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2013

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A Team-Based Behavioral Economics Experiment on
Smoking Cessation

By
Justin S. White

A dissertation submitted in partial satisfaction of the
requirements for the degree of
Doctor of Philosophy
in
Health Services and Policy Analysis
in the
Graduate Division
of the
University of California, Berkeley

Committee in charge:

Professor William H. Dow, Chair
Professor Stefano DellaVigna
Professor David I. Levine

Spring 2013

Abstract

A Team-Based Behavioral Economics Experiment
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Professor William H. Dow, Chair

Tobacco use is a leading cause of death worldwide, yet smoking cessation services are not widely available in many low-resource settings. Popular approaches also fail to help smokers to maintain self-control and motivation. The degree to which peer pressure promotes self-control in team-based health interventions remains largely untested. Moreover, peer pressure and cash incentives have rarely been mobilized in tandem. To this end, we conducted a randomized controlled trial in 42 villages in Thailand to test a novel intervention that combines commitment contracts for smoking cessation with team incentives that activate peer pressure. We randomly assigned 201 participants, 11% of all smokers in the study area, to a control group that received smoking cessation counseling or a treatment group that received counseling plus a commitment contract, team incentives, and text message reminders for smoking cessation. We find that, relative to the control group, the intervention increased biochemically verified smoking abstinence by 25% points at six months (three months post-intervention). Moreover, the intervention cost about \$300 per marginal quitter, less than half that of common smoking cessation aids in Thailand. We find evidence that exogenously selected teammates had a large causal effect on each other's outcomes. The team effects are heterogeneous with respect to participants' *ex ante* quit predictions: the success of less confident smokers increases with a teammate's degree of self-confidence whereas the success of more confident smokers does not change. Further analyses indicate that heterogeneous teams result in higher aggregate quitting than do homogeneous teams. Our team commitment intervention may offer a viable cost-effective alternative to smoking cessation approaches in low-resource settings.

To my mother, my inspiration

Acknowledgements

UC Berkeley has changed me, for the better. Will Dow owes a great deal of credit for my personal and professional growth. His unflinching mentorship and critical eye have made my work more rigorous and more relevant. His encouragement of my journey to Thailand on a path less traveled was instrumental in bringing my brainchild to life. I am also indebted to Stefano DellaVigna and David Levine for the time, guidance, and wisdom they have shared over the past few years.

Parichart Sukanthamala proved to be the saving grace for this study during its implementation, providing timely research assistance, a deft touch in managing the field staff, much needed cultural translation, and a sense of humor. Suthat Rungruanghiranya, Tawima Sirirassamee, and Chaturon Tangsangworntamma showed admirable open-mindedness in allowing a foreigner to test a new and strange intervention in their backyard.

I received helpful comments on my dissertation research from seminar and conference audiences at the Pacific Conference for Development Economists (2013), Annual Health Economics Conference (2012), ASHEcon biennial meeting (2012), PAA annual meeting (2012), APHA annual meeting (2012), Behavior Change Research Network Conference (2012), UC Berkeley Demography Brown Bag (2012), UC Berkeley Health Economics Journal Club (2012), Mahidol University Institute for Population and Social Research (2011), Chulalongkorn University College of Public Health Sciences (2011), and UC Berkeley Development Lunch (2010). All errors are my own.

I am thankful for the generous financial support of my funders. The U.S. National Institutes of Health supported the study with three grants, including two pilot grants, one awarded by the Center on the Economics and Demography of Aging at UC Berkeley (NIA P30-AG012839) and the other awarded by the Berkeley Population Center (NICHD R21-HD056581). I also received a predoctoral training fellowship from the UC Berkeley Demography Department (NIA T32-AG000246), which funded me during my year-long excursion to Thailand. The IRB at Srinakharinwirot University and UC Berkeley approved the study. The trial is registered at [ClinicalTrials.gov](https://clinicaltrials.gov), number NCT01311115.

Most importantly, I want to acknowledge the support of my partner Rita Hamad, who accompanied me each step of the dissertation phase of my life. Always ready to edit yet another draft, eager to share a slice of her brilliance, and sensitive to the emotional and practical challenges of dissertating, she has shown the patience and love of a saint.

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Chapter 1

Overview and Background

This chapter provides a brief overview of the motivation for and contributions of this dissertation. It then discusses tobacco use worldwide, evidence for common approaches to smoking cessation, and tobacco use in Thailand, where our behavioral intervention takes place.

1.1 Overview

Tobacco-attributable mortality is projected to reach 8.3 million people per year within the next two decades, accounting for one in 10 deaths worldwide (Mathers and Loncar, 2006). More than 80% of this mortality is projected to occur in low-income and middle-income countries. Treatment for tobacco dependence is currently not widely available in low-resource settings in the developed and developing world. A principal barrier is the relatively high cost of popular smoking cessation aids. In this study, we apply recent findings from the behavioral economics literature to design a novel intervention that uses social and monetary incentives for delivering smoking cessation assistance to smokers in low-resource communities.¹

The medical and public health communities have leaned heavily on pharmacologic remedies for assisting smokers with quit smoking (Fiore et al., 2009). An important limitation of this approach is that it does not provide tools for smokers who cannot stay motivated to quit or control their impulses to smoke. Smoking, like other addictive goods, leads users to suffer self-control problems, or *present bias* in the lexicon of behavioral economics. Some present-biased individuals are fully aware of (sophisticated about) their self-control problems, some are totally oblivious (naïve) about their inability to follow through on plans, and many individuals are partially naïve about their problems, understanding that they have present bias but remaining overoptimistic about their ability to exert willpower in the future. We design a behavioral intervention that seeks to assist present-biased smokers of all stripes to quit smoking.

