising to recruit 6.4% of all adult smokers in the entire country (Tillgren, Haglund, Ainetdin & Holm, 1995) into the contest. More importantly, from the perspective of supporting young adult smokers to quit, there is evidence that contests may have a better reach among young adults than older adults. In community settings, the population that enters contests tends to be significantly younger than those choosing other forms of cessation assistance. For example, Hahn et al. (2004) report that the mean age of participants volunteering to be in a Quit and Win contest was significantly lower compared to participants in the control group choosing other forms of cessation aides. In their study evaluating a cessation contest implemented at three colleges in Wisconsin,
Rooney and colleagues (2005) report that 94% of participants felt that contests were a good way to get students to quit.

### 2.4.1.2. Efficacy of contests

With respect to successful cessation, Quit and Win contests consistently produce cessation rates that are higher than unassisted quitting rates. Typically, 5-7% of smokers attempting to quit on their own will achieve abstinence (USDHHS clinical guideline). Research suggests that abstinence rates immediately following the contest period are much higher than this, ranging from approximately 10% to 50%, (Bains, Pickett, Laundry & Mecredy, 2000; Croghan et al., 2001; Elder, Campbell, Mielchen, Hovell & Litrownik, 1991; Gomez-Zamudio et al., 2004; Hahn et al., 2005; Hawk et al., 2006; Koffman, Lee & Hopp, 1998; Korhonen, Su, Korhonen, Utela & Puska, 1997; Lando, Loken, Howard-Pitney & Pechacek, 1990; O’Connor et al., 2006; van Osch et al., 2009). A study by van Osch et al. (2009) provided compelling evidence of the efficacy of contests. They evaluated the outcomes of a community-based Quit and Win contest in the Netherlands by comparing a group of adult contest participants to a control group of adult smokers who explicitly indicated that they were going to quit within the next month but were not in the contest. Immediately after the 30-day contest period, 35% of contest participants were abstinent compared to 11% of control participants. In a national Quit and Win contest in Finland, Korhonen et al. (1997) found that 70% of the 1,419 adult smokers who were reached for the follow-up survey reported that they were smoke-free immediately after the 30-day contest period had ended. Assuming that non-respondents were smokers, the researchers concluded that 46% of contestants maintained abstinence for the one month following the contest quit date. In another international Quit and Win contest held in Germany, over 90,000 smokers...
participated in the 4-week contest. Of the 996 smokers who were randomly contacted to participate in the follow-up survey at the end of the contest, 69% reported they had been smoke-free for the entire 4-week contest (Schulze et al., 2005).

There is also some evidence that community-based contests are able to produce modest rates of long-term cessation after the contest is over and the chance of winning a prize is no longer a motivation (Ashbury et al., 2006; Croghan et al., 2001; Elder et al., 1991; Hahn et al., 2005; Korhonen et al., 1997; Schulze et al., 2005; Tillgren et al., 2005). For example, in their evaluation of a randomized control trial with a sample of 494 volunteer Quit and Win contestants and 512 randomly selected smokers not exposed to the contest media campaign, Hahn et al. (2005) reported that smokers in the Quit and Win contest were 5.3 times more likely to achieve abstinence from smoking as confirmed by urine cotinine analysis one year after the contest start date. In another study by the same authors looking at the efficacy of Quit and Win contests among the low-income population, 23% of the 248 volunteer contestants self-reported cessation 12 months after the contest compared to 8.7% of the 290 control participants. In another study, Korhonen et al. (1997) found that 19% of the adult smokers participating in Finland’s national Quit and Win were still smoke-free 6 months after the contest start date, and 15% continued to avoid smoking at the one year mark (based on self-report and the conservative assumption that all non-respondents were smoking). In Sweden, 21% of the 557 randomly selected contestants who responded to the follow-up mail questionnaire in a national Quit and Win contest reported that they had been smoke-free for the full 12 months since the contest started (Tillgren et al., 1995). In Ontario, Ashbury et al. (2006) evaluated the annual provincial contest and found that 31.4% of the 347 randomly-
selected participants who were reached for the 1-year telephone follow-up reported sustained abstinence from smoking for that interval.

Quit and Win contests have been met with some criticism in the literature. Cahill and Perera (2008) noted a general lack of controlled research designs in studies of contests. Others have commented on the precipitous drop in cessation rates that occur after the contest ends. For example, Croghan et al. (2001) reported that, of the 304 smokers who participated in a 4-week contest in the U.S., the continuous abstinence rate dropped from 42% immediately after the contest, to 11% one year later. While there can be no doubt that the long term efficacy of contests is lower than the short term efficacy, it must be noted that quit rates are still well above those observed for unassisted quitting.

While the majority of smokers want to quit smoking (Black et al., 1993; Everett et al., 1999; Messer et al., 2008; Ott et al., 2005; Rooney et al., 2005; Solberg, et al., 2007b; Wechsler et al., 1998), many lack a “trigger” to motivate them to make a quit attempt (Korhonen et al., 1997). Evaluations of Quit and Win contests show that contests are successful in facilitating the link between intentions to quit and cessation attempts (Chapman, Smith, Mowbray, Hugo & Egger, 1993; Leinweber, Macdonald & Campbell, 1994; O’Connor et al., 2006). Therefore, contests act as a catalyst for smoking behaviour change. In an evaluation of Quit and Win contests implemented in 11 different communities in New York State between 2001 and 2004, 90% of the 5,504 adult smokers who entered a contest reported making at least one quit attempt during the contest period (O’Connor et al., 2006). Based on evidence suggesting that attempting to quit smoking paves the way to sustained cessation (Diemert, Bondy & Manske, 2013; O’Connor et al.,
motivating smokers to make a quit attempt is an important outcome of Quit and Win contests in addition to their efficacy and reach.

2.4.2. The role of social support and incentives in contests

2.4.2.1. Social support in contests. Some contests include built-in social support in the form of mandatory “buddies” (Ashbury et al., 2006; Gomez-Zamudio, 2004; van Osch et al., 2009) or regular support messages (van Osch et al., 2009). Data gathered in studies of Quit and Win contests show that social support has been received positively by participants. For example, 52% of adult smokers in Ontario’s 2002 Quit and Win contest rated their buddy as helpful or very helpful in their efforts to stop smoking (Ashbury et al. 2006). In their evaluation of Quebec’s provincial contest which involved over 20,000 smokers, Gomez-Zamudio et al. (2004) reported that 72% of contestants rated their buddy as very useful or quite useful during their quit attempt, and the majority (60%) chose to quit without any additional assistance or aids other than the social support provided by their buddy. Studying a 30-day contest implemented in a community in the Netherlands, van Osch et al. (2009) similarly found that 70% of participants rated their buddy’s support as useful or very useful. Because this contest also included email support, van Osch et al. were able to examine the appeal for this form of support. Almost two-thirds (65%) of the contestants they surveyed reported that email support messages were a little useful or useful to their quit attempt.

In addition to being appealing, social support buddies and email messages seem to increase the odds of quitting success, both in the short and long term (Ashbury et al., 2006; Gomez-Zamudio et al., 2004; Rayans, Hahn & Hedgecock, 2008; van Osch et al., 2009). van Osch et al. (2009) found that adult Quit and Win contestants who reported
using their buddy for support and reading the support emails were significantly more likely to be smoke-free at the end of the 1-month contest period compared to those who did not use social support. Likewise, data from both the Quebec (Gomez-Zamudio et al., 2004) and Ontario (Ashbury et al., 2006) provincial contests demonstrated that contestants who were still smoke-free 1-year after the contest start date rated the support they received from their buddy to be more useful than did those who had relapsed. International studies of Quit and Win contests have yielded similar results. In their investigation of a contest held in Germany as part of the international Quit and Win contest, Schulze et al. (2005) determined that successful cessation was significantly associated with the presence of support from family, friends or colleagues. In the U.S., Croghan et al. (2001) similarly found that having a support person who was enrolled in the buddy section of the contest was a predictor of cessation for contestants.

2.4.2.2. Incentives in contests. As stated by O’Conner et al. (2006), a primary goal of Quit and Win contests is to use incentives to motivate smokers to remain smoke-free in the first few weeks following cessation, when the risk of relapse is highest. Typically, participants are offered the chance to win prizes including cash (Rayens et al., 2008; Bains et al., 2000), vacations (Korhonen, Kamardina, Salto, Korhonen & Puska, 1998), donated items, (Lando et al., 1995), vehicles (Bains, Pickett & Hoey, 1998), or a combination of these incentives (Gomez-Zamudio et al., 2004; Rooney et al., 2005). Although it can be assumed that the chance to win a prize may initially attract a smoker to enter a contest and thus contribute to the excellent reach contests have (Donatelle et al., 2004; Cahill & Perera, 2008), it is not clear whether or how the chance to win a prize is related to quitting outcomes in Quit and Win contests. Asbury et al. (2006) found that
53.7% of adult participants in Ontario’s provincial contest rated the prize as not at all important or not important in their decision to enter the contest, and that there was no significant relationship between quitting success and the importance contestants placed on the prizes offered in the contest. These results led them to conclude that the prize may not be related to successful cessation. Because other investigations of contests have not explicitly addressed the relationship between contestants’ perceptions of the prize and their cessation outcomes, it remains unclear whether and how the prize might increase the likelihood of cessation.

2.4.3. Other factors that may influence the success of quit and win contests. Contests may have the additional benefit of motivating smokers to use pharmaceutical and behavioural cessation aids during their quit attempt, and thus to increase their likelihood of successful cessation. O’Connor and colleagues found that during the 1-month contest period, a large proportion of adult contestants enrolled in a Quit and Win contest in New York state reported accessing pharmacotherapy or behavioural cessation aids: 36.5% purchased nicotine replacement therapy (NRT) products; 14.8% got a prescription for Zyban or other prescription medication; 7.4% had attended a stop-smoking support group and; 4% had called into a telephone quitline. In a national Quit and Win contest in Quebec, adult smokers were encouraged to use a formal cessation support during the contest period. Following the contest, 41% of contestants reported using at least one aid during the contest period (Gomez-Zamudio et al., 2004), with the most commonly used aids being bupropion (42.5%), nicotine patches (38.2%), and nicotine gum (30.5%). As expected, contestants who used a pharmacological aid during the contest period were significantly more likely than those who did not to be smoke-free
six months and one year after the start date of the contest (37.6% vs. 33.6% and 23.9% vs. 19.7%, respectively).

2.4.4. Effectiveness and reach of Quit and Win contests for young adult smokers. Although the previous review of young adult smokers’ quitting preferences suggests that contests may be appealing to them, little is known about the success of contests in this age cohort. Thomas et al. (2010) and Rooney et al. (2005) offer some preliminary evidence of the potential efficacy of Quit and Win contests for a young adult population. Thomas et al. (2010) evaluated a contest offered on two 2-year colleges and two 4-year colleges in Minnesota. The contest was open to undergraduate students who were interested in quitting smoking, and ran for one month. Rooney et al. (2005) evaluated a 7-week smoking cessation contest delivered once in the spring, and again in the fall at three colleges in Wisconsin. In both studies, the researchers reported that approximately 2% of students who smoked registered for the contest. Both studies also yielded results suggesting favourable cessation outcomes. Thomas et al. for example reported that, immediately following the 30-day contest period, 72.1% of the 588 contestants who responded to the online survey reported abstinence throughout the entire contest period. Assuming that the 153 non-respondents were still smoking, the overall rate of abstinence among contestants was 53.2%. Upon follow-up two weeks later, 44.7% of the student contestants who had initially reported 30-day continuous abstinence self-reported that they were still smoke-free. Rooney et al. (2005) assessed cessation outcomes immediately after the 7-week contest period and 6 months after the start date of the contest. They used expired carbon monoxide testing to assess short term outcomes, and self-reported smoking status (collected during telephone interviews) to assess long
term outcomes. The researchers concluded that 36% of the 152 contestants quit smoking for the 7-week contest period. Looking at long-term abstinence, Rooney et al. (2005) reported that 5% of the post-secondary smokers who were in the spring contest and 30% of those in the fall contest were smoke-free 6 months after the start date of the contest. (They suggest that very different cessation rates were likely due to the poor follow-up rate of the spring contest caused by students moving for the summer break).

2.4.5. Rationale for offering Quit and Win contests to young adult smokers.
Quit and Win contests successfully help smokers to quit “on their own” while offering real or implied support and the chance to win a prize. These features, along with the fact that contests can be used easily and free of charge, are all consistent with young adult smokers’ preferred approaches to quitting smoking. Furthermore because young adults have less-established smoking patterns, consume fewer cigarettes per day, are less likely to be addicted to nicotine, and are more likely to smoke occasionally (vs. daily) (Breslau & Peterson, 1996; Hammond, 2005; Lenk, Chen, Bernat, Forster & Rode, 2009; Ott et al., 2005), Quit and Win contests may produce higher rates of cessation among young adults than the population of older (more addicted) smokers. Finally, Quit and Win contests may be an ideal intervention for young adult smokers given the accessibility of this particular age group. Specifically, with the exception of adolescent smokers, young adult smokers may be the most accessible population of smokers. Statistics Canada (2007) reports that close to 8 out of every 10 young people who were tracked from 1999-2005 attended a post-secondary institution by the time they reached their mid-twenties. Therefore, it can be expected that a large proportion of young adult smokers are accessible through post-secondary institutions. In fact, Hammond (2005) reports that 25%
of all young adult smokers in Ontario fit into the occupational category “student”, the category that captures the greatest proportion young adult smokers. Although each campus is a self-contained micro-community, the young adults who attend post-secondary institutions are a fairly homogeneous and definable population with the common experiences of attending school, and socializing in the campus environment. These data demonstrate that there is the potential to reach a substantial proportion of young adult smokers with a single Quit and Win contest.

2.5. Purpose

2.5.1 Research goal. The literature reviewed here suggests that Quit and Win contests have the potential to reach a large number of young adult smokers, and be effective in helping them to quit. To date, there has been no study of Quit and Win contests with Canadian post-secondary students. Furthermore, although this review of young adults’ cessation preferences revealed that social support would be an integral component of an appealing intervention, and although evaluations of Quit and Win contests have offered evidence to support the fact that social support may increase the odds of quitting success, no contest targeted to young adult smokers has included social support. In addition, despite evidence suggesting that young adults believe that having the opportunity to win a prize would increase the likelihood of quitting (Lawrance, 2001), it is not known what relationship exists between incentives and cessation outcomes among young adults. Overall, whether and to what degree buddy support, email support and prize incentives are related to cessation outcomes in Quit and Win contests for Canadian young adult smokers remains an empirical question. Therefore, the purpose of this study was to evaluate the cessation outcomes of a provincial Quit and Win contest for Ontario
young adult post-secondary students. Of particular interest was whether and how specific program elements (i.e., social support and contest incentives) relate to successful quitting, and how other factors (i.e., use of pharmacotherapy) affect quitting success.

2.5.2 Research questions. To address the stated goals of this study, the following research questions were posed:

1. To what degree did contestants value receiving email support, having a buddy, being eligible to win a prize, and being part of a “community” of quitters?

2. What proportion of contestants attempted to quit during the contest period?

3. What proportion of contestants achieved 6-week continuous abstinence?

4. Was 6-week continuous abstinence associated with:
   
   (a) demographic characteristics (i.e., age, gender, place of residence), baseline smoking behaviours (i.e., weekly tobacco consumption, age of initiation of smoking, attempting to quit in past year), and use of quit aides (i.e., pharmacological, behavioural, or other)?