The first part of our approach relies on binding monetary precommitments called *commitment contracts* in which an individual bets money that he or she will achieve a

¹ Our focus is on closing the smoking treatment gap in rural areas, but our intervention is flexible enough to be offered in a variety of settings, including in clinics and worksites.

specified goal, in our case smoking abstinence at three months. The money is returned only if the person succeeds. Precommitments, such as commitment contracts, are an established mechanism for motivating sophisticated present-biased individuals to display willpower (Bryan, Karlan and Nelson, 2010). Yet, commitment contracts pose some important problems. First, naïve agents fail to recognize their need for precommitments. Second, partially naïve agents may take up the contracts but then fail to invest enough to motivate themselves. Under-commitment has plagued attempts to implement commitment contracts in field settings and led to high failure rates, e.g., 67% in the best-known implementation of commitment contracts for smoking cessation (Giné, Karlan and Zinman, 2010). These partially naïve agents may end up worse off than if they had not entered into the contract and lost their money.

We propose a novel solution to the under-commitment problem: supplementing basic commitment contracts with team incentives. We place individuals in teams of two and offer team incentives conditioned on the outcomes of both team members in order to induce peer pressure, a strong force for regulating motivation and self-control (Asch, 1951; Cialdini, 2007). We test if peer pressure, long recognized as a contributor to risky health behaviors, can be activated along with financial motivation and social support to foster positive health behavior.² Despite the potency of peer pressure and monetary incentives for influencing health behavior, researchers have rarely mobilized the two forces in tandem. A combination of team incentives and commitment contracts differs from contingent cash payments and basic commitment contracts in three key respects. First, participants must deposit money up front, selecting for motivated individuals who are most likely to benefit from the incentives, potentially improving the incentives' (cost-)effectiveness. Second, theory predicts that basic commitment contracts attract sophisticated agents, whereas the cash from our team incentives may also draw in partially or fully naïve agents.³ Moreover, team incentives may be especially helpful for (partially) naïve agents who are prone to under-commit. Third, team incentives add social incentives to the monetary incentives, the combination of which may help naïve and partially naïve agents to overcome problems of under-commitment.

Peer support groups and other forms of team-based interventions have been a common approach to health behavior change, as witnessed by the popularity of organizations such as Weight Watchers and Alcoholics Anonymous. Advocates of team-based approaches often highlight the ability of teams to provide members with knowledge, motivation, and emotional support.⁴ However, team-based interventions can also be harmful under certain

² Our two-arm feasibility trial was not designed to disentangle all of the causal pathways mobilized by the intervention, although we are planning a larger evaluation to do so.

³ The incentives could also attract time-consistent (“rational”) smokers, although we find that a substantial share of participants hold overoptimistic beliefs about their ability to display self-control. The presence of the cash bonus means that the intervention is not a pure commitment device, which neither a standard economic agent nor a naïve agent would take.

⁴ Some literatures would refer to our team concept as a buddy, partner, or peer group intervention. We believe that “team intervention” best captures the spirit of our trial, and adopt that terminology throughout.

circumstances. In particular, if a person fails to achieve a goal, his or her teammates may become disenchanted, performing worse than if they had acted alone. This discouragement effect could account for the lack of success of team-based social support interventions for smoking cessation (Park, Tudiver and Campbell, 2012). There is a need for rigorous research that documents the effects of health interventions involving small teams. In our study, we exploit random team assignment to credibly identify the team effects. We try to understand the degree to which teams yield positive or negative spillover effects for our study participants. Specifically, we test a theoretical prediction from Battaglini, Bénabou and Tirole (2005) that teams have heterogeneous effects, such that being paired with a person who has a high self-assessed probability of quitting has a positive influence on a teammate's success and being paired with a person who has a low probability has a negative influence on a teammate's success.

We fielded a randomized controlled trial in 42 villages in central Thailand to study the effects on smoking abstinence of combining commitment contracts and team incentives. We recruited 215 smokers and randomly assigned 201 of them in a 1:2 ratio to a control group that received two rounds of smoking cessation counseling or to a treatment group that received the counseling plus a three-part *team commitment contract*: 1) a savings account with a minimum balance of \$1.67, weekly deposit collection of additional voluntary deposits, and a project-matched contribution of \$5-10, all of which were forfeited if the person failed to abstain from smoking, 2) a \$40 cash bonus if the person and an assigned teammate both abstained, and 3) weekly text message reminders for 10 weeks after enrollment. Participants could pre-select a teammate or choose to be randomly assigned a teammate from the same village and gender at enrollment.⁵ The team bonus is equivalent to roughly four days of household income (Thailand National Statistics Office, 2008). All incentives were contingent on seven-day smoking abstinence assessed biochemically at three months. We also biochemically verified smoking abstinence at six months and collected self-reported smoking status at one month and 14 months.⁶

We designed our team commitment intervention with several theoretical constructs in mind. First, as discussed, smokers may suffer from present bias, a systematic over-valuation of the present relative to future time periods. Present bias may lead a smoker to abandon a quit attempt because the craving and withdrawal costs loom large relative to the longer-run health and financial consequences of a failed quit attempt. Second, *peer pressure* can provide a way for individuals to overcome precommitment problems (Babcock and Hartman, 2011), although the pathway has rarely been exploited. We offer team incentives to supplement a monetary precommitment with a social commitment to smoking abstinence. Third, individuals often fail to follow through on their plans because *limited attention* distracts them from the goals they set (Karlan et al., 2012; Cadena and Schoar, 2011; Cadena et al.,

⁵ We adopted this design feature to compare the effects of teams with arbitrarily assigned and naturally occurring social ties. We also believed it would increase study take-up.

⁶ We lost one participant to follow-up at three months and no participants at six months, aside from one death.

2011). We provide participants with weekly text message reminders, which have been shown to assist individuals with limited attention (Karlan et al., 2012), including for promoting smoking cessation (Free et al., 2011; Rodgers et al., 2005). The weekly visits from deposit collectors also serve as a reminder. Finally, though not a primary motivation, our data also allow us to test for the presence of *projection bias*, namely the degree to which smokers fully appreciate the value of being smoke-free. Behavioral economists find that projection-biased individuals under-predict how their preferences will change in the future, leading to an aversion to depart from the status quo (Loewenstein, O’Donoghue and Rabin, 2003).

Our study makes three main contributions, which correspond to our study’s main specific aims. First, we characterize the extent to which smokers succumb to two behavioral biases that can hamper their ability to quit smoking: present bias and projection bias. Evidence on smokers’ behavioral biases is limited, though frequently used to justify policy interventions.⁷ We observe that participants mispredict their future behavior, in accordance with known behavioral biases. Smokers hold overconfident beliefs about their ability to quit smoking, relative to others’ predictions for that index person. Further, many smokers are naïve with respect to their present bias: they display severe overoptimism compared to their later observed behavior and fail to fully revise their beliefs post-intervention when the costs associated with trying to quit smoking are better known. We also test if smokers are *projection-biased*—that is, if smokers under-appreciate how their preferences will change in the future. Using Acland and Levy’s (2012) difference-in-differences test of projection bias, we find evidence consistent with the notion that smokers under-predict how much they will value being smoke-free by 40–50%.

Second, we test a unique variant of a theory-driven intervention designed to overcome these behavioral biases. We test the intervention in a low-resource setting where conventional cessation services are not readily available. We find that the demand for our team commitment intervention is similar to other studies. About 10% of smokers in the study area, and 40% of those who had plans to quit, signed up for the team commitment intervention. The main impact evaluation results indicate that, relative to the control group, the intervention more than tripled the quit rate at the end of the three-month intervention period (average treatment effect [ATE] of 31.7% points). The intervention more than doubled the quit rate three months post-intervention: 46% of the treatment group quit compared to 15% of the control group (ATE of 25.5% points). This effect largely persisted to 12 to 15 months after enrollment (ATE of 17.4% points). Further, we compare the incremental cost-effectiveness of our intervention to two common smoking cessation aids in Thailand, in order to determine the viability of team commitment as an alternative to current approaches.

⁷ Some studies assume the existence of these biases (Gruber and Köszegi, 2001), and others infer their presence based on smokers’ use of precommitments (Wertebroch, 1998; Gruber and Mullainathan, 2005). For an example of these concepts being applied to a recent policy discussion, see a 2010 paper from the U.K.’s Cabinet Office Behavioural Insights Team: <https://www.gov.uk/government/publications/applying-behavioural-insight-to-health-behavioural-insights-team-paper>. Accessed March 12, 2011.

The team commitment intervention dominates popular smoking cessation aids in Thailand on a cost-effectiveness basis. Team commitment had an incremental cost per quitter of \$281 in Thailand, compared to \$1,780 for nicotine gum and \$2,073 for varenicline.

Finally, we examine the effects that teammates have on each other’s outcomes. We quantify the causal effect on a person quitting of a teammate quitting, and we test a theoretical prediction regarding the heterogeneous nature of these team effects with respect to baseline quit predictions. According to Battaglini, Bénabou and Tirole (2005), partnerships can lead to multiple equilibria: “good news” about a teammate’s willpower boosts a person’s self-confidence, increases effort, and promotes quitting, whereas “bad news” discourages quitting.⁸ We further investigate the preferred rule that a social planner might use to assign teams, in line with recent attempts to find optimal policies for sorting individuals into teams (Graham, Imbens and Ridder, 2009; Bhattacharya, 2009). We find evidence that teammates have a large causal effect of 40-50% points on each other’s quit status. Moreover, we find little evidence of a discouragement effect from a bad news equilibrium. This result implies that optimal pairings, from the perspective of a social planner, consist of heterogeneous teams in which one teammate has a high self-assessed probability of quitting and the other a low probability.