   (b) the degree to which contestants valued receiving email support, having a buddy, being eligible to win a prize, and being part of a “community” of quitters (independent of demographic characteristics and smoking behaviours)?

5. What proportion of contestants relapsed back to smoking after achieving 6-week continuous abstinence?

6. What proportion of contestants continued to remain smoke-free after the contest (to achieve 3-month sustained abstinence)?

7. Was 3-month sustained abstinence associated with:
(a) demographic characteristics (i.e., age, gender, place of residence), baseline smoking behaviours (i.e., weekly tobacco consumption, age of initiation of smoking, attempting to quit in past year), and use of quit aides (i.e., pharmacological, behavioural, or other)?

(b) the degree to which contestants valued receiving email support, having a buddy, being eligible to win a prize, and being part of a “community” of quitters (independent of demographic characteristics and smoking behaviours)?

8. Among contestants who did not achieve 3-month sustained abstinence:

(a) by how much did their tobacco consumption decline (from baseline to 3-month follow-up)?

(b) was reduction associated with: demographic characteristics (i.e., age, gender, place of residence), baseline smoking behaviours (i.e., weekly tobacco consumption, age of initiation of smoking, attempting to quit in past year), and the degree to which contestants valued receiving email support, having a buddy, being eligible to win a prize, and being part of a “community” of quitters?
Chapter 3: Methods

3.1 Methods Overview

3.1.1 Research ethics board clearance. The procedures used in this study received ethical clearance from Brock University’s Research Ethics Board. The certificate of clearance is presented in Appendix A.

3.1.2 Study design. To evaluate the cessation outcomes of a Quit and Win contest for Ontario post-secondary students and determine whether and how specific components of the contest (i.e., social support and incentives) are associated with successful quitting, a one group pre-test/post-test study design was used. Quantitative data were collected at baseline using an online survey tool. Structured telephone interviews comprised primarily of close-ended questions were used to collect follow-up data three months after the contest start date. Structured telephone interviews were also conducted 1 month after the contest started in order to check contest adherence (and to generate data for purposes separate from this study). The timeline for the study is depicted in Figure 1.

Efficacy trials are used to determine whether, under ideal conditions, an intervention can produce specified outcomes. This type of highly-controlled rigorous research is relatively common in investigations of smoking cessation interventions such as nicotine replacement therapies and pharmacological aides where strict controls can be applied and stringent outcome measures (such as biochemical validation of tobacco abstinence) can be used. Effectiveness studies, on the other hand, are conducted under “real world” conditions where controls are applied less stringently or not at all, and outcomes are not necessarily subjected to cross-validation. Virtually all published studies of Quit and Win contests can be regarded as effectiveness studies: participants are not
<table>
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<tr>
<th></th>
<th>December</th>
<th>January</th>
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<tr>
<td><strong>Contest</strong></td>
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<td>Contest promotion and</td>
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<td>recruitment of</td>
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<td>participants</td>
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<td><strong>Data Collection</strong></td>
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<td>Administration of</td>
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<td>baseline survey(^a)</td>
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<td>Telephone interviews for</td>
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<td><strong>Emails</strong></td>
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<td>participants</td>
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<td>X</td>
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<td>24 – March 7, 2011</td>
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<td>Contest support emails</td>
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<td>X</td>
<td>X(^b)</td>
<td>X(^c)</td>
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<td>to participants</td>
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*Figure 1. Timeline for Contest and Data Collection.*

\(^a\)The baseline survey was built into the registration form for the contest. \(^b\)In addition to support emails, 10 potential contest winners were contacted by email. \(^c\)The final support email included an announcement of prize winners. \(^d\)Emails were sent to advise participants of the follow-up telephone calls and encourage them to respond.
generally required to meet inclusion criteria, “uncontrolled” use of additional interventions is allowed, etc. Like these studies, the current investigation is an effectiveness study, exploring the real-world impact of a behaviour change intervention on a population of smokers.

3.2 Contest Overview

3.2.1 Structure of the contest. As part of its ongoing mandate to reduce tobacco use among young adults, a provincially-funded tobacco control initiative called Leave The Pack Behind hosts an annual contest for post-secondary students across Ontario. The contest offers students the option to enter one of four contest categories: (1) “Quit For Good” (open to smokers who will completely abstain from smoking); (2) “Keep The Count” (open to smokers who will reduce smoking consumption by 50%); (3) “Party Without The Smoke” (open to smokers who will abstain from smoking while drinking alcohol); (4) “Don’t Start and Win” (open to non- or ex-smokers who will remain smoke-free). To enter the contest, students are required to meet the eligibility criteria for the category (e.g., they must smoke regularly to enter Quit For Good, or be smoke-free to enter Don’t Start and Win). All contestants must also identify a “buddy” whose role is to support and monitor their behaviour and assist them to fulfill their contest requirements. Finally, in order to register, contestants must agree to follow all contest rules including procedures to verify their smoking/smoke-free status at the conclusion of the 6-week contest period. (Rules and regulations of the contest, exactly as
they appeared to contestants in the 2011 version of the contest under investigation here, are presented in Appendix B.)

3.2.2 **Key contest elements.** All contestants receive standard email support messages, enter the contest with a buddy, and have the chance to win the grand prize. These universal elements of the contest are described below. They represent the unique contest elements under investigation in the current study.

3.2.2.1 **Email support messages.** All contest participants receive informative and encouraging support emails throughout the contest period. The emails are written by students and are tailored to each contest category. Emails for contestants were developed by one undergraduate and one graduate student working with Leave The Pack Behind. The tone of the emails is that of one student speaking to another (See Appendix C). Emails are tailored to post-secondary students and thus contain smoking and quitting information relevant to this age group (e.g., tips for avoiding smoking during exams and when out at the bar). Further, they give congratulations for getting through each day (or week), and offer support and tips to those dealing with withdrawal or a slip up. Emails are sent to contestants according to the schedule shown in Figure 1: on January 1; one week prior to the start date of the contest (i.e., contestants’ “quit date”); daily for the first

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1 When they register, contestants are offered an optional package of self-help smoking cessation material. Contestants are informed that they get this “quit kit” from their campus health centre or a display booth hosted by the Leave The Pack Behind peer team on their campus. All quit kits contain Leave The Pack Behind’s 2-booklet self-help program, *Smoke|Quit*, that contestants can use as they quit smoking (Travis & Lawrance, 2009), and the *u know u want 2...help a friend quit smoking* booklet that contestants can pass on to their buddy. Most quit kits are campus-specific; accordingly quit kits received by contestants are not identical across campuses.
three days of the contest; and weekly for the remainder of the contest period, ending with a final email the week after the contest ends announcing the grand prize winner. All emails are automatically delivered on the schedule noted above through an automated email system developed for the *wouldurather...* contest.

### 3.2.2.2 Buddies

During contest registration, all contestants are required to identify their own support buddy. A buddy, usually a friend, is any individual who has a valid email address and is willing to support the contestant’s efforts to quit. These support buddies are intended to provide emotional support to the contestant during the contest period, monitor his/her smoking behaviours, and help the contestant meet the requirements of the contest.

Buddies receive emails similar to those sent to contestants. Written in the same tone as the contestants’ emails and sent on the same schedule, these emails provide insight into what the contestant is dealing with, and offer tips on how to help that person stay smoke-free. Tips presented to buddies mirror the content and suggestions given in the corresponding contestant email. For instance, when it is suggested to contestants that they might want to stay home from the bar to avoid smoking when they drink, buddies are provided with a list of things that they could do with their friend instead of going to the bar. Buddies’ emails are designed to help them offer optimal, non-judgemental support to their friend throughout the contest.

### 3.2.2.3 Prize incentives

At the end of the contest period, prizes are awarded to randomly-selected contestants in each contest category whose smoking/smoke-free status is verified through urine cotinine testing and attestation of the “buddy” that the contestant complied with contest rules. All contestants enrolled in the *Quit For Good* category are
eligible for one cash grand prize of $1,000. This grand prize is advertised on contest promotional material and the contest website. (In the 2011 version of the contest, some Quit For Good contestants were also eligible for campus-specific prizes if the institution they attended opted to make such incentives available. Additional prizes included: tuition vouchers, cash, gift cards, and other goods and services.)

3.2.3 2011 Contest. The version of the contest under investigation in the current study kicked off in January 2011 and lasted six weeks. Promotion of the 2011 contest began in November 2010, through posters, brochures, and display booths hosted by LTPB student-teams, as well as through clinician-referral, word-of-mouth, social media, dayplanner ads, newspaper ads, and electronic messaging to the student body. These promotions were all part of the normal LTPB programming for this event. Detailed information about the contest and contest rules were available electronically beginning in December 2010, and online registration for the contest opened at that time.

3.2.4 Campuses offering the contest. In Ontario, there are 20 publicly-funded universities and 28 publicly-funded colleges. In 2010/11, the would rather... contest was offered at the 42 post-secondary institutions that were actively involved with the Leave The Pack Behind tobacco control initiative. This included 19 universities representing 23 separate campus locations and 23 colleges representing 29 separate campus locations. Distinguishing characteristics of the 52 sites, including type of institution, size, location, language, presence of a LTPB peer team, are presented in Appendix D.

3.3 Participants

Approximately 563,000 students, including an estimated 144,000 smokers, from a total of 42 post-secondary institutions in Ontario were eligible to join the 2010/11
would urather... contest which ran from January 24 to March 7, 2011. Participants in the study were would urather... contestants who: (1) entered the contest via the online registration process between December 1, 2010, and January 23, 2011; (2) enrolled in the Quit For Good category; (3) self-identified as smokers (as per the eligibility requirements for this category); and (4) gave informed consent to provide data for the study.

3.4 Materials

3.4.1 Baseline measures. Questions comprising the baseline questionnaire were based on gold standard measures from the literature wherever possible. Some of the baseline questions were included for purposes other than the current study. Only those questions of relevance to the current study are described here. The full online baseline questionnaire is reproduced in Appendix E.

3.4.1.1 Demographic characteristics. General demographic data were obtained from all study participants. Specifically, participants were asked to provide their gender, age (in years), and their current place of residence [with parent/guardians; in residence; off-campus (alone or with others)]. This measure of living arrangement was adapted from the Canadian Campus Survey by Adlaf et al. (2003).

3.4.1.2 Smoking behaviours. Smoking behaviour is routinely assessed by asking about respondents’ tobacco use in the past 30 days (Adlaf, Gliksman, Demers & Newton-Taylor, 2003; Canadian Tobacco Use Monitoring Survey, 2011). Here, participants were asked how often in the past month they smoked a cigarette, even a puff, and given the response options of: every day or almost every day; on some days each week; once or twice all together; and I did not smoke at all. To further appraise tobacco consumption, participants were also asked how many cigarettes they smoked in the past week.
Level of nicotine addiction was estimated by asking participants this question: “How soon after waking up in the morning do you smoke your first cigarette.” Response options were: within 5 minutes; within 6-30 minutes; within 31-60 minutes; and after more than an hour. This item was taken from the 6-item Fagerstrom Test for Nicotine Dependence (FTND) (Heatherton, Kozolowski, Frecker & Fagerstrom, 1991) which is the standard instrument for assessing the intensity of nicotine addiction in the general population. Among adult smokers, the single item is highly correlated with total scale score and with biochemical measures of nicotine dependence (Baker et al., 2007; Etter, Vu Duc & Perneger, 1999, Heatherton et al., 1991). While this single item appears to have better psychometric properties than the FTND in its entirety when applied to light smokers (Etter et al., 1999), and is identical to the measure used in another study of Quit and Win contests for post-secondary students (Thomas et al., 2010), it is not without weaknesses. Specifically, it has been suggested that older youth and young adults who live at home or in post-secondary campus residences may not have the opportunity to smoke within the first 5 (or even 30) minutes after waking due to restrictions imposed by their living arrangements, parents, or campus tobacco policies. Data collected with this measure may under represent “heavy addiction” classification for post-secondary students.

Smokers reported their age of initiating smoking by indicating the age (in years) at which they smoked their first whole cigarette. Finally, participants were asked whether they had intentionally tried to quit smoking in the past year [yes; no].

3.4.2 Intervention check. The interview scripts along with the questions comprising a 1-month follow-up (completed for reasons separate from the current study)
are presented in Appendix F. The only question of interest from this assessment was whether or not participants made an attempt to quit at the outset of the contest: *In the past month, did you try to quit smoking?*

3.4.3 Three-month follow-up measures. Three months after the start date of the contest, data were collected about participants’ smoking and quitting behaviours, their use of tobacco products and smoking cessation aides, and their evaluation of the social support and incentives offered in the contest. The interview scripts along with the questions comprising the 3-month follow-up telephone interview are presented in Appendix G. The questionnaire items of relevance to the current study are described here.

3.4.2.1 Smoking and quitting behaviours. To assess whether participants had abstained from smoking during the entire 6-week contest period, they were asked: “*Were you smoke-free for the full 6-week duration of the contest, without even a single puff from a cigarette?*” To assess whether they had achieved 3-month sustained abstinence from smoking (i.e., continued to abstain from smoking after the contest ended), they were asked: “*Since day 1 of the contest, have you been completely smoke-free without even a single puff?*” Response options for both these questions were yes, no.

Number of cigarettes smoked in the past week was recorded as 0 for participants reporting 3-month sustained abstinence. All other participants were asked how many cigarettes they had smoked in the past week.

3.4.2.2 Use of quit aides and tobacco products. All participants were asked whether they had used any of 10 specific quitting aides during the 6-week contest period. Items for this measure and categorization of quitting aides as “pharmacological,” “behavioural,” and “other” were adapted from a seminal study of a nationally
representative sample of American young adults’ use of cessation treatments (Curry et al., 2007). Table 3 lists and shows categorization of the 10 quitting aides assessed in this question.

3.4.2.3 Value of contest components. Evaluation of the social support and incentives offered in the contest was based on a researcher-designed measure of the perceived value of these contest components. In this study, all participants were asked to respond on 5-point Likert scales (where 1 = strongly disagree and 5 = strongly agree) to these four statements about their time in the contest: (1) As a contestant, I valued having a buddy; (2) As a contestant, I valued receiving the emails; (3) As a contestant, I valued the chance to win a prize; and (4) As a contestant, I valued knowing there is a community of other students who are quitting at the same time as me. This assessment of contest components was based on similar assessments from the literature which have been used to evaluate the perceived usefulness (Hahn et al., 2004), practicability and pleasantness (van Osch et al., 2009), and importance (Ashbury et al., 2006) of contest components such as prizes as social support.

3.5 Procedures

3.5.1 Baseline procedures. College and university students were recruited to participate in the study when they logged on to the contest website to register for the contest. Specifically, when they clicked <Register For Contest> an invitation to participate in the study automatically appeared (The invitation is reproduced in Appendix H). Students could accept or decline this invitation to participate in the study. Those who declined were linked directly to the contest registration form. Those agreeing to participate in the study were linked to the study consent form that clearly outlined the
Table 3

Measures to Assess Participants’ Use of Cessation Aides During the Contest

<table>
<thead>
<tr>
<th>Quit Aide</th>
<th>Categorization</th>
</tr>
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<tbody>
<tr>
<td>During the contest, did you…</td>
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<tr>
<td>try nicotine replacement gum</td>
<td>Pharmacological</td>
</tr>
<tr>
<td>try nicotine replacement patch</td>
<td></td>
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<tr>
<td>try other nicotine replacement product (inhaler, lozenge, nasal spray, tablet)</td>
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<tr>
<td>try a prescription pill (Zyban or Champix)</td>
<td></td>
</tr>
<tr>
<td>talk to a health professional (doctor, nurse, pharmacist, counsellor, etc.)</td>
<td>Behavioural</td>
</tr>
<tr>
<td>use a telephone quit line</td>
<td></td>
</tr>
<tr>
<td>go to a stop-smoking class, clinic, or support group</td>
<td>Other</td>
</tr>
<tr>
<td>get help or support from family and friends</td>
<td></td>
</tr>
<tr>
<td>use the internet, books, pamphlets, or videos</td>
<td></td>
</tr>
<tr>
<td>use acupuncture or hypnosis</td>
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</table>
nature and details of the study. After giving their consent by clicking <I agree to participate in the study>, participants were automatically connected to the baseline questionnaire and contest registration form. Upon submitting their baseline/registration form, participants were presented with a page that thanked them for joining the study and issued a randomly-generated identification number with instructions to save the number in the event that they ever wished to anonymously withdraw from the study.