Taken together, our findings add to the empirical literature on the economics of risky health behaviors and addiction. We also offer a practical solution to a substantial policy problem. Global tobacco control efforts are expected to increase the demand for quitting in the coming decade, making the availability of low-cost treatment options increasingly important. Team commitment contracts may offer a viable cost-effective alternative to other smoking cessation approaches in low-resource settings.

1.2 Background

1.2.1 Tobacco Use and Regulation

Tobacco use will exact a hefty toll on population health over the coming decades. In 2010, tobacco was the second leading risk factor contributing to the global burden of disease, measured in terms of mortality rate and disability-adjusted life years (DALYs) (Lim et al., 2012). As Figure 1.1 indicates, only high blood pressure accounts for more deaths and more DALYs. Tobacco-attributable mortality, based on extrapolations from lung cancer death rates, is projected to reach 8.4 million annual deaths by the end of the decade, up from 3.0 million deaths in 1990 (Murray and López, 1997). In comparison, the same study projected that HIV/AIDS will account for 1.8 million annual deaths in 2020. Moreover, 70% of tobacco-related deaths in 2020 are projected to occur in low- and middle-income countries (Murray and López, 1997). This estimate mirrors the share of current global cigarette

⁸ There is some empirical support for heterogeneous team effects, including Babcock et al. (2011) and Bandiera, Barankay and Rasul (2010).

consumption in low- and middle-income countries, also 70% (World Health Organization, 2009b). Figure 1.2 highlights the global reach of tobacco. It is a leading risk factor for death throughout most regions of the world, with the exception of certain parts of sub-Saharan Africa. In Southeast Asia, tobacco use is also the second leading risk factor for death and disability.

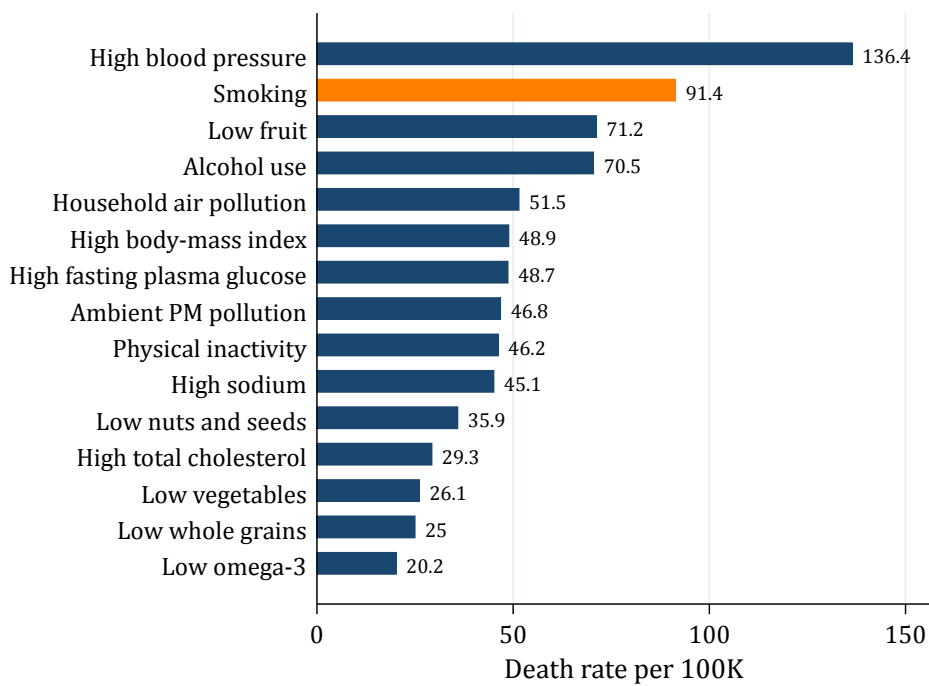
Deaths attributable to tobacco take a variety of forms. The leading specific causes of smoking-attributable death are lung cancer, ischemic heart disease, and chronic obstructive pulmonary disease (a complex of emphysema and chronic bronchitis) (Adhikari et al., 2008). Nearly all smoking-attributable deaths can be classified as the result of chronic illness. As such, the rise of tobacco-related deaths in the developing world represents the broader epidemiological transition from infectious disease to chronic disease that less-developed countries are currently undergoing.

Smoking presents several economic rationales for government intervention (Jha and Chaloupka, 1999). First, smoking generates negative externalities, though the magnitude varies across settings. The costs of second-hand smoke can be substantial (Hirayama, 1981; United States Surgeon General, 2006), especially in geographic areas where smoking is (or was) common in restaurants and indoor public venues. In economies with employer-based health insurance or publicly funded health systems, non-smokers subsidize the direct medical costs from smoking-related illness and disability. An off-setting positive externality, in which smokers die prematurely and do not collect social security payments, is not large in most developing countries, where the pension systems are less generous than in industrialized countries. Lost productivity due to premature illness or death of smokers also imposes a substantial social cost.⁹ Second, smokers may have incomplete information about the risks of smoking. Younger and less-educated individuals may be less able or willing to act on information about smoking risks. The prevalence of youth onset of smoking has spurred many governments to limit tobacco industry advertising. Some research finds that, if anything, smokers in the U.S. overestimate the health risks of tobacco use (Viscusi, 1998), although others dispute this finding (Slovic, 2001). Risk perceptions vary by country, depending in part on smokers' health knowledge, activities of the tobacco control community, investment in anti-tobacco messaging campaigns, content of cigarette warning labels, and so forth. Third, smokers often suffer from chemical dependence on nicotine and self-control problems that prevent themselves from optimizing their lifetime consumption of tobacco. Such *internalities*, if sufficiently large, provide a case for tobacco control regulations as a form of commitment device (Gruber and Köszegi, 2001, 2004). We review the literature on self-control problems and smoking in Section 2.1.

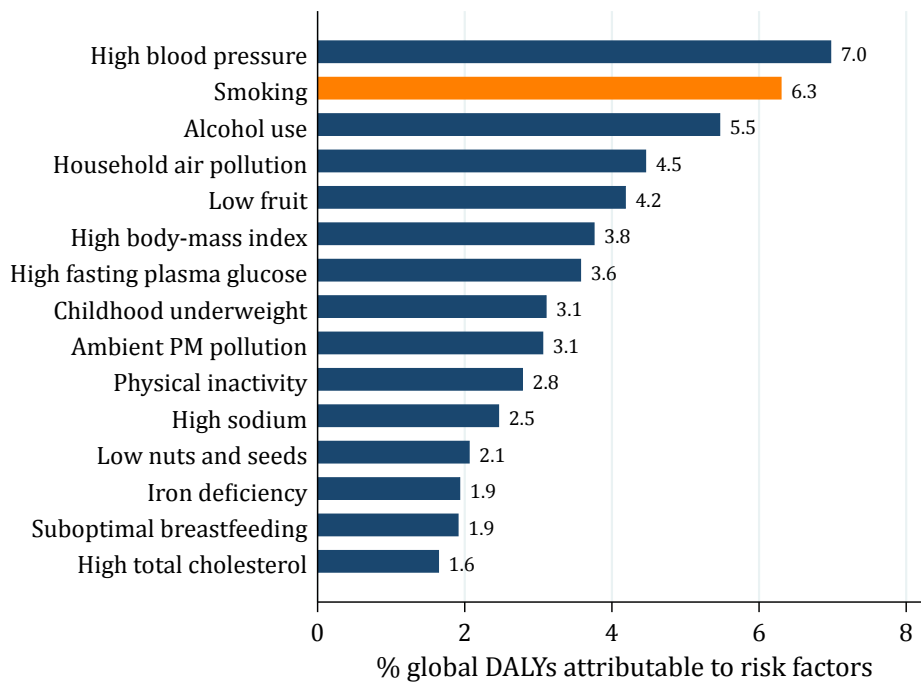
⁹The U.S. Centers for Disease Control and Prevention estimates that smoking-attributable productivity losses were \$96.8 billion per year from 2001-2004 (Adhikari et al., 2008). These were estimated by multiplying sex- and age-specific smoking-attributable mortality by remaining life expectancy and lifetime earnings. The estimate excludes costs associated with employee absenteeism and productivity losses attributable to second-hand smoke.