3.5.2 Follow-up procedures. Follow up of participants was conducted by telephone and included an intervention check one month after they entered the contest, and an assessment of outcomes three months after they entered the contest. Follow-up procedures are described below.

3.5.2.1 Data collectors. The 1-month intervention check and 3-month follow-up telephone interviews were conducted by one senior research assistant who regularly worked for Leave The Pack Behind, and nine undergraduate research assistants hired and trained by the principal investigator (LT). During the 2-hour training session, all research assistants received a thorough description of the study and pertinent background information about smoking and quitting. Research assistants were taught how to engage smokers and quitters in the interview, and role played various permutations of the interview schedule. Ethical issues associated with data collection were reviewed, and research assistants were taught how to accurately, completely and confidentially record participants’ responses on the data collection instrument.

3.5.3.2 Steps to maximize follow-up response rates. In the week before each follow-up telephone interview was scheduled to occur, automated emails were sent to all study participants encouraging them to take the phone call, and reminding them of the
opportunity to win a prize if they did so. The prize incentive for answering the phone at the 1-month intervention check was the chance to win a $100 gift certificate to the retailer of the winner’s choice. The prize incentive for answering the phone at the 3-month follow-up time was the chance to win a $150 gift certificate to the retailer of choice.

For both the 1-month intervention check and the 3-month follow-up interview, at least six attempts were made to reach each participant by phone. If voicemail was reached, interviewers simply hung up. If another person was reached, interviewers indicated that they would call back later. If no contact was made with the participant after at least six attempts, the participant was considered lost to follow-up at that time.

3.5.3.3 One-month intervention check. Participants were contacted one month after entering the contest in order to complete a single-item intervention check for this study and a more extensive assessment of attitudes and behaviours for an unrelated study. The full interview process is described here.

Research assistants began the 1-month follow-up phone call by introducing themselves, reminding participants of the contest study, and reiterating that participants could withdraw from the study at any time and for any reason. After securing participants’ verbal consent to continue, the 5-10 minute interview was administered. To end the phone call, the research assistants thanked participants for their time, informed them when and how the winner of the prize draw for the study would be contacted.

Participants’ answers to the interview questions were manually recorded on a data collection instrument coded only with the participant’s unique identifier code. This recording of data was done during the phone call, and was re-checked by the research
assistant immediately upon completing the call. To further enhance accuracy of data collection, the researcher or the senior research assistant was always present to answer questions and offer assistance when research assistants were conducting follow-up telephone calls.

3.5.3.4 Three-month follow-up telephone interviews. All participants (whether or not they were reached for the 1-month interview/intervention check) were contacted for the 3-month follow-up interview. The same protocol described for the 1-month intervention check was used at the 3-month follow-up interview with the exception that participants were informed that the study was over and that a summary of the results would be posted on the contest website.

3.6 Analytic Strategy

3.6.1 Data input. Baseline data were captured electronically when participants completed the online baseline questionnaire. These data were downloaded directly into the electronic database. Data from the intervention check and follow-up call were entered into the database by research assistants. As part of the quality control procedures for data entry, all follow-up data collection forms were reviewed by the researcher for completeness and accuracy prior to data entry. Finally, all hard copy data collection forms were retained in the event that cross-checking of electronic and original data was required.

3.6.2 Data cleaning and screening. Standard cleaning procedures were performed to check for input errors. To check for any obvious outliers and key punch errors made by the research assistants during data entry, frequencies were run for all variables of interest.
3.6.3 Missing data. Recruitment procedures resulted in 288 post-secondary students entering the study. Among the 288 participants entering the study, 3-month follow-up data were available for 201 individuals as shown in Figure 2. It should be noted that 23 of these 201 participants did not complete the 1-month intervention check. Extremely minimal missing data were observed for measures obtained at baseline and follow-up. Specifically, at baseline, one participant failed to report whether or not a quit attempt was made in the past year and one participant did not report weekly tobacco consumption. The participant who did not report weekly tobacco consumption did self-identify as a daily smoker and was therefore assigned a value of 7 for number of cigarettes smoked in the past week to represent the most conservative weekly smoking consumption possible for a daily smoker. It was not possible to fill in a score for the participant who did not report a past year quit attempt. At three-month follow-up, scores for weekly tobacco consumption were missing for two participants due to interviewer error. These two participants were not asked about their weekly consumption and so were conservatively assigned the same number of cigarettes they reported smoking at baseline. No missing scores were found for any of these key variables: contest-period smoking abstinence, 3-month sustained abstinence, and perceived value of the email support messages, the buddy support, being part of a community of smokers all trying to quit, and the availability of a prize incentive.

3.7 Analytic Plan

3.7.1 Preparing for analysis

3.7.1.1 Checking assumptions for statistical tests. As part of the process of preparing for data analyses, the distributions of scores for continuous variables were
Figure 2. Numbers of smokers, contest registrants, and participants in the final study sample
plotted, and means, standard deviations and skewness indicators were examined.

Measures assessing the value participants placed on contest components were fairly normally distributed, as were measures of age and age of initiating smoking. Measures of weekly tobacco consumption, however, were found to be highly skewed. While this skewness negated the use of parametric tests (such as t-tests) it did not rule out the use of nonparametric tests or binary logistic regression analysis (which makes no assumptions about the distribution of variables entered as predictors). Accordingly, the measure of weekly tobacco consumption was retained with no transformations to correct for skewness and analyzed using non-parametric procedures.

Logistic regression analysis is used to predict membership in one or the other of two categories represented by the dependent variable from scores on multiple continuous and/or categorical independent variables presented simultaneously. Logistic regression imposes few conditions on the type of predictors used. Independent variables (i.e., predictors) need not be interval, nor normally distributed, nor linearly related, nor of equal variance within each group. However, the response categories for a predictor must be mutually exclusive and exhaustive; a case can only be in only one response category; and every case must be a member of one of the response categories. Additionally, while not an assumption, it is recognized that larger samples are needed (for logistic regression than linear regression) because maximum likelihood coefficients (used in logistic regression) are large-sample estimates.

In the analyses conducted for this study, the recommended minimum of 50 cases per predictor was not achieved. While all other assumptions were satisfactorily met, the
smaller sample size may make the logistic regression models (solutions) less stable than desirable.

**3.7.12 Software.** All statistical analyses were performed using SPSS version 20.0. Alpha was set at .05 and two-tailed tests of significance were chosen for all analyses unless otherwise indicated.

**3.7.2 Description of sample.** Descriptive analyses were run to describe the demographic characteristics and baseline smoking behaviours of the sample.

**3.7.3 Analyses addressing research questions.** For Research Question 1 addressing the value participants ascribed to contest components, means and standard deviations were calculated, and a repeated measures ANOVA was used to assess whether differences in participants’ perceptions of the value of particular contest components reached significance.

To determine the proportion of participants making a quit attempt (Research Question 2), a percent was calculated using data collected at the 1-month intervention check.

Research Questions 3 and 5 addressed the proportions of participants obtaining 6-week continuous abstinence for the contest period and 3-month sustained abstinence for the period following the contest start date respectively. Based on the accepted convention of determining cessation rates for both the “actual” sample of participants who provide complete data for the key variables of interest at baseline and at follow-up, and the “intention-to-treat” (ITT) sample of participants who enter the study but may or may not have complete data for follow-up, these two samples were derived as follows. The ITT sample was comprised of all 288 participants who entered the study and
completed the baseline questionnaire, including the 87 participants (30.2% of the initial sample) who did not complete the follow-up interview. These 87 participants were categorized as “smoking” for both the 6-week contest period and the 3-month follow-up period in the ITT analyses. The actual sample was comprised of the 201 participants for whom complete follow-up were available. Abstinence outcomes were calculated as the percent of participants who self-reported being completely smoke-free for the interval under assessment.

To determine if participants’ demographic characteristics, baseline smoking behaviours, use of quit aides, and perceptions of the value of contest components were associated with 6-week continuous abstinence and 3-month sustained abstinence (Research Questions 4 and 7), a series of logistic regression models was run. As shown in Table 4, Model 1 included just demographic variables (gender, age, living arrangement) to predict abstinence outcomes, while Model 2 included demographic variables and baseline smoking behaviours (weekly tobacco consumption, age of initiation of smoking, whether a quit attempt was made in the past year). Model 3 included the same variables as Model 2 along with measures of participants’ use of quitting aides. Finally, building on Model 3 (which included demographic characteristics, smoking behaviours at baseline, and use of quit aides), Model 4 included the degree to which participants valued having a buddy, receiving regular support emails, having the chance to win a prize, and being part of a community of smokers all quitting at the same time.

The final research question (Research Question 8) addressed outcomes among participants who did not achieve 3-month sustained abstinence from smoking: whether
Table 4

*Logistic Regression Models to Predict Cessation Outcome*

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4¹</th>
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<td>age (in years)</td>
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<td>living arrangement (with parents, without parents)</td>
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<tr>
<td>Smoking behaviours at baseline</td>
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<td>age of smoking onset (in years)</td>
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<td>weekly tobacco consumption (# cigarettes)</td>
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<tr>
<td>past year quit attempt (yes, no)</td>
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<td>Use of quit aides</td>
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<td>pharmacological aides (yes, no)</td>
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</tr>
<tr>
<td>behavioural aides (yes, no)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>other aides (yes, no)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value ascribed to contest components</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>support emails</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>support buddy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>chance at prize incentive</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>being part of community of quitters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Two separate logistic regression analyses were conducted: one for contest period abstinence (yes, no), and one for 3-month sustained abstinence cessation (yes, no).
cigarette consumption decreased, and whether reductions in amount smoked could be predicted from demographics, smoking behaviours, use of quit aides, and perceived value of contest components. For these participants, weekly rates of tobacco consumption reported at baseline and at 3-month follow-up were compared. To accommodate the severe positive skew observed in the measure of weekly cigarette use, a Wilcoxon Signed Rank Test was used (instead of a paired-samples $t$-test). Predictors of reduction were examined by first categorizing participants as those whose weekly tobacco consumption was lower at follow-up compared to baseline and those whose weekly tobacco consumption was unchanged or higher at follow-up compared to baseline, and then conducting binary logistic regression analysis to determine whether reduced (vs. unchanged/increased) tobacco consumption was associated with demographic characteristics, baseline smoking behaviours, use of quit aides, and perceptions of the value of contest components.
Chapter 4: Results

4.1 Attrition Analysis and Description of Final Sample

To compare the demographic characteristics and baseline smoking behaviours of participants who did ($n = 201$) and did not ($n = 87$) complete the 3-month follow-up telephone interview, attrition analyses were conducted. As shown in Table 5, no significant differences were observed between the two groups. Demographic characteristics and smoking behaviours of the 201 participants comprising the final sample are represented by the second column of Table 5.  

4.2 Contest Components

4.2.1 Perceived value of contest components. Inspection of the mean scores (presented in Table 6) reveals that all four contest components were judged favourably. To determine if ratings of individual components differed significantly from each other, a one-way repeated measures analysis was performed. To account for a violation in the assumption of homogeneity of variance across samples, the corrected $F$-value was used. A significant omnibus test was observed, $F(3, 198) = 29.44$, $p < .01$. Post hoc follow-up least squares difference tests showed that being eligible to win a prize was valued more highly than any other contest component, while having a buddy and belonging to a

---

2 Because contest registration (hence study recruitment) occurred over an 8-week period, analyses were also conducted to compare demographic characteristics and baseline smoking behaviours of early (December) registrants and late (January) registrants. Results are presented in Appendix I.
Table 5

Demographic Characteristics and Baseline Smoking Behaviours of Participants

Completing the 3-month Follow-up and Those Lost to Follow-up

<table>
<thead>
<tr>
<th>Demographics and Baseline Smoking Behaviours</th>
<th>Participants Lost to Follow-up (N = 87)</th>
<th>Participants Completing Follow-up (N = 201)</th>
<th>( \chi^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( n )</td>
<td>%</td>
<td>( N )</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>36</td>
<td>41.4</td>
<td>92</td>
</tr>
<tr>
<td>Female</td>
<td>51</td>
<td>58.6</td>
<td>109</td>
</tr>
<tr>
<td>Place of residence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With parents</td>
<td>23</td>
<td>26.4</td>
<td>71</td>
</tr>
<tr>
<td>Not with parents</td>
<td>64</td>
<td>73.6</td>
<td>130</td>
</tr>
<tr>
<td>Attempted to quit in past year</td>
<td>70(^a)</td>
<td>83.3</td>
<td>159(^b)</td>
</tr>
<tr>
<td>Time to first cigarette after waking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within 5 minutes</td>
<td>22</td>
<td>25.6</td>
<td>46</td>
</tr>
<tr>
<td>6-30 minutes</td>
<td>18</td>
<td>20.9</td>
<td>50</td>
</tr>
<tr>
<td>31-60 minutes</td>
<td>31</td>
<td>36.0</td>
<td>82</td>
</tr>
<tr>
<td>More than 1 hour</td>
<td>15</td>
<td>17.4</td>
<td>23</td>
</tr>
</tbody>
</table>

\( M \quad sd \quad M \quad sd \quad t \)

| Age                                          | 25.24 | 8.57 | 23.35 | 5.46 | 1.90\(^c\) |
| Age of initiation of smoking                 | 15.33 | 3.10 | 15.17 | 3.09 | 0.38\(^d\) |
| Number of cigarettes in the past week        | 46.41 | 47.68 | 52.46 | 47.46 | -1.26\(^c\) |

\(^a\)Data were missing for three participants. \(^b\)Data were missing for one participant. \(^c\)\( df = 117.39 \). \(^d\)\( df = 285 \). \(^e\)To account for skewness in the data, a Mann-Whitney \( U \)-test was conducted; \( z \) is reported.
Table 6

Perceptions of the Value of Contest Components

<table>
<thead>
<tr>
<th>Contest Component</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>As a contestant, I valued the chance to win a prize</td>
<td>4.42</td>
<td>0.84</td>
</tr>
<tr>
<td>As a contestant, I valued having a buddy</td>
<td>3.95</td>
<td>1.32</td>
</tr>
<tr>
<td>As a contestant, I valued being part of a quit community</td>
<td>3.89</td>
<td>1.11</td>
</tr>
<tr>
<td>As a contestant, I valued receiving the e-mails</td>
<td>3.46</td>
<td>1.21</td>
</tr>
</tbody>
</table>

Participants responded on 5-point Likert scales (where 1 = *strongly disagree* and 5 = *strongly agree*). Means with the same superscript differed significantly based on *least squares differences* post-hoc tests; \( p < .05, \) two-tailed.
community of quitters were valued equally and more highly than receiving support emails.