Chapter 1. Overview and Background

Figure 1.1: Global Disease Burden Attributed to Leading Risk Factors, 2010



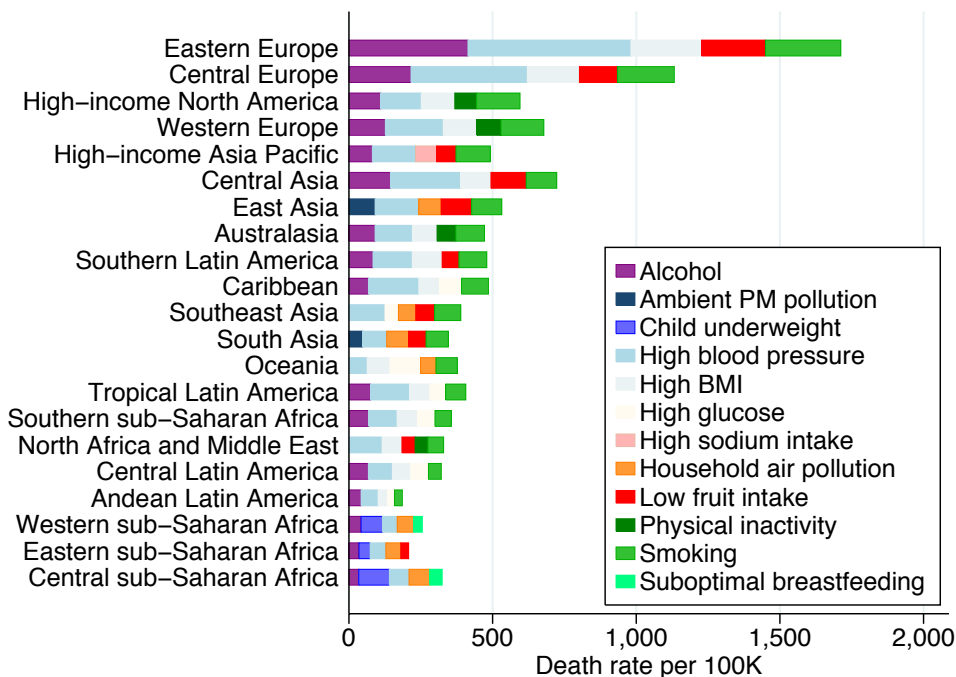
(a) Global mortality rate per 100K



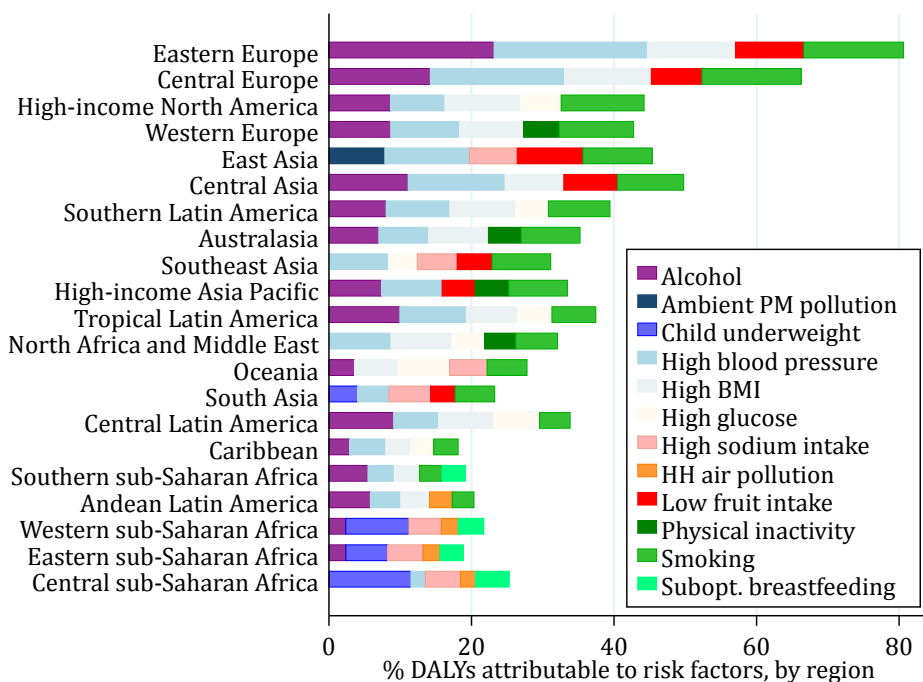
(b) % DALYs attributable to risk factors

Note: Data come from the Global Burden of Disease project and are available for download at: <http://www.healthmetricsandevaluation.org/gbd>. Analysis based on Lim et al. (2012).

Figure 1.2: Disease Burden Attributed to Leading Risk Factors, by Region, 2010



(a) Mortality rate per 100K by region



(b) % DALYs attributable to risk factors, by region

Note: Data from the Global Burden of Disease project and available for download at: <http://www.healthmetricsandevaluation.org/gbd>. Analysis based on Lim et al. (2012). Countries are sorted in descending order of tobacco disease burden. “PM” denotes particulate matter. “BMI” denotes body mass index.

Tobacco use throughout much of the industrialized world has been in decline for more than two decades (OECD, 2009). The experience with smoking in the U.S. and much of Europe point toward a stylized description of the stages of change in aggregate, national smoking patterns (Lopéz, Collishaw and Piha, 1994). Early in the demographic lifecycle, smoking rates are low, with men over-represented as smokers. Male and female smoking rates continue to rise throughout Stage 2 until knowledge of smoking risks, tobacco control measures (e.g., tobacco taxes), and social norms regarding smoking begin to reverse the trend. For example, per-capita consumption crested in the U.S. in 1964, the year that the Surgeon General released a report stating that smoking causes lung cancer (United States Surgeon General, 1964). Stage 3 is marked by increasing regulation of tobacco and a continuing drop in smoking rates. The disease burden, which lags smoking rates by approximately 20 years, continues to rise in the medium term despite falling smoking rates. Male morbidity and mortality tend to precede the female burden of disease, corresponding to the timing of aggregate, sex-specific consumption patterns. Applying this model to Asia, one would conclude that nearly all Asian countries are best classified in Stage 2, with high smoking rates and limited tobacco control regulations. There are strong reasons, discussed below, to believe that the Asian experience will resemble this model's prediction of falling smoking rates over time.

Over the coming decade, observers expect tobacco control regulations in low- and middle-income countries to resemble those in the industrialized world. In response to the health threat posed by smoking, 176 countries representing 88% of the world's population have ratified a tobacco control treaty adopted by the World Health Organization (WHO) in 2003, which binds national governments to implement a series of anti-tobacco policies.¹⁰ Many countries have passed legislation to come into compliance with the treaty, for example, by limiting advertising and modifying warning labels on cigarette packs. The increasing regulation and stigmatization of tobacco use in low- and middle-income countries presages a rising demand for quitting, a pattern already experienced in most industrialized countries. Yet, developing countries, especially those in Asia, have invested few resources in smoking treatment programs to meet this impending demand.

1.2.2 Approaches to Smoking Cessation

The main challenges that smokers face in attempting to quit are withdrawal symptoms and nicotine cravings. Withdrawal symptoms include a variety of affective, cognitive, and physiological symptoms, usually transient in nature, whereas nicotine cravings may persist for long after a person abstains from tobacco..¹¹ Relapse rates tend to be high, peaking in the first 30 days after quitting (Brandon et al., 1990; Hunt, Barnett and Branch, 1971).