4.3 Contest Outcomes

4.3.1 Attempts to quit. Whether participants made a quit attempt during the contest was assessed at the 1-month intervention check. Among the 184 participants for whom data were available, 99.5% had attempted to quit smoking during the contest period.

4.3.2 Abstinence outcomes. Six-week continuous abstinence and 3-month sustained abstinence were assessed using data collected at the 3-month follow-up. Continuous abstinence during the 6-week contest period was achieved by 80 (39.8%) of the 201 participants who provided complete data and were included in the final sample. The intention-to-treat analysis, based on all 288 participants entering the study, revealed 27.8% of the ITT sample achieved 6-week continuous abstinence for the full contest period.

Among the 80 participants who reported continuous abstinence for the duration of the 6-week contest period, 23 relapsed back to smoking at some point between the end of the contest and the 3-month follow-up. This represents 28.7% of the 80 participants who achieved contest-period abstinence, and 11.0% of the total sample of 201 participants.

Sustained abstinence for the entire 3-month period under investigation was achieved by 57 (28.4%) of the 201 participants comprising the final sample. The intention-to-treat analysis revealed that 19.8% of all 288 participants entering the study achieved 3-month sustained abstinence from smoking.
4.3.3 Predictors of contest-period 6-week continuous abstinence. To determine if participants’ demographic characteristics, baseline smoking behaviours, use of quit aides, and perceptions of the value of contest components were associated with contest-period 6-week continuous abstinence, a series of binary logistic regression models were run. The four logistic regression models are presented in Table 7 (Models 1 and 3) and Table 8 (Models 3 and 4).

In order to assess the quality of the models produced, a number of statistics were produced. The model chi-square and the Hosmer-Lemeshow goodness of fit statistic were used to determine the extent to which the model, with the independent variables entered, was associated with the abstinence outcome. A significant model chi-square demonstrates that a model which includes the predictors offers a better prediction of the outcome than a null model with no predictors. For the Hosmer-Lemeshow goodness of fit test, a non-significant test statistic demonstrates that the model fits the data at an acceptable level. Nagelkerke’s $R^2$ is somewhat analogous to the $R^2$ in linear regression models and can be used to estimate the proportion of variance in the dependent variable that can be explained by adding independent variables into the model. Odds ratios (ORs), confidence intervals (CIs), and beta coefficients ($b$) for each independent variable were produced to determine the strength of association between the specific predictors and the dependent measure. A significant $b$ indicates that a 1-unit increase in a continuous independent variable or membership in the identified category for a categorical independent variable (compared to the reference category), influences the probability of the outcome in question.
Table 7

Logistic Regression Predicting Contest Period 6-week Continuous Abstinence: Models 1 and 2

<table>
<thead>
<tr>
<th>Variable</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td></td>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b</td>
<td>OR</td>
<td>95% CI</td>
<td>b</td>
<td>OR</td>
<td>95% CI</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-1.42</td>
<td>0.24</td>
<td></td>
<td>-1.02</td>
<td>0.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.03</td>
<td>1.03</td>
<td>[0.98, 1.09]</td>
<td>0.04</td>
<td>1.04</td>
<td>[0.98, 1.10]</td>
<td></td>
</tr>
<tr>
<td>Male&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.38</td>
<td>1.47</td>
<td>[0.83, 2.61]</td>
<td>0.43</td>
<td>1.54</td>
<td>[0.85, 2.79]</td>
<td></td>
</tr>
<tr>
<td>Living with parents&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.13</td>
<td>1.14</td>
<td>[0.61, 2.12]</td>
<td>0.14</td>
<td>1.15</td>
<td>[0.62, 2.15]</td>
<td></td>
</tr>
<tr>
<td>Smoking behaviours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weekly tobacco consumption</td>
<td>-0.00</td>
<td>0.98</td>
<td>[0.99, 1.00]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of initiation to smoking</td>
<td>-0.03</td>
<td>0.97</td>
<td>[0.88, 1.07]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past year quit attempt&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0.12</td>
<td>1.13</td>
<td>[0.55, 2.31]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Model Fitting Information

<table>
<thead>
<tr>
<th></th>
<th>( \chi^2 )</th>
<th>df</th>
<th>( \chi^2 )</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall model</td>
<td>3.06</td>
<td>3</td>
<td>4.09</td>
<td>6</td>
</tr>
<tr>
<td>H-L Goodness of Fit</td>
<td>8.20</td>
<td>8</td>
<td>19.36*</td>
<td>8</td>
</tr>
<tr>
<td>Nagelkerke ( R^2 )</td>
<td>.02</td>
<td></td>
<td>.03</td>
<td></td>
</tr>
</tbody>
</table>

* \( p < .05 \).

<sup>a</sup>Female is the reference category. <sup>b</sup>Not living with parents is the reference category. <sup>c</sup>Coded 0 = no attempt made (reference category) and 1 = attempt made.

Table 8
Table 8

Logistic Regression Predicting Contest Period 6-week Continuous Abstinence: Models 3 and 4

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 3</th>
<th></th>
<th></th>
<th>Model 4</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>OR</td>
<td>95% CI</td>
<td>b</td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.26</td>
<td>0.77</td>
<td>[0.98, 1.10]</td>
<td>-0.79</td>
<td>0.45</td>
<td>[0.98, 1.11]</td>
</tr>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.39</td>
<td>1.04</td>
<td>[0.98, 1.10]</td>
<td>0.43</td>
<td>1.04</td>
<td>[0.98, 1.11]</td>
</tr>
<tr>
<td>Male(^a)</td>
<td>0.32</td>
<td>1.38</td>
<td>[0.74, 2.57]</td>
<td>0.31</td>
<td>1.36</td>
<td>[0.62, 2.58]</td>
</tr>
<tr>
<td>Living with parents(^b)</td>
<td>0.13</td>
<td>1.14</td>
<td>[0.60, 2.19]</td>
<td>0.18</td>
<td>1.20</td>
<td>[0.62, 2.34]</td>
</tr>
<tr>
<td>Smoking behaviours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weekly tobacco consumption</td>
<td>0.00</td>
<td>1.00</td>
<td>[0.99, 1.01]</td>
<td>0.00</td>
<td>1.00</td>
<td>[0.99, 1.01]</td>
</tr>
<tr>
<td>Age of initiation to smoking</td>
<td>-0.04</td>
<td>0.97</td>
<td>[0.87, 1.07]</td>
<td>-0.05</td>
<td>0.96</td>
<td>[0.86, 1.06]</td>
</tr>
<tr>
<td>Past year quit attempt(^c)</td>
<td>0.12</td>
<td>1.13</td>
<td>[0.54, 2.37]</td>
<td>0.14</td>
<td>1.15</td>
<td>[0.53, 2.49]</td>
</tr>
<tr>
<td>Use of quit aides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharmacological</td>
<td>-0.66(^*)</td>
<td>0.52</td>
<td>[0.27, 0.97]</td>
<td>-0.73(^*)</td>
<td>0.48</td>
<td>[0.25, 0.93]</td>
</tr>
<tr>
<td>Behavioural</td>
<td>-0.67(^*)</td>
<td>0.51</td>
<td>[0.27, 0.98]</td>
<td>-0.77(^*)</td>
<td>0.46</td>
<td>[0.24, 0.91]</td>
</tr>
<tr>
<td>Other</td>
<td>-0.29</td>
<td>0.77</td>
<td>[0.27, 2.08]</td>
<td>-0.43</td>
<td>0.65</td>
<td>[0.22, 1.93]</td>
</tr>
<tr>
<td>Value of contest components</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receiving email support</td>
<td>0.19</td>
<td>1.21</td>
<td>[0.92, 1.59]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Having a support buddy</td>
<td>0.12</td>
<td>1.13</td>
<td>[0.87, 1.46]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Being eligible for a prize</td>
<td>0.89</td>
<td>1.09</td>
<td>[0.73, 1.62]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belonging to a community of quitters</td>
<td>-0.21</td>
<td>0.81</td>
<td>[0.61, 1.08]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Table 8 continues)
<table>
<thead>
<tr>
<th>Model Fitting Information</th>
<th>$\chi^2$</th>
<th>df</th>
<th>$\chi^2$</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall model</td>
<td>16.23</td>
<td>9</td>
<td>21.00</td>
<td>13</td>
</tr>
<tr>
<td>H-L Goodness of Fit</td>
<td>13.90</td>
<td>8</td>
<td>7.91</td>
<td>8</td>
</tr>
<tr>
<td>Nagelkerke $R^2$</td>
<td>.11</td>
<td></td>
<td>.14</td>
<td></td>
</tr>
</tbody>
</table>

* $p < .05$.

*aFemale is the reference category. bNot living with parents is the reference category. cCoded 0 = no attempt made (reference category) and 1 = attempt made.*
As shown in Table 7, demographic variables entered in Model 1 did not produce a significant model chi-square. Predictors were not significantly associated with contest-period 6-week continuous abstinence. The non-significant Hosmer-Lemeshow test, however, suggested good model fit (compared to the null model). When measures of smoking behaviours were added to the analysis (Model 2), model fit was poor and none of the predictors reached significance. Model 3 included measures of participants’ use of quit aides in addition to demographic characteristics and baseline smoking behaviours (see Table 8). Use (versus no use) of pharmacological quit aides and use (versus no use) of behavioural quit aides were each associated with lower odds of achieving 6-week continuous abstinence for the contest period. The Hosmer-Lemeshow goodness of fit test showed the predicted model adequately fit the observed values and omnibus test statistics showed the overall model approached significance ($p = .062$). Model 4, the final model, revealed that participants’ judgements of the value of four specific components of the contest were not significantly associated with contest-period 6-week continuous abstinence. Use of pharmacological and behavioural quit aides continued to be significantly associated with reduced odds of contest-period abstinence. As shown in Table 8, the Hosmer-Lemeshow test showed good model fit and omnibus test statistics showed the overall model approached significance ($p = .073$).

4.3.4 Predictors of 3-month sustained abstinence. A series of four logistic regression models, identical to those described above, were conducted to determine if participants’ demographic characteristics, baseline smoking behaviours, use of quit aides, and perceptions of the value of contest components were associated with 3-month
sustained abstinence. Tables 9 and 10 present Models 1 and 2, and Models 3 and 4, respectively.

As shown in Table 9, entry of demographic variables into Model 1 revealed that older age was associated with increased odds of achieving 3-month sustained abstinence. Omnibus tests of the model were mixed with the Hosmer-Lemeshow goodness of fit test showing an inadequate fit, but the omnibus chi-square reaching significance ($p = .013$). When measures of smoking behaviours were included (Model 2), older age was again significantly associated with higher odds of sustained quitting. Less frequent tobacco consumption was marginally related to higher odds of sustained abstinence. The Hosmer-Lemeshow goodness of fit test for Model 2 showed good model fit, and the omnibus statistic revealed the overall model was significantly associated with 3-month sustained abstinence ($p = .012$).

Model 3, which included measures of participants’ use of quit aides as well as smoking behaviours and demographics, produced a significant model ($p = .002$) with older age associated with higher odds of achieving 3-month sustained abstinence, and use of pharmacological quit aides associated with lower odds of achieving 3-month sustained abstinence. The Hosmer-Lemeshow goodness of fit test for Model 3 showed good model fit. In Model 4, the final model, participants’ judgements of the value of the contest emails, the support buddy, being able to win a prize, and being part of a quit community were not significantly associated with 3-month sustained abstinence; older age and use of pharmacological quit aides were significantly associated with 3-month sustained abstinence as described in Model 3. As in Model 3, Model 4 adequately fit the data, and the model was significantly associated with 3-month sustained abstinence ($p = .012$).
Table 9

*Logistic Regression Predicting 3-Month Sustained Abstinence: Models 1 and 2*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th></th>
<th></th>
<th>Model 2</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>OR</td>
<td>95% CI</td>
<td>B</td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td>Constant</td>
<td>-3.34</td>
<td>0.35</td>
<td></td>
<td>-3.39</td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td>Demographics</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.84*</td>
<td>1.09</td>
<td>[1.03, 1.15]</td>
<td>.10*</td>
<td>1.10</td>
<td>[1.04, 1.17]</td>
</tr>
<tr>
<td>Malea</td>
<td>0.54</td>
<td>1.72</td>
<td>[0.91, 3.26]</td>
<td>0.50</td>
<td>1.66</td>
<td>[0.85, 3.22]</td>
</tr>
<tr>
<td>Living with parentsb</td>
<td>0.44</td>
<td>1.56</td>
<td>[0.78, 3.11]</td>
<td>0.44</td>
<td>1.55</td>
<td>[0.77, 3.12]</td>
</tr>
<tr>
<td>Smoking behaviours</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weekly tobacco consumption</td>
<td>-0.01</td>
<td>0.99</td>
<td>[0.99, 1.00]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of initiation to smoking</td>
<td>0.31</td>
<td>1.03</td>
<td>[0.93, 1.15]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past year quit attemptc</td>
<td>-0.50</td>
<td>0.61</td>
<td>[0.29, 1.28]</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Model Fitting Information</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Overall model</td>
<td>10.74*</td>
<td>3</td>
<td></td>
<td>16.26*</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>H-L Goodness of Fit</td>
<td>18.64*</td>
<td>8</td>
<td></td>
<td>4.36</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Nagelkerke R²</td>
<td>.08</td>
<td></td>
<td></td>
<td>.08</td>
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<td></td>
</tr>
</tbody>
</table>

* p < .05.

aFemale is the reference category. bNot living with parents is the reference category. cCoded 0 = *no attempt made* (reference category) and 1 = *attempt made.*
Table 10

**Logistic Regression Predicting 3-Month Sustained Abstinence: Models 3 and 4**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 3</th>
<th></th>
<th>Model 4</th>
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<tr>
<td></td>
<td><strong>b</strong></td>
<td><strong>OR</strong></td>
<td><strong>95% CI</strong></td>
<td><strong>B</strong></td>
</tr>
<tr>
<td>Constant</td>
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<td>0.81</td>
<td></td>
<td>-1.85</td>
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<tr>
<td>Demographics</td>
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<tr>
<td>Age</td>
<td>0.10*</td>
<td>1.11</td>
<td>[1.04, 1.18]</td>
<td>0.10*</td>
</tr>
<tr>
<td>Male&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.44</td>
<td>1.55</td>
<td>[0.77, 3.09]</td>
<td>0.45</td>
</tr>
<tr>
<td>Living with parents&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.45</td>
<td>1.57</td>
<td>[0.76, 3.23]</td>
<td>0.42</td>
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<tr>
<td>Smoking behaviours</td>
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<td></td>
</tr>
<tr>
<td>Weekly tobacco consumption</td>
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<td>1.00</td>
<td>[0.99, 1.00]</td>
<td>-0.00</td>
</tr>
<tr>
<td>Age of initiation to smoking</td>
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<td>1.02</td>
<td>[0.92, 1.14]</td>
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</tr>
<tr>
<td>Past year quit attempt&lt;sup&gt;c&lt;/sup&gt;</td>
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<td>0.60</td>
<td>[0.28, 1.30]</td>
<td>-0.48</td>
</tr>
<tr>
<td>Use of quit aides</td>
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<td></td>
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<tr>
<td>Pharmacological</td>
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<td>0.43</td>
<td>[0.20, 0.90]</td>
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<tr>
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<td>[0.32, 1.41]</td>
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<td>Other</td>
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<tr>
<td>Value of contest components</td>
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<td></td>
</tr>
<tr>
<td>Receiving email support</td>
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<td>0.97</td>
<td>[0.73, 1.30]</td>
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<td>Having a support buddy</td>
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<td>1.03</td>
<td>[0.78, 1.37]</td>
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<td>Being eligible for a prize</td>
<td>-0.09</td>
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<td>[0.59, 1.40]</td>
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<td>Belonging to a community of quitters</td>
<td>0.07</td>
<td>0.93</td>
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</table>

(Table 10 continues)
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<tr>
<th>Model Fitting Information</th>
<th>( \chi^2 )</th>
<th>df</th>
<th>( \chi^2 )</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall model</td>
<td>26.52*</td>
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<td>27.09*</td>
<td>13</td>
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<tr>
<td>H-L Goodness of Fit</td>
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<td>3.33</td>
<td>8</td>
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<tr>
<td>Nagelkerke ( R^2 )</td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

* \( p < .05 \).