¹⁰The text of the Framework Convention on Tobacco Control (FCTC) treaty and the latest news on implementation are available at: <http://fctc.org/>.

¹¹See Shiffman, West and Gilbert (2004) for a discussion of measuring and assessing withdrawal and cravings.

Relapse during the first three months of a quit attempt is estimated to vary from 35% to 81% (Curry and McBride, 1994). In order to sustain a lasting quit, moderate and heavy smokers often require multiple quit attempts.

The majority of smokers attempt to quit without the use of a smoking cessation aid (Chapman and MacKenzie, 2010). For example, two-thirds to three-quarters of ex-smokers in the U.S. stopped unaided (Lee and Kahende, 2007; Shiffman et al., 2008). In Thailand, the proportion of unassisted quits is 90% (World Health Organization, 2009*a*). Unassisted quitters have not fared any worse with avoiding relapse than have users of pharmacological treatments (Hughes et al., 1992; Alpert, Connolly and Biener, 2012). As such, researchers have searched for better ways to assist smokers with quitting and preventing relapse.

Clinical practitioners currently recommend one of three treatment options for tobacco dependence (Fiore et al., 2009): nicotine replacement therapy (NRT), prescription medications, and individual and group counseling. The clinical practice guidelines recommend providing patients with these treatments in combination (e.g., both NRT and individual counseling). NRT includes over-the-counter, nicotine-containing products, including gum, lozenges, nasal spray, inhalers, and patches. These products are designed to wean smokers off nicotine by steadily reducing the dosage and thereby mitigating the nicotine urges and withdrawal symptoms. Compared to placebo or no NRT, NRT increases the probability of six- to 12-month abstinence by 50 to 70%, relative to a low baseline rate of about 10% (Stead et al., 2008). This finding holds across NRT products and across recruitment settings (including community-based recruitment). Two pharmacotherapies are available to reduce the severity of nicotine cravings and withdrawal symptoms: varenicline and bupropion. Both drugs increase the likelihood of quitting compared to placebo (Cahill, Stead and Lancaster, 2012), although there is conflicting evidence on their comparative effectiveness against NRT (Wu et al., 2006), in part because many of the trials are sponsored by the pharmaceutical industry. The typical treatment course for NRT and pharmacotherapy lasts seven to 12 weeks. Counseling may take a number of different forms. Examples include coaching, motivational interviewing, and cognitive behavioral therapy.

The Cochrane Collaboration has conducted a series of meta-analyses of randomized trials on the effectiveness of behavioral interventions for smoking cessation.¹² Taken as a whole, the evidence base is replete with contradictory findings and does not lead to any quick and easy conclusions about which smoking cessation strategies are most effective. Self-help interventions do not raise the quit rate compared with no intervention and other minimal interventions (Lancaster and Stead, 2005*b*). Individual counseling, defined as a face-to-face encounter with a counselor trained in assisting smoking cessation, increases the likelihood of quitting compared to minimal contact with a provider, such as usual care, up to 10 minutes of advice, and the provision of self-help materials (Lancaster and Stead, 2005*a*). However, the

¹² The use of randomization in the clinical medicine and public health literatures should not be construed with a claim of high quality. Many studies (1) fail to use a system that conceals treatment allocation from participants, (2) do not report randomization procedures, (3) do not use biochemical validation of abstinence, and (4) do not report the results on an intention-to-treat basis.

benefit of counseling versus the control dissipates somewhat, and becomes only marginally significant, when both groups receive NRT. Comparisons of different approaches to counseling with similar intensity tend to find no differences. Increasing counseling intensity (i.e., number of sessions) tends to have no effect on outcomes (Lancaster and Stead, 2005*a*). Even brief simple advice about quitting smoking from physicians increases 12-month abstinence rates by 1 to 3 percentage points (Stead, Bergson and Lancaster, 2008). Multiple sessions of telephone counseling aids quitting relative to provision of self-help materials or brief counseling at a single call (Stead, Lancaster and Perera, 2006). The evidence on the benefit of group counseling above and beyond individual counseling is inconclusive, although group therapy is associated with higher quit rates than minimal contact (Stead and Lancaster, 2005). Partner interventions also have been a common adjunct to other cessation strategies. Typically, partnerships have not enhanced the likelihood of quitting (May and West, 2000; Park, Tudiver and Campbell, 2012). Section 2.4.2 on social support provides a more thorough discussion of empirical evidence on dyadic strategies.

Researchers have experimented with two other forms of behavioral interventions for promoting smoking cessation: commitment contracts (also called deposit contracts or contingency contracts) and direct pecuniary incentives. This literature is reviewed in Section 2.1.2 and Section 2.3. Our study tests a novel intervention that uses social and monetary incentives for delivering smoking cessation services in order to address a major issue with more conventional treatment options: smoking cessation services are not widely available in low-resource-settings in the developed and developing world.