\(^a\)Female is the reference category. \(^b\)Not living with parents is the reference category. \(^c\)Coded 0 = no attempt made (reference category) and 1 = attempt made.
4.3.5. Reduction in tobacco consumption. Among the 144 contestants who did not achieve 3-month sustained abstinence, weekly tobacco consumption was assessed to determine whether it declined from baseline to 3-month follow-up.\(^3\) Analysis using a Wilcoxon Signed Rank Test to account for the skewed data showed their average weekly tobacco consumption decreased significantly from baseline \((M = 54.91, SD = 45.92)\) to follow-up \((M = 24.29 \text{ cigarettes}, SD = 33.31)\) \((z = -8.12, p < .001)\).

To determine if reduction (vs. no reduction) in tobacco use among the 144 non-abstainers could be predicted from their demographic characteristics, baseline smoking behaviours, use of quit aides, and perceptions of the value of contest components, a series of four logistic regression analyses was run. Model 1 included demographic variables; Model 2 included demographic variables and baseline smoking behaviours; variables indicating use of quit aides were added in Model 3; and Model 4 included all of these variables as well as participants’ ratings of contest components. None of the four models produced a significant overall chi-square, nor did any of the individual predictors reach significance. It should be noted that the sample size \((n = 144)\) was somewhat small for the number of predictors included in the final model \((k = 13)\), with the potential for unstable results.

\(^3\) Included in this subsample of 144 participants were 121 individuals who did not achieve 6-week continuous abstinence for the contest period and 23 “relapsers” who did achieve 6-week continuous abstinence for the contest period but had relapsed back to smoking by the 3-month follow-up.
Chapter 5: Discussion

Based on the high prevalence of smoking among 18-to-24 year-olds—including post-secondary students (CTUMS, 2011; Johnston et al., 2001; Weschsler, 1998), and the apparent paucity of effective smoking cessation interventions for this age group (Murphy-Hoefe et al., 2005; Travis & Lawrance, 2009) this study examined whether and how a Quit and Win contest could support smoking cessation among young adult students. In particular, this study evaluated the cessation outcomes of a provincial Quit and Win contest for Ontario post-secondary students with specific attention to how program components (i.e., having a support buddy, receiving support emails, having a prize incentive, and being part of a community of quitters) related to successful quitting. Contrary to existing evidence that young adults regard various types of social support (An et al., 2008; Bader et al., 2007; Curry et al., 2007; Haug et al., 2009; Klatt et al., 2008; Riley et al., 2008) and incentives (Bader et al., 2007; Crutzen et al., 2011; Davidson et al., 2009; Maher et al., 2007) as appealing components of smoking cessation interventions, neither the social support components of the contest nor the prize incentive were found to be significantly associated with quitting. Even so, and consistent with the existing literature (Rooney et al., 2005; Thomas et al., 2010), the current study did demonstrate the strong potential of Quit and Win contests to help post-secondary students to quit.

5.1 Contest Outcomes

5.1.1 Abstinence from smoking. The current study revealed that 39.8% of the 201 participants who completed the 3-month follow-up measure (27.8% of the intention-to-treat sample of all 288 participants) achieved continuous abstinence for the duration of the 6-week contest period. Previous investigations of Quit and Win contests reveal a wide
range of abstinence results with as few as 10% of participants reporting abstinence to as many as 70% reporting smoke-free status at the end of the contest or follow-up period (Bains et al., 2000; Croghan et al., 2001; Elder et al., 1991; Gomez-Zamudio et al., 2004; Hahn et al., 2005; Hawk et al., 2006; Koffman et al., 1998; Korhonen et al., 1997; Lando et al., 1990; O’Connor, et al., 2006; van Osch et al., 2009). Short-term quit proportions in the range of 20% to 50% seem most common for contests lasting 4 weeks or more, with this being true for both adults (Bains et al., 2000; Croghan et al., 2001; Elder et al., 1991; Gomez-Zamudio et al., 2004; Hahn et al., 2005; Hawk et al., 2006; Koffman et al., 1998; Korhonen et al., 1997; Lando et al., 1990; O’Connor, et al., 2006; van Osch et al., 2009) and young adults (Rooney et al., 2005; Thomas et al., 2010). Indeed, the current results are virtually identical to those of Rooney et al. (2005) who reported a 36% contest period abstinence proportion in their evaluation of two identical 7-week Quit and Win contests delivered at three colleges in Wisconsin. Overall then, the current results compare favourably with existing literature, and suggest that a meaningful proportion of young adult smokers will achieve abstinence immediately after a contest.

While research suggests that one-fifth to one-half of contestants are generally smoke-free at the end of a Quit and Win contest, the proportion who sustain abstinence from smoking tends to fall off. In the current study, follow-up data provided by the 201 contestants completing the 3-month follow-up measure revealed that the proportion reporting smoke-free status fell from 39.8% at the end of the contest to 28.4% at the 3-month follow-up (values were 27.8% and 19.8% respectively for the ITT analysis). Looking specifically at the proportion of quitters who relapsed, it was determined that 23 (28.7%) of the 80 participants who reported continuous abstinence for the duration of the
6-week contest period had relapsed back to smoking at some point between the end of the contest and the 3-month follow-up interview.

The occurrence of relapse after the contest period is quite common in Quit and Win contests in the community (Cahill & Perera, 2008) and on campus (Rooney et al., 2005; Thomas et al., 2010). Closer review of the literature, however, suggests that the drop in the proportions of quitters sustaining abstinence after the end of the contest may be more precipitous in the community than on campus. Evaluations of Quit and Win contests held for adult smokers in the community show that half, if not three-quarters, of contest period quitters have resumed smoking at the time of follow-up (Gomez-Zamudio et al., 2004; Korhonen et al., 1997; Tillgren et al., 1995; van Osch et al., 2009). In their studies of campus-based Quit and Win contests, Rooney et al. (2005) suggested that two-thirds of the young adult students in a campus-based contest relapsed to smoking after a period of abstinence, while Thomas et al. (2010) reported that close to half of contestants relapsed. This compares to just over one-quarter of contestants in the current study returning to smoking after stopping for at least six weeks. Taking into account methodological limitations (such as timing of end of contest and follow-up interviews and high attrition) that may have inflated estimates of relapse rate in the studies by Rooney et al. and Thomas et al., the possibility that relapse rates are lower for students than adults in Quit and Win contests is tenable and justifies more attention.

5.1.2 Tobacco consumption. Looking at other smoking and quitting behaviours of participants in the current study demonstrated that the majority of the contestants who were not successful in sustaining abstinence during or after the contest were still able to make positive changes to their smoking behaviour. In particular, 99.5% of the 288 participants in the total sample reported attempting to quit. Furthermore, among the 144
smokers who did not achieve 3-month sustained abstinence, 86% reported smoking fewer cigarettes at the 3-month follow-up compared to the amount they reported smoking at baseline, with weekly tobacco consumption decreasing from 54.9 cigarettes at baseline to 24.3 cigarettes at 3-month follow-up. Research shows that even unsuccessful quit attempts are an important outcome of cessation interventions since it typically takes multiple attempts to quit for good, and past quit attempts are predictive of successful abstinence in the future (Diemert et al., 2013; O’Connor et al., 2006). Similarly, reductions in consumption are important because they can represent positive steps and greater commitment to quitting, and reduce exposure to second-hand smoke among individuals who associate with the smoker (Lindson, Aveyard & Hughes, 2010). Thus, to the extent that campus-based contests stimulate quit attempts or reductions in tobacco consumption, they likely enhance young adult smokers’ cognitive and behavioural strategies for successfully quitting in the future.

5.1.3 Recruitment and reach. In addition to the positive cessation and reduction outcomes observed among the young adult students in the Quit and Win contest, the current study also revealed that the population reach of a contest offered on campus may be quite substantial. For example, of the estimated 144,732 smokers in the student population to which the contest was available, 1,535 enrolled in the contest (and 288 joined the study). This enrollment represents 1.1% of all smokers who could have joined and compares favourably with the recruitment rate of 1.3% observed for Ontario’s long-running, annual Quit and Win contest that is open to all adult smokers in the province (Ontario Tobacco Research Unit, 2011). It was lower than the 2% rate of recruitment reported by Rooney et al. (2005) in their investigation of a Quit and Win contest offered to an estimated 7,600 smokers from three U.S. college campuses, but not unexpectedly
so. The higher rate of recruitment achieved by Rooney et al. was likely attributable to characteristics of the target population. Specifically, effective promotion of a Quit and Win contest is easier to achieve in a smaller, more geographically-confined and homogeneous population because print and electronic promotion can be personalized and can be supplemented with face-to-face and word-of-mouth promotions to a greater degree than is possible with promotions that need to cover a larger, geographically-dispersed, heterogeneous population. Ultimately, enrollment for campus-based contests can be expected to match the 0.5-to-2% recruitment rates typically observed for Quit and Win interventions (Cahill & Perera, 2008), or even exceed these rates if the contest is offered to a smaller, more homogeneous student population (such as the student body of a single institution).

Quit and Win contests also match young adults’ preferences for quitting methods that are free, easy to access, and involve social support (Curry et al., 2007; Solberg et al., 2007a). Given that young adults are the least likely of all age groups to be offered or to use “proven” pharmacological methods of quitting (Curry et al., 2007; Fiore et al., 1990), and in light of high recruitment rates for contests, the potential of Quit and Win contests to increase the proportions of young adults who quit successfully is clear. Certainly, with nearly 20% of the young adult contestants sustaining their smoke-free status for three months after entering the contest (i.e., six weeks after the contest ends), this level of success compares extremely positively to young adult smokers’ typical approach of quitting without assistance, a method that is estimated to have a quit rate of 5-7%. Overall, these findings might suggest that Quit and Win contests are an especially effective cessation intervention for young adults, and have the potential to produce longer term maintenance of cessation. Perhaps due to the shorter smoking career of young
adults, and their less frequent and less heavy use of tobacco (Lantz, 2003; Staten et al., 2007; Thompson et al., 2007), it may be relatively easy for young adults to maintain a quit attempt that has already been sustained for six weeks. Indeed, the cessation literature is quite conclusive in that lighter, less nicotine dependent smokers are more likely to succeed at quitting compared to heavier, more nicotine addicted smokers (Agrawal et al., 2008; Harris et al., 2008; Zhu et al., 1999).

5.1.4 Evaluation of contest components. In order to better understand how contests might support smoking cessation and abstinence, researchers have examined how components such as support buddies, emails, and prizes are regarded by contestants and whether these components (or participants’ perceptions of them) are related to successful cessation and abstinence. In the absence of any such research with young adult contestants in campus contests, the current study examined whether and to what degree contestants valued specific components of the campus contest. Components investigated were: (1) the mandatory support buddy chosen by the contestant, whose role it was to provide support to the contestant and to confirm his or her smoke-free status, (2) the prize of $1,000 cash awarded to one grand prize winner at the conclusion of the contest, (3) the regular support emails sent throughout the duration of the contest, and (4) the community of quitters, i.e., the perceived membership to a community of peers who are all simultaneously attempting to quit. Each of these components was identified in the literature as qualities of smoking cessation approaches that appear to be appealing to post-secondary students and fit with their preference to use social support and receive an incentive for quitting smoking.

5.1.4.1 Values of contest components. Not surprisingly, results of this study showed that prizes were a highly-valued component of the Quit and Win contest on
campus: participants’ average rating of this component was 4.42 on a 5-point scale. The high rating of the prize by young adults in this study is consistent with related research suggesting that the use of incentives may entice young adults to enroll in web-assisted tobacco control interventions (Crutzen et al., 2011), increase young adults’ use of telephone quitlines (Maher et al., 2007), and enhance retention of young adults in self-help smoking cessation interventions (Davidson et al., 2009). On the other hand, the high valuation of the prize stands in contrast to findings of van Osch et al. (2009) who reported that 43% of contestants in a country-wide Quit and Win contest in the Netherlands rated the prize as not at all helpful to their ability to remain abstinent (response options were: 1, helped a lot; 2, helped much; 3, helped a little; 4, did not help). Likewise, young adults’ favourable perceptions of the prize observed in the current study contrast with the findings of Ashbury et al. (2006) who reported that 53.7% of adult participants in an Ontario-wide Quit and Win contest rated the prize as not at all or not very important to their decision to enter the contest. Acknowledging that Ashbury et al. asked about reasons for entering the contest, whereas the current study asked contestants to rate the prize in terms of its value to their quit attempt, it generally seems that the importance of a prize is greater among young adult than adult Quit and Win participants.

Less valued than the prize, but with average scores very close to 4 (out of 5), were contestants’ ratings of the value of having a buddy to support their quitting efforts and the value of being part of a community of peers who were also trying to quit. These findings are consistent with young adults’ preference for using social support during quit attempts. Using data from a nationally representative sample of U.S. smokers, Curry et al. (2007) determined that young adult smokers were more likely to use social support than any other cessation aid during a quit attempt. The appeal of social support is further
highlighted in other studies showing young adults’ positive reactions to support buddies in online interventions (An et al., 2008), young adults’ stated preference for social support over other types of interventions for quitting (Bader et al., 2007), and the increased likelihood of cessation among students who perceived being supported by a trained peer-support student in a web-assisted tobacco intervention (Klatt et al., 2008).

Of interest, young adults’ favourable perceptions of social support during the contest do not appear to differ much from adults’ perceptions. In their evaluation of a Quit and Win contest in the province of Quebec, for example, Gomez-Zaumudio et al. (2004) asked participants to rate the utility of their buddy to their quit attempt on a scale not dissimilar to the one used in the current study. Although the mean score was not provided, the researchers reported that 72% of contestants rated their buddy as very useful or quite useful.

In the current study, emails were the least valued component of the contest, with an average rating just above the midpoint of the 5-point scale. A number of explanations can be offered for this finding. First, it may be that the automated nature of the emails made them unappealing: such emails would lack the immediacy and personalization to which young adults are accustomed. Second, the content of the emails may not have matched the individuals’ current experiences with quitting smoking and thus made it hard for them to relate to the content or appreciate the quit tips being offered at that time. Finally, for this highly-wired cohort, any type of automated emails may simply be seen as unwelcome junk mail.

The young adults’ somewhat lukewarm response to emails in a contest is fairly consistent with ratings of email support messages observed among adult contestants in community Quit and Win contests. For instance, van Osch et al. (2009) reported that
participants rated the overall value of contest emails as 6.3 on a scale of 1 to 10, and gave email messages the lowest rating of all the cessation support components offered that contest (including emails, buddy, counseling program, computer-tailored advice, and telephone coach). On the other hand, the low ratings of emails by participants in this study seem to contradict findings from related research with young adults. For instance, in their evaluation of a campus-based intervention that included personalized one-to-one social support email messages, Abroms et al. (2007) reported that the vast majority of the young adult participants found the emails appealing: 91% reported that they read all of the emails, and over half reported that they wrote back to the emails three or more times over the intervention period. A study by Klatt et al. (2008) also revealed a positive relationship between perceived support from weekly personalized email support messages and smoking abstinence in their study of a web-assisted tobacco intervention for young adults. Additionally, greater engagement in the support emails (i.e., writing back more often) was independently associated with greater odds of smoking abstinence. Overall, more research is certainly required to isolate key content and mechanisms of delivery for emails that are integrated into campus-based Quit and Win contests.

5.1.4.2 Relationship between contest components and cessation. While the appeal of the contest components (e.g., being able to win a prize, having support of a buddy, belonging to a community of quitters, and receiving support emails) was clear, the relationship of these components to quitting success seemed more tenuous. Binary logistic regression analyses were used to determine whether participants’ demographic characteristics, smoking behaviours, use of quit aides, and evaluation of the contest components influenced the odds of successfully achieving either 6-week continuous abstinence or 3-month sustained abstinence from smoking. From two separate analytical
models predicting 6-week continuous abstinence and 3-month sustained abstinence, it was determined that trying a pharmacological quit aide (like the nicotine patch or gum) was independently associated with decreased odds of achieving abstinence at both 6-week follow-up and at 3-month follow-up. Using a behavioural quit aide (such as speaking to a health professional or calling a telephone quit line) was independently associated with decreased odds of 6-week continuous abstinence, while older age was found to be independently associated with increased odds of 3-month sustained abstinence. None of the smoking behaviours, nor the perceived value of any contest components were related to abstinence outcomes at the 6-week or 3-month follow-up times.

The lower odds of being abstinent observed for participants who tried pharmacological quit aides or used behavioural support during the contest period may reflect contestants’ expectations about what these aides could do for them. It is possible, for example, that participants who used nicotine replacement therapy or a prescription medication assumed that the aide would make quitting easier. This assumption may have led to poor planning and preparation in other areas related to successful quitting (e.g., having a plan for quitting, taking steps to minimize or avoid smoking triggers, and using alternate coping strategies for stress). The lower odds of successful abstinence seen among the young adult contestants using pharmacological or behavioural quit aides may also point to underlying differences between those smokers who chose to use aids and those smokers who attempted to quit without these aids. Specifically, those using the supports may have foreseen (and actually experienced) quitting as a more difficult process than those who did not use pharmaceutical or behavioural interventions to support their quit attempt. This is the explanation offered by Ashbury et al. (2006) and
van Osch et al. (2009) who both found that adult Quit and Win contestants who did not use pharmacological quit aides had greater odds of achieving continuous abstinence after the contest period compared to those who did use these aides. These researchers speculated that contestants seeking more intensive aides are the heavier, nicotine-addicted smokers who will have greater difficulty achieving and sustaining abstinence from smoking.

The finding that older contestants had higher odds of 3-month sustained abstinence may reflect the role of past experience with quitting. It is possible that older contestants may have made more quit attempts prior to the current contest, which may have resulted in a greater understanding of the factors related to quitting successfully. In previous quit attempts, contestants may have experimented with different strategies for managing triggers to smoke and avoiding relapse. Having been through quitting more times before, it is possible that older contestants knew what to expect and thus were more prepared for quitting during the contest. Indeed, in their investigation into the predictors of quit attempts and smoking abstinence among an Ontario cohort of young adult smokers, Diemert et al. (2013) reported that more prior quit attempts predicted successful abstinence on the current attempt. It may also be possible that older students were more likely to sustain their abstinence due to their proximity to graduating, a time when many post-secondary smokers say they want to quit smoking by (Ott et al., 2005).

The absence of any relationship between smoking cessation outcomes and the perceived value of the contest prize, buddy support, email support and sense of community was surprising—especially given that the young adult contestants in this study generally responded positively when asked if they valued these components. In previous studies of various smoking cessation interventions for young adults, provision of
social support has been quite consistently associated with successful smoking cessation and abstinence (Abroms et al., 2007; Klatt et al., 2008). It may be, however, that the type of social support available from a buddy or perceived community of peers is different from the one-to-one social support proactively offered in other types of interventions. For instance, in studies by Klatt et al. (2008) and Abroms et al. (2007), social support was continuously offered to young adults involved in a web assisted tobacco intervention through proactive, personalized contact over email. The participants in these studies were highly engaged with this type of ongoing, informed, positive, helpful, and prompt support from trained support persons, and engagement was positively related to successful quitting. In a contest, on the other hand, where one-to-one social support is obtained from untrained “buddies” that contestants identify themselves, support may be sporadic, clumsy, ill-conceived, and available only when requested. In fact, some contestants may not have asked for any support from their buddies, with the consequence that one-to-one support was absent for most or all of the contest period. Thus, even though it was valued, it may be that the social support available in the contest was insufficiently personalized and proactive to be associated with greater odds of abstinence.

The absence of any relationship between smoking cessation outcomes and the perceived value of the contest prize, buddy support, email support and sense of community was also surprising given that some studies of Quit and Win contests in the general community have generally shown associations between contestants’ regard of contest components and smoking abstinence. Most commonly, evaluations of community-based Quit and Wins conclude that a support buddy is related to greater odds of both short and long-term maintenance of smoking abstinence (Ashbury et al., 2006;
Gomez-Zamudio et al., 2004; Rayens et al., 2008; van Osch et al., 2009). It may be that young adults are not accessing their buddies the same way older adult contestants do. Perhaps, because of their greater experience with smoking cessation, adult contestants in Quit and Win contests solicit their buddies’ support more often, and in more purposeful ways that lead to helpful discussions about quitting. Along the same lines, it may be that older, more mature individuals acting as buddies for contestants take the role more seriously, leading to more proactive support being offered to the contestants. In the current study, the lack of an association between perceived value of a buddy and abstinence may reflect young adult smokers’ inability or unwillingness to solicit buddy support at all or in a way that provided the social support necessary for increasing the odds of achieving abstinence.

The finding that contestants’ ratings of the prize incentive was not related to abstinence is not completely surprising as it mirrors results reported by Ashbury et al. (2006)—the only study to investigate the relationship between the prize incentive and contest outcomes. It is likely that contestants’ high ratings of the prize incentive would be more strongly related to their decision to enter the contest than their ability to abstain from smoking. The prize incentive would represent a strong external motivator that pushes young adult smokers to sign up for the contest and make a quit attempt. Sustaining that quit attempt to the point of long term abstinence from smoking would probably depend on internal motivation (as well as behavioural actions). In their study of cash incentives (i.e., extrinsic motivation) for quitting and staying smoke-free, Lynagh, Sanson-Fisher & Bonevski (2013) concluded that this type of extrinsic motivator is not necessarily sufficient for sustaining abstinence. Other research of incentives for health
behavior change similarly suggests that extrinsic motivators such as financial incentives may be effective in stimulating short-term behaviour change, but this behavior change may not be sustained once the incentive is withdrawn (Cahill & Perera, 2009). Instead, some researchers argue that behaviour change stemming from intrinsic motivation is preferable because it increases self-efficacy and the quality of the behaviour change, which may result in longer term change (Ryan & Deci, 2000). Although the relationship between Quit and Win contests and intrinsic motivation is not known, research from other fields suggests that large financial incentives may actually have a negative impact on intrinsic motivation if that external incentive suppresses internal motivation for change (Deci, Koestner & Ryan, 1999). Overall, the impact of financial incentives such as prizes in Quit and Win contests on internal motivation and long term health behaviour change is unclear and warrants further investigation. In the meantime, the form of motivation (intrinsic vs. extrinsic) for immediate behaviour change, such as registering for a contest, may be inconsequential if that motivation will lead to better health (smoking cessation). Thus, despite the lack of relationship between the incentive and quitting in the current study, it seems that prize incentives remain an important component of Quit and Win contests because they likely push smokers to enroll in a cessation intervention and make a quit attempt.

5.2 Implications

5.2.1 Implications for practice. Evidence from the current study and others like it (Rooney et al., 2005; Thomas et al., 2010) suggests that campus-based Quit and Win contests have potential for excellent population impact among young adult post-secondary students. Reach, as evidenced by the registration rate for this campus Quit and
Win contest, compared very favourably to community-based Quit and Win contests. The number of students who quit and sustained their abstinence was substantial, and possibly higher than numbers observed in the general population. Furthermore, positive outcomes such as reductions in tobacco consumption were also observed among the majority of smokers who did not achieve total abstinence from smoking. Overall, these results have profound implications for health professionals and administrators of post-secondary institutions. First, and most obviously, they point to the tremendous potential of contests to reduce the prevalence and frequency of smoking on campus. This would not only improve the health of the students who quit smoking, it would also enhance the health of the entire campus community by reducing campus citizens’ exposure to second-hand smoke. Second, Quit and Win contests meet young adult smokers’ preferences for easy-to-access, free, self-directed interventions, while placing relatively minimal financial, human resource and time demands on the institution. Accordingly, for a relatively modest investment, campus health professionals and administrators could implement this type of health behaviour intervention with the expectation of a strong positive response from students.

Of all the components offered in the contest studied here, support emails were the least valued, and there was no evidence that receiving automated support emails enhanced contestants’ odds of achieving smoking abstinence. These are important findings for practitioners and administrators considering that support emails are likely the most time-consuming, administratively-demanding and costly component of the contest to deliver. It may be that emails that are personalized to each individual would hold more appeal and have a more positive influence on cessation than automated messages, however more research is needed to establish this, and even then, the potential benefits of
providing tailored, personalized emails must be weighed against the feasibility of doing so in a large-scale, population-level intervention like a Quit and Win contest. At present, the weight of the current results and related literature suggests that post-secondary institutions that are not equipped to write and distribute regular support emails as part of a Quit and Win contest may still achieve good success without this component.

By their very nature, Quit and Win contests are built around the chance to win a prize, and the prize is typically seen as an integral part of the contest, with virtually all contests providing an incentive for abstinence (Cahill & Perera, 2009). In the contest studied here, the cash prize incentive was not related to greater odds of successful abstinence, but was very highly valued by contestants, suggesting that a grand prize is likely a vital component of Quit and Win contests for this age group. To minimize the time and effort directed into securing a large cash prize for a campus-based contest, contest organizers could consider offering in-kind prizes such as tuition vouchers, campus bookstore gift cards, parking passes or other student-friendly incentives under direct control of the institution. With so little research available to direct the choice of incentives, campus administrators’ own judgements seem to be the best guide for prize selection.

5.2.2 Implications for research. Some components of a campus-based Quit and Win contest such as automated support emails can be resource-intensive to develop and implement. Other components, like support from self-selected buddies of contestants, are far less so. This study showed that contestants’ perceptions of the value of contest emails, social support, and prizes were unrelated to their success at achieving abstinence. This does not necessarily imply that these components can be eliminated from the Quit and Win contest structure. Instead, these results point to the need for more research into
whether and how these components influence the overall population impact of campus-based contests. For example, although the degree to which contestants valued the prize was unrelated to cessation success in this study, the prize itself was highly valued by the smokers who signed up for the contest. Perhaps then, the prize contributes to the reach of the contest and thus enhances the population impact.

A better understanding of how particular components of contests are related to the success of contests may be achieved using randomized control trials that systematically vary features and delivery of specific contest components (e.g., type and dollar-value of prize incentive; frequency, source, and personalization of support emails and buddy support; etc.). Outcomes of interest would include both reach and cessation/abstinence. Thus, for example, to determine if contest components are valuable to Quit and Win interventions in terms of enhancing recruitment, researchers would not only assess the degree to which components influenced contestants’ quitting behaviours, but also whether and how these components influenced their decision to join the contest. Insight into how components are related to the recruitment rates achieved by Quit and Win contests would contribute to the evidence base that informs contest design and assist campus administrators and health professionals to determine which contest components should be included in order to achieve the highest possible population impact with available resources. Until more research is conducted, a prudent course of action would be to retain components shown in related literature to enhance the appeal and effectiveness of smoking cessation interventions for young adults, such as social support.

Another priority for research is the long-term efficacy of Quit and Win contests for young adult students. Longer term (6- to 12-month) follow-up of contestants would provide estimates of long-term efficacy to the extent that recall bias could be controlled.
Unfortunately, use of biochemical validation of self-reported abstinence would be highly impractical for a population-level intervention such as a contest (Gorber, 2009) and may be especially so with the highly-transient college and university student population. A more plausible way to increase the reliability and validity of longer term recall would be through the use of retrospective interview procedures (Ericson & Simon, 1993; Cote, Ericsson & Law, 2005). In this interview method, participants are asked detailed questions about their specific experiences associated with a past event. In reference to contest outcomes, participants would be asked to think and talk about their specific experiences with quitting (e.g., when they quit, what aides they used, when they experienced set-backs). This retrospective interview procedure would be expected to generate more accurate and reliable answers than a single general question about their smoke-free status, and ultimately lead to a more valid estimate of long-term efficacy of Quit and Win contests.

5.3 Strengths and Limitations

5.3.1 Limitations. Because the majority of studies of Quit and Win contests rely exclusively on self-report data, social desirability and recall bias are pervasive threats to the validity of the results throughout the literature (Ashbury et al., 2006; Bains et al., 2000; Gomez-Zaumudio et al., 2006; Korhonen et al., 1997; Schulze et al., 2005; Tillgren et al., 2006). These potential threats existed in the current study. For example, because the desired outcomes of the intervention were transparent to participants, a social desirability response bias may have occurred with participants over-reporting the level of abstinence (or smoking reductions) they achieved.
Using biochemical validation of smoking status could possibly minimize threats related to self-report. On the other hand, biochemical verification procedures diminish the reach of population-based interventions, lead to poorer recruitment and response rates, and therefore reduce the generalizability of the study results. In reports addressing these drawbacks, Gorber et al. (2009) concluded that biochemical validation is neither desirable nor required in population-based studies with limited face-to-face contact. Instead, optimal data collection methods are mail, telephone, or internet. Furthermore, it is usual practice in self-report surveys to consider participants’ recollection of their smoking and quitting experiences as accurate, even in the long-term [e.g., up to a year following the Quit and Win contest (Ashbury et al., 2006)]. Thus, while there was potential for self-report bias in the current study, it was no greater than in other similar studies in this area of inquiry.

In addition to self-report bias, the potential for volunteer bias existed in the current study. When asked to participate in this study, 48% of eligible contest registrants agreed to do so. It may be that the individuals who were willing to participate felt more confident about their ability to quit, while the less confident individuals declined participation because they wanted to avoid the obligation to share their possible “failure” with the researchers. While acknowledging that this bias may have occurred, it should be noted that the volunteers for the study were similar to the non-volunteers in terms of

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4 There is evidence that biochemical and self-report measures of cessation are moderately-highly correlated in studies of Quit and Win contests. For example, Thomas et al. (2009) collected urine samples from 29 contestants who self-reported abstinence at the end of a college-based Quit and Win contest. Of the 29, 24 (82%) had biochemical test results that confirmed their self-reported abstinence.
demographic characteristics and baseline smoking behaviours, and that the final sample was generally similar to other samples of young adults drawn for national surveys (e.g., Adlaf et al. (2003) [Campus Health Survey]; Health Canada, 2010 [Canadian Tobacco Use Monitoring Survey]). Therefore, it seems unlikely that volunteer bias had a profound impact on the results obtained here.

A limitation of the current study is the unknown construct validity of the researcher-designed measure of participants’ perceptions of contest components. Although the questions were designed to measure the degree to which contestants regarded the contest components as “valuable” to their efforts to quit smoking, there was no consensus in the literature to guide the operationalization of this construct. Accordingly, the questions used here were based on similar questions from the literature which have been used to evaluate the perceived usefulness (Hahn et al., 2004), practicability, pleasantness (van Osch et al., 2009), and importance (Ashbury et al., 2006) of contest components. They closely mirror the terminology of van Osch et al. who, in one of the most recent and most comprehensive evaluations of Quit and Win contests, used the term “value” when asking participants to rate each contest component overall. Ultimately, the question of whether “value” is the best choice for a one-item measure of the perceived utility and helpfulness of contest components may be a less important issue than the question of whether a particular component is instrumental in enhancing recruitment versus supporting cessation. This differentiation seems to require further exploration.

An additional limitation of the current study is the one group study design. Without a control group, it is not possible to assess cause-effect relationships that might
exist between the intervention and the abstinence outcomes. Several threats to internal validity are possible with this study design, and each offers alternative plausible explanations for the abstinence rates observed among contest participants. For instance, given the January start date of the contest, it is possible that New Year’s resolutions, or the heavy advertising of quit aids typically observed in January acted like interventions, causing contestants to quit. Similarly, the possibility exists that participants would have quit smoking even if they did not enter the contest, due to typical changes in personal growth and life events that tend to occur among students as they move into second semester and/or approach graduation.

Finally, because many interviewers were involved in follow-up data collection, there was potential for loss of fidelity and response bias in data collection procedures. Interviewers may have strayed from the study protocol thus reducing the reliability and fidelity of the measures. They may have adapted an empathetic tone in their dialogue that inadvertently influenced respondents to systematically offer more favourable answers. To guard against these possibilities, quality control measures were included in the procedures for data collection. Specifically, all research assistants conducting interviews were thoroughly trained by the researcher, interviews were conducted using a highly structured script with virtually no prospect of unrelated dialogue, and all telephone interviews were conducted with the researcher or senior research assistant nearby to ensure any concerns were dealt with immediately, and to minimize any actions that could lead to biases. In addition, interview (data collection) forms were reviewed by the researcher after interviews were conducted to monitor whether interviewer was recording answers that looked significantly different from any others.
5.3.2 Strengths. Despite its possible limitations, this study had a number of strengths. The sample generated for this study included students from 52 separate post-secondary campuses, including both small and large, commuter and residential institutions from rural and urban areas across Ontario. Based on the number and diversity of institutions included in the study, it seems likely that the campuses in the study are representative of Ontario post-secondary institutions. Such a broad selection of schools may have a greater potential to yield a provincially representative sample of post-secondary students than would a restricted sample of schools from one area. Therefore, the diversity in the institutions included in the current study would optimize the representativeness of the sample and enhance the generalizability of the results. Given that previous evaluations of Quit and Win contests for the post-secondary population have been based on samples drawn from only a handful of American post-secondary campuses, the current study strengthens the field of research by replicating previous results with a larger and presumably more diverse sample. It is possible however that although the campuses are diverse, the same type of student at each school may have chosen to register (or not register) for the Quit and Win contest. For example, because of cultural or language barriers, international students at all campuses may have been less likely to register. Therefore, results may not be generalizable to international students at all campuses, or at campuses with a large proportion of international students. More information about the characteristics of the study sample relative to the characteristics of the post-secondary population in Ontario is needed to assess the representativeness of the sample, and should be considered in future studies.
The use of phone interviews, as opposed to paper and pencil or online surveys, can be seen as a strength of this study for a few of reasons. First, participants may be more likely to provide complete and truthful answers to an interviewer who can offer prompts and take steps to minimize self-report bias. Second, ensuring that all interviewers were thoroughly trained, that all interviews were conducted using a structured script, and that any methodological questions or concerns arising during an interview were dealt with immediately by the researcher, guarded against recall and social desirability biases. Finally, compared to self-administered questionnaires, telephone interviews generally produce higher response rates, further enhancing the validity of the findings. In the current study, for example, 69.8% of the participants who joined the study were reached by the follow-up phone survey. Other similar studies of the young adult population report average response rates around 40% (An et al., 2008; Berg et al., 2011; Lenz, 2004; Ridner, 2005; Rooney et al., 2005; Staten et al., 2007) with very few reporting response rates as high as the current study (Kenford et al., 2005; Thomas et al., 2010). The high response rate achieved by the current study reduced the likelihood of attrition bias and thus increased the generalizability of the results.

5.4 Conclusions

Considering the substantial health, economic, societal, and personal costs of tobacco use, there is a tremendous demand for population-level interventions that can reach a significant proportion of the young adult population and effectively convert smokers to non-smokers. The Quit and Win contest for Ontario post-secondary students studied here was found to be an appealing and effective intervention for stimulating smoking cessation and abstinence among young adult smokers. Almost every contestant
made an attempt to quit during the 6-week contest, and 27.8% of contestants achieved at least short-term (i.e., 6-week) abstinence from smoking. By the most conservative calculation, 19.8% of the participants in this investigation sustained smoking abstinence for a full three months after entering the contest. Among those who did not quit smoking, a majority (86%) reduced their tobacco use, with average decreases of 30 cigarettes smoked per week. It was not evident whether and which specific component of the contest had potential to increase participants’ likelihood of becoming or staying smoke-free; however, it was clear that prizes and social support (from a buddy and a community of peers who are also quitting smoking) were important to the young adults smokers on some level.

Equally as important as the apparent effectiveness of the contest was reach of the contest. The population impact of a smoking cessation intervention is a function of both the number of smokers engaged in the intervention and its effectiveness at helping them to quit. As evidenced here, a campus-based Quit and Win contest may achieve high levels of participation—likely due to its consistency with young adults’ preferences for self-directed quit methods that involve social support and incentives.

Overall, this study makes a valuable and novel contribution to the scientific literature addressing smoking cessation among young adults. It is the first study to evaluate a Quit and Win contest explicitly tailored and delivered to a Canadian population of post-secondary students. Given the high prevalence of tobacco use in this population and the general lack of appealing, effective, age-tailored interventions for young adults, this study is an important step in determining whether and how Quit and
Win contests can best be used to meet young adults’ cessation preferences and reduce the prevalence of smoking in this population.
References


Appendix A: Ethics Clearance Form

Certificate of Ethics Clearance for Human Participant Research

DATE: 12/1/2019

PRINCIPAL INVESTIGATOR: LAWANCE, Kell-an - Community of Health Sciences

FILE: 10-109 - LAWANCE

TYPE: Masters Thesis Project

STUDENT: Lindsay Taylor

SUPERVISOR: Kell-an Lawance

TITLE: Outcome evaluation of a campus-based smoking cessation contest

ETHICS CLEARANCE GRANTED

Type of Clearance: NEW

Expiry Date: 12/1/2011

The Brock University Research Ethics Board has reviewed the above named research proposal and considers the procedures, as described by the applicant, to conform to the University's ethical standards and the Tri-Council Policy Statement. Clearance granted from 12/1/2010 to 12/1/2011.

The Tri-Council Policy Statement requires that ongoing research be monitored by, at a minimum, an annual report. Should your project extend beyond the expiry date, you are required to submit a Renewal Form before 12/1/2011. Continued clearance is contingent on timely submission of reports.

To comply with the Tri-Council Policy Statement, you must also submit a final report upon completion of your project. All report forms can be found on the Research Ethics web page.

In addition, throughout your research, you must report promptly to the REB:

a) Changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
b) All adverse and/or unexpected experiences or events that may have real or potential unforeseeable implications for participants;
c) New information that may adversely affect the safety of the participants or the conduct of the study;
d) Any changes in your source of funding or new funding to a previously unfunded project.

We wish you success with your research.

Approved:

Michelle McEwen, Chair
Research Ethics Board (REB)

Note: Brock University is accountable for the research carried out in its own jurisdiction or under its auspices and may refuse certain research even though the REB has found it ethically acceptable.

If research participants are in the care of a health facility, a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and clearance of those facilities or institutions are obtained and filed with the REB prior to the initiation of research at that site.
Appendix B: Rules & Regulations of Contest

Before the contest, contestants must:

- meet eligibility criteria for the Quit For Good category
- submit a fully complete registration form online or to the LTPB student team

During the contest period contestants must:

- quit smoking, and remain smoke-free during the entire 6 weeks of the contest. This means they can't use any kind of tobacco product from January 24, 2011 to March 7, 2011 (inclusive). Quitting aids such as nicotine replacement therapy (patch, gum) or medications are allowed.
- keep in contact with their buddy so their buddy can support them and know how they are doing.
- respond within 48 hours if they are contacted by Leave The Pack Behind.

Near the end of the contest period, Leave The Pack Behind contacts contestants as potential winners of the Quit For Good prize(s). Contestants who are selected as potential winners must:

- reply to Leave The Pack Behind within 24 hours of being contacted
- go to their campus clinic within 48 hours of being contacted to:
  - show their student identification card
  - provide a urine sample for a cotinine test to see if they are smoke-free
  - sign a declaration form to say they followed the rules and are smoke free
- make sure their buddy submits their declaration form within 48 hours of being contacted. The buddy declaration form will be emailed to buddies of potential winners.

Potential winners who complete all these requirements and test as smoke-free are entered into the final draw!

Prize Draws for Quit For Good Contestants

Potential winners are contacted by email at the address provided at registration.

Possible winners forfeit their eligibility for the final prize draw if they:

- do not meet timelines for replying to LTPB, visiting the campus clinic, completing the cotinine test, and submitting all required forms
- have not followed the contest rules before, during and/or near the end of the contest period
- decline or fail the cotinine test
- Potential winners who complete the requirements of the preliminary prize draw and are found to be smoke-free are entered into the final draw. Final winners are selected at random.
Appendix C: Contest Emails

[Example Email: Contestant]

Subject wouldurather… DAY 1!

Content:

This is day 1 of being smoke-free! Congrats for quitting! Be sure to reward yourself today. During the first few days of your quit attempt, you might want a distraction, so here are some ideas. Don’t forget to ask your buddy join you!

- Update your playlist
- Walk a dog
- Take a nap
- Do a Sudoku puzzle
- Eat a popsicle
- Go to the gym
- Sing (really loud!)
- Start running (visit QUITRUNCHILL.org for an online DIY running program)
- Take pictures & post them on Facebook
- Clean out your closet
- Hug a friend
- Dance like no one is watching
- Play football
- Paint your nails

Remember, if it’s feeling difficult to go without a smoke you can make an appointment at your student health services to discuss ways to take the edge off. Check out our website to find out where your clinic is and what their hours are.

---

LTPB Team
www.LeaveThePackBehind.org
www.QUITRUNCHILL.org
www.facebook.com/LeaveThePackBehind
[Example Email: Buddy]

Subject wouldurather…Helping your friend on DAY 1!

Content:

Thanks for helping your friend quit smoking –Today is day 1 of the contest!

Right now, providing lots of positive encouragement is important, so remember to check in with your friend to see how he/she is doing.

Other things to keep in mind:

- Understand that quitting is hard.
- Stick with the positive. Remind them that they are making a healthy start to 2011!
- Offer to call, text or visit your friend to see how they are doing. Ask how they are feeling and what you can do to help, not whether or not they have been smoke-free.
- Reward them for getting through their first day smoke-free.

Friends who help someone quit – priceless.

--
LTPB Team
www.LeaveThePackBehind.org
www.QUITRUNCHILL.org
www.facebook.com/LeaveThePackBehind
## Appendix D: Participating Campuses

<table>
<thead>
<tr>
<th>Campus</th>
<th>Type of Institution</th>
<th>Size</th>
<th>Location</th>
<th>Language</th>
<th>LTPB Peer Team</th>
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<td>Sault Ste. Marie</td>
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<td>Humber College (North)</td>
<td>Applied Arts and Technology</td>
<td>15,500</td>
<td>Toronto</td>
<td>English</td>
<td>Yes</td>
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<tr>
<td>Humber College (South)</td>
<td>Applied Arts and Technology</td>
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<td>Toronto</td>
<td>English</td>
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<tr>
<td>La Cite Collegiale</td>
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<td>4,200</td>
<td>Ottawa</td>
<td>French</td>
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<td>Applied Arts and Technology</td>
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<td>Sarnia</td>
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<td>Applied Arts and Technology</td>
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<td>Hamilton</td>
<td>English</td>
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<td>Niagara College (Niagara-on-the-lake)</td>
<td>Applied Arts and Technology</td>
<td>3,000</td>
<td>Niagara-on-the-lake</td>
<td>English</td>
<td>Yes</td>
</tr>
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<td>Sheridan College (Brampton)</td>
<td>Applied Arts and Technology</td>
<td>6,600</td>
<td>Brampton</td>
<td>English</td>
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</tr>
<tr>
<td>College Name</td>
<td>Program Name</td>
<td>Enrollment</td>
<td>City</td>
<td>Language</td>
<td>Placement</td>
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<tr>
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<tr>
<td>Sheridan College (Oakville)</td>
<td>Applied Arts and Technology</td>
<td>8,100</td>
<td>Oakville</td>
<td>English</td>
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<td>St. Clair College (Chatham)</td>
<td>Applied Arts and Technology</td>
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<td>Chatham</td>
<td>English</td>
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<tr>
<td>St. Clair College (Windsor)</td>
<td>Applied Arts and Technology</td>
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<td>Windsor</td>
<td>English</td>
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</tr>
<tr>
<td>St. Lawrence College</td>
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<td>Kingston</td>
<td>English</td>
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<tr>
<td>Sault College</td>
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<td>Sault Ste. Marie</td>
<td>English</td>
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<tr>
<td>Seneca College</td>
<td>Applied Arts and Technology</td>
<td>19,200</td>
<td>Toronto</td>
<td>English</td>
<td>No</td>
</tr>
</tbody>
</table>
Appendix E : Baseline Survey

Baseline Questions

1. Contest Category:
   □ Quit 4 Good
   □ Keep The Count
   □ Party Without the Smoke
   □ Don’t Start & Win

2. First name: ________________________________
   Last name: ________________________________

3. Phone (1): ________________________________
   Phone (2): ________________________________
   Email: ________________________________

4. Gender: □ Female □ Male □ Other

5. Age: __________

6. **Think about the past month.** How often did you smoke a cigarette, even a puff?
   □ every day, or almost every day
   □ on some days each week
   □ once or twice all together
   □ I did not smoke at all

7. **Think about the past week.** How many cigarettes did you smoke?
   _____ cigarettes

8. How old were you when you smoked your first whole cigarette?
   _____ years

9. How soon after waking up in the morning do you smoke your first cigarette?
   □ within 5 minutes
   □ within 6-30 minutes
   □ within 31-60 minutes
   □ after more than an hour

10. In the **past year,** did you intentionally try to quit smoking?
    □ yes □ no

11. Where do you live?
    □ with parents/guardians
    □ in residence
    □ off-campus (alone or with others)

12. Do you live with someone who smokes?
    □ yes □ no
13. Do any of your close friends smoke?
   □ yes  □ no

14. Right now, how sure are you that you can resist the temptation to smoke?
   not at all sure  1 - - - 2 - - - 3 - - - 4 - - - 5 very sure

15. Having support from my buddy will help me quit.
   not at all sure  1 - - - 2 - - - 3 - - - 4 - - - 5 very sure

16. Receiving encouraging, informative emails from LTPB during the contest will help me quit.
   not at all sure  1 - - - 2 - - - 3 - - - 4 - - - 5 very sure

17. The chance to win a prize will help me quit.
   not at all sure  1 - - - 2 - - - 3 - - - 4 - - - 5 very sure

18. Knowing there is a community of other students quitting at the same time as me will help me quit.
   not at all sure  1 - - - 2 - - - 3 - - - 4 - - - 5 very sure

19. Check all the ways you learned about this year’s wouldrather… contest.
   □ I saw posters, brochures, newspaper ads, dayplanner ads, etc. (i.e., print info)
   □ I saw info on my campus electronic bulletin board, the LTPB website, closed circuit TV, etc. (i.e., electronic info)
   □ I received an email announcement sent directly to me
   □ I heard about it from a friend, someone from LTPB, or my campus clinic (i.e., word of mouth)
   □ I learned about it on facebook, twitter, YouTube, Read-It, etc. (i.e., social media)

20. Check the ONE thing that triggered you to register for this year’s wouldrather… contest.
   □ the poster, brochure, newspaper ad, dayplanner ad, etc. (i.e., the print info)
   □ the info on your campus electronic bulletin board, the LTPB website, closed circuit TV, etc. (i.e., the electronic info)
   □ getting an email announcement sent directly to you
   □ hearing about it from a friend, someone from LTPB, or my campus clinic (i.e., word of mouth)
   □ the message on facebook, twitter, YouTube, Read-It, etc. (i.e., social media)
Appendix F: Intervention Check 1-month Interview

TELEPHONE SCRIPT FOR INTERVIEW

Hi______________, this is ____________. About a month ago, you joined a study about the wouldrather… contest. If it’s okay with you, I’d like to take 5 minutes to ask you a few questions for the study, and remind you that you are still eligible for both the contest and the study prizes.

So, is it okay if I ask you a few questions and record your answers for the study?

No ➔ That’s okay. You are still eligible for the prize draw for a $100 gift card. If you’re the winner, I’ll be calling you to let you know and make arrangements for getting the gift card.

Can I call you for the 3-month follow-up? [record decision; end call]
- YES
- NO

Yes ➔ Great, thank you. Do you have any questions before we get started?

Yes ➔ answer questions, then proceed with interview

No ➔ proceed with interview

Ok, just so you know, because this is a study, I have to ask you certain questions in a particular order, so bear with me if I sound repetitive at any point.

[proceed to interview questions]

1. Since day 1 of the contest (January 24th), have you been completely smoke-free, without even a single puff from a cigarette?

☐ Yes I have [proceed to #3 QUIT]
☐ No, I haven’t [proceed to #2]

2. In the past 7 days, have you been completely smoke-free, without even a single puff?

☐ Yes I have

So how many days have you been smoke-free? _____ days [proceed to #3 QUIT]

☐ No, I haven’t

In the past month, did you try to quit smoking? ☐ Yes [proceed to #7 SMOKING ]
☐ No [proceed to #7 SMOKING ]
1. Now I’m going to read a statement, and ask you to tell me how much you agree with it on a scale from 1-5 with 1 being you strongly disagree, and 5 being you strongly agree. Ok? Here’s the statement:

Right now, I am sure are that I can resist the temptation to smoke.  

<table>
<thead>
<tr>
<th>Prompt:</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

2. Now, I’d like to find out how valuable certain elements of the contest have been to you as you try to stay quit. Again, I will read out a statement, and you can tell me how much you agree with it on a scale of 1-5.

The first statement is: I value having a buddy

The next statement is: I value receiving the emails

The third: I value the chance to win a prize

And the last statement: I value knowing that there is a community of other students quitting at the same time as me

3. In the past month have you used:

- Hookah? Y/N
- Electronic Cigarettes? Y/N
- Other (eg. Cigar, cigarillo, smokeless tobacco?) Y/N

4. And, finally, I’m going to read out a list of ways people quit smoking. I’ll read each one, and you tell me if you used the aid or not since the contest started.

<table>
<thead>
<tr>
<th>Did you...</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>try nicotine replacement gum?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>try nicotine replacement patch?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>try other nicotine replacement product? (inhaler, lozenge, nasal spray, tablet)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>try a prescription pill (Zyban or Champix)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>use a telephone quitline?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>go to a stop-smoking class, clinic, or support group?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>talk to a health professional? (doctor, nurse, pharmacist, counselor, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>get help or support from friends or family?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>use the internet, books, pamphlets, or videos?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>use acupuncture or hypnosis?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pick up the contest quit kit from your campus clinic or LTPB peer-team?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[proceed to interview closure script]
STUDENT IS SMOKING: Complete this page only and proceed to interview closure script.

7. How many cigarettes did you smoke in the last week?  
   _____ cigs

8. Now, I’d like to find out how valuable certain elements of the contest have been to you in the past month.  
   I’m going to read out a few statements, and you can tell me how much you agree with it on a scale from 1 - 5, with 1 being you strongly disagree, and 5 being you strongly agree.

   The first statement is: I have valued having a buddy  
   Prompt: Strongly Disagree     Disagree     Neither     Agree     Strongly Agree

   The next statement is: I have valued receiving the emails  
   Prompt: Strongly Disagree     Disagree     Neither     Agree     Strongly Agree

   The third: I have valued the chance to win a prize  
   Prompt: Strongly Disagree     Disagree     Neither     Agree     Strongly Agree

   And the last statement: I have valued knowing that there’s a community of other students quitting at the same time as me  
   Prompt: Strongly Disagree     Disagree     Neither     Agree     Strongly Agree

9. And, finally, I’m going to read out a list of ways people quit smoking. I’ll read each one, and you tell me if you used the aid or not since the contest started.

   Did you… 
   No  Yes
   …try nicotine replacement gum? 
   …try nicotine replacement patch? 
   …try other nicotine replacement product? (inhaled, lozenge, nasal spray, tablet) 
   …try a prescription pill (Zyban or Champix)? 
   …use a telephone quitline? 
   …go to a stop-smoking class, clinic, or support group? 
   …talk to a health professional? (doctor, nurse, pharmacist, counselor, etc.) 
   …get help or support from friends or family? 
   …use the internet, books, pamphlets, or videos? 
   …use acupuncture or hypnosis? 
   …pick up the contest quit kit from your campus clinic or LTPB peer-team?

[proceed to interview closure script]
**Interview closure script**

Well, that’s it. To thank you for taking the time to speak with me today, I’d like to enter your name in a draw for a $100 gift card to the retailer of your choice. If you’re the winner, I’ll give you a call in the next two weeks to let you know. And if not, I’ll be calling you for the final interview in 2 months… that’s in April. Can I call you at this phone number for the final interview, or is there a better number for me to reach you?

[record phone number]

Do you have any questions about the study?

[answer questions]

Please keep in mind that you can visit the wouldurather… website, for lots of info about smoking and quitting. And don’t forget that a summary of the results of the study will be posted there later in the summer.

Thanks!
Appendix G: 3-month Follow-up Interview

TELEPHONE SCRIPT FOR INTERVIEW

Hi______________, this is ____________. I’m calling about the study you joined about the wouldurather... contest. If it’s okay with you, I’d like to take 5 minutes to ask you a few questions for the study, and remind you that you are still eligible for the study prize of a $150 gift card.

So, is it okay if I ask you a few questions and record your answers for the study?

No ➔ That’s okay. You are still eligible for the prize draw for a $150 gift card. If you’re the winner, I’ll be calling you to let you know and make arrangements for getting the gift card. [end call]

Yes ➔ Great, thank you. Do you have any questions before we get started?

Yes ➔ answer questions, then proceed with interview

No ➔ proceed with interview

Ok, just so you know, because this is a study, I have to ask you certain questions in a particular order, so bear with me if I sound repetitive at any point.

[proceed to interview questions]

1. Since day 1 of the contest (January 24th), have you been completely smoke-free, without even a single puff from a cigarette?

☐ Yes I have [proceed to #4 QUIT]

☐ No, I haven’t [proceed to #2]

2. Were you smoke-free for the full 6-week duration of the contest, without even a single puff from a cigarette? (January 24th – March 7, 2011)

☐ Yes I was [proceed to #3]

☐ No, I wasn’t [proceed to #3]

3. In the past 7 days, have you been completely smoke-free, without even a single puff?

☐ Yes I have ___

So how many days have you been smoke-free? _____ days [proceed to #4 QUIT]

☐ No, I haven’t ___

In the past month, did you try to quit smoking?

☐ Yes [proceed to #6 SMOKING ]

☐ No [proceed to #6 SMOKING ]
STUDENT HAS QUIT Complete this page only and proceed to interview closure script

1. Now I’m going to read you a series of 4 statements that have to do with how much you valued certain elements of the contest Think back to the contest period: I’ll read each statement and you can tell me how much you agree with each on a scale from 1-5, with 1 being you strongly disagree, and 5 being you strongly agree. Ok? The First statement is:

As a contestant, I valued having a buddy

Promt: 1 2 3 4 5

As a contestant, I valued receiving the emails

As a contestant, I valued the chance to win a prize

As a contestant, I valued knowing that there is a community of other students quitting at the same time as me

Right now, I am sure are that I can resist the temptation to smoke.

5. And, finally, I’m going to ask you a series of Yes / No questions about things you did during the contest period (January 24-March 7).

<table>
<thead>
<tr>
<th>During the Contest, Did you…</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>…use hookah?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…use electronic cigarettes?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…use other tobacco products? (eg., cigars, cigarellos, smokeless tobacco)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…try nicotine replacement gum?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>… try nicotine replacement patch?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…try other nicotine replacement product? (inhaler, lozenge, nasal spray, tablet)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…try a prescription pill (Zyban or Champix)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…use a telephone quitline?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…go to a stop-smoking class or support group?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…talk to a health professional? (doctor, nurse, pharmacist, counselor, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…get help or support from friends or family?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…use the internet, books, pamphlets, or videos?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…use acupuncture or hypnosis?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…pick up the contest quit kit from your campus clinic or LTPB peer-team?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[proceed to interview closure script]
6. How many cigarettes did you smoke in the last week?  
_____ cigs

7. Now I’m going to read you a series of 4 statements that have to do with how much you valued certain elements of the contest. Think back to the contest period: I’ll read each statement and you can tell me how much you agree with each it on a scale from 1-5, with 1 being you strongly disagree, and 5 being you strongly agree. Ok? The First statement is:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Prompt:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>As a contestant, I valued having a buddy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>As a contestant, I valued receiving the emails</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>As a contestant, I valued the chance to win a prize</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>As a contestant, I valued knowing that there is a community of other students quitting at the same time as me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. And, finally, I’m going to ask you a series of Yes / No questions about things you did during the contest period (January 24-March 7).

<table>
<thead>
<tr>
<th>During the Contest, Did you…</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>…use hookah?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…use electronic cigarettes?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…use other tobacco products? (eg., cigars, cigarellos, smokeless tobacco)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…try nicotine replacement gum?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>… try nicotine replacement patch?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…try other nicotine replacement product? (inhaler, lozenge, nasal spray, tablet)</td>
<td></td>
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<tr>
<td>…try a prescription pill (Zyban or Champix)?</td>
<td></td>
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<tr>
<td>…use a telephone quitline?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…go to a stop-smoking class or support group?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…talk to a health professional? (doctor, nurse, pharmacist, counselor, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…get help or support from friends or family?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…use the internet, books, pamphlets, or videos?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…use acupuncture or hypnosis?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>…pick up the contest quit kit from your campus clinic or LTPB peer-team?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Interview closure script

Well, that’s it, there are no more calls for the study. To thank you for taking the time to speak with me today, I’d like to enter your name in a draw for a $150 gift card to the retailer of your choice. If you’re the winner, I’ll give you a call in the next two weeks to let you know.

Do you have any questions about the study?
[answer questions]

Please keep in mind that you can visit the wouldrather… website, for lots of info about smoking and quitting. And don’t forget that a summary of the results of the study will be posted there later in the summer.

Thanks!
Appendix H: Study Invitation

Registration

You’re about to register for the wouldnurather... contest. Congrats!

A grad student from Brock University is studying the contest. You can help improve the contest by joining her research study.

If you join the study, your registration info will be included in an anonymous database for the study. You may also receive two very quick phone calls (in February and April) to find out your opinions and experiences with the contest.

If you participate in the study, you’ll be entered into two separate draws to win a:

- $100-value prize
- $150-value prize

If you’re interested in joining the study, click here.

Or, click here to enrol in the contest but not the study.
Appendix I: Comparison of early and late contest registrants

Contest registration (hence study recruitment) occurred over an 8-week period. Analyses were conducted to compare demographic characteristics and baseline smoking behaviours of early (December) registrants and late (January) registrants. As shown in Table I, participants were largely similar with the exception that individuals registering in January smoked more frequently than those registering in December. It may be that heavier smokers were not as confident in their ability to make a quit attempt, and thus they held off on registering for the contest until the end of the registration period as they required more time to contemplate their decision to quit. Results indicated that there was no relationship between frequency of smoking and abstinence outcomes, so it is unlikely that time of registration impacted abstinence outcomes. As it is standard methodology for contests to offer registration periods that span eight weeks, and each contestant is bound by the same quit date and contest duration, the implications of this difference are unclear.
Table I

Demographic Characteristics and Baseline Smoking Behaviours of Participants
Registering in December and Those Registering in January

<table>
<thead>
<tr>
<th>Demographics and Baseline Smoking Behaviours</th>
<th>Participants Registered in December ($N = 44$)</th>
<th>Participants Registered in January ($N = 157$)</th>
<th>$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>$n$</td>
<td>%</td>
<td>$n$</td>
</tr>
<tr>
<td>Male</td>
<td>15</td>
<td>34.1</td>
<td>77</td>
</tr>
<tr>
<td>Female</td>
<td>29</td>
<td>65.9</td>
<td>80</td>
</tr>
<tr>
<td>Place of residence</td>
<td>$n$</td>
<td>%</td>
<td>$n$</td>
</tr>
<tr>
<td>With parents</td>
<td>18</td>
<td>40.9</td>
<td>53</td>
</tr>
<tr>
<td>Not with parents</td>
<td>26</td>
<td>59.1</td>
<td>104</td>
</tr>
<tr>
<td>Attempted to quit in past year</td>
<td>33</td>
<td>75.0</td>
<td>126$^a$</td>
</tr>
<tr>
<td>Time to first cigarette after waking</td>
<td>$M$</td>
<td>$sd$</td>
<td>$M$</td>
</tr>
<tr>
<td>Within 5 minutes</td>
<td>13</td>
<td>29.5</td>
<td>33</td>
</tr>
<tr>
<td>6-30 minutes</td>
<td>11</td>
<td>25.0</td>
<td>39</td>
</tr>
<tr>
<td>31-60 minutes</td>
<td>16</td>
<td>36.4</td>
<td>66</td>
</tr>
<tr>
<td>More than 1 hour</td>
<td>4</td>
<td>9.1</td>
<td>19</td>
</tr>
<tr>
<td>Age</td>
<td>24.05</td>
<td>6.60</td>
<td>23.15</td>
</tr>
<tr>
<td>Age of initiation of smoking</td>
<td>14.75</td>
<td>3.07</td>
<td>15.29</td>
</tr>
<tr>
<td>Number of cigarettes in the past week</td>
<td>32.57</td>
<td>29.92</td>
<td>58.04</td>
</tr>
</tbody>
</table>

* $p < .05$

$^a$Data were missing for one participant. $^b df = 199$. $^c df = 199$. $^d$To account for skewness in the data, a Mann-Whitney $U$-test was conducted; $z$ is reported.