1.2.3 Tobacco Use in Thailand and Southeast Asia

Tobacco use is a leading risk factor for morbidity and mortality in Thailand and throughout Southeast Asia (SEA). About one in ten deaths in SEA were attributable to tobacco in 2004.¹³ In our Thai setting, 13% of deaths in 2004 were related to tobacco (World Health Organization, 2012). Based on historical smoking trends, the disease burden attributable to tobacco can be expected to grow steadily over the coming decade. In most SEA countries, the smoking prevalence among adult males exceeds 40% (World Health Organization, 2009*b*). In contrast, female smoking rates tend to be low, under 5%.¹⁴ Smoking rates across the region have risen over the past decade, despite the recent adoption of tobacco control measures in every Southeast Asian country. Transnational tobacco companies have stimulated greater consumption through aggressive marketing and pricing strategies. For example, these companies have avoided high tariffs by shifting production to the free trade

¹³Based on WHO mortality estimates by risk factor, available at: <http://www.who.int/evidence/bod>. Accessed May 12, 2010.

¹⁴Only a small percentage of SEA women admit to smoking; however, women may systematically underreport consumption because female smoking is considered culturally inappropriate.

area for the Association of Southeast Asian Nations (ASEAN).¹⁵

Although men consume most tobacco in SEA, the health and economic burdens are spread more evenly. Women and children are exposed to second-hand smoke and the associated health risks. The direct medical costs of tobacco-attributable illness can be substantial. In addition, household tobacco expenditures may crowd out spending on health, education, and nutrition (Busch et al., 2004; Wang, Sindelar and Busch, 2006; John, 2008; Block and Webb, 2009). These commonly overlooked patterns harm the welfare of women and children, especially because tobacco products comprise a large share of the typical household budget in the region. For example, Indonesian households with a smoker spent 11.5% of average monthly expenditures on tobacco in 2005 (Barber et al., 2008). According to one study that was not subjected to peer review, the poorest quintile of Thai smokers were estimated to have spent 13.5% of their annual household budget on tobacco in 2006 (Sarunya et al., 2008).

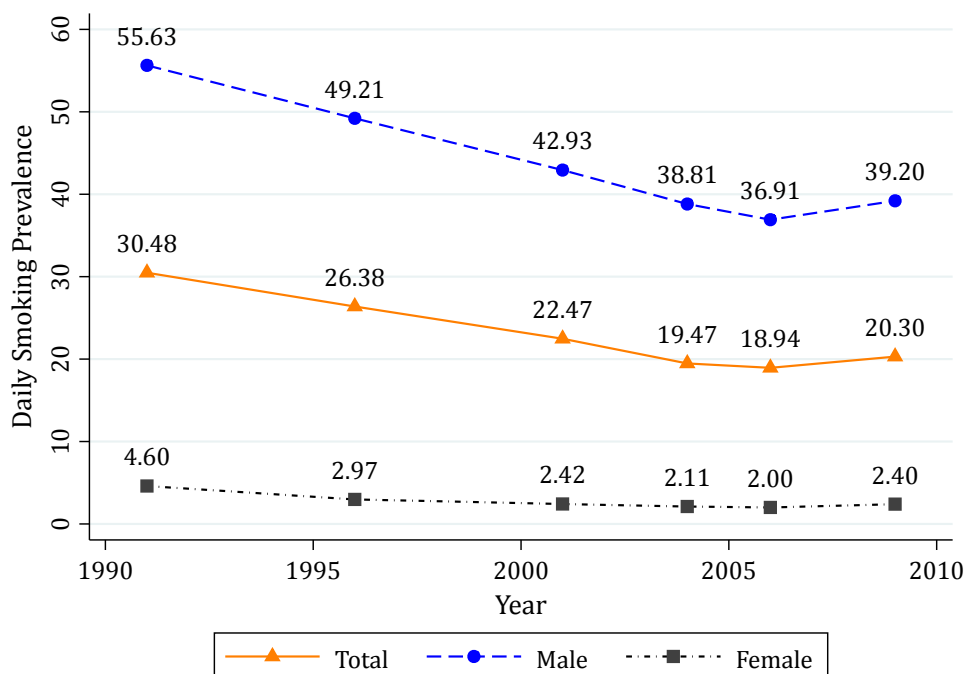
Thanks in part to the WHO treaty on tobacco control, SEA countries appear poised to follow their Western counterparts in a pattern of steadily declining tobacco use. In terms of the stylized framework presented earlier, this represents movement away from rising smoking rates in Stage 2 to a period of declining rates in Stage 3. Thailand is ahead of its neighbors in this lifecycle, having already started a period of declining prevalence (Figure 1.3). Thailand's progress derives from its unique political history with tobacco and its assertive use of regulations (Vateesatokit, Hughes and Ritthphakdee, 2000). Since the 1980s, the Thai government has fashioned the most comprehensive tobacco control policies in the region. Strong public support for these restraints stems from the perceived encroachment on national sovereignty by transnational tobacco companies. Thailand was forced to open its markets to cigarette exports in 1991 after a legal challenge by the United States on behalf of tobacco companies. This ruling led to a popular backlash against the tobacco industry and opened up political space for the Thai government to pass a series of tobacco control laws.

In some of the most recent reforms in 2005 and 2006, Thailand passed a large increase in its cigarette excise tax, restricted the display of cigarettes at point of sale, and added pictorial warning labels. Due in part to these reforms, especially the tax hike, quit rates jumped to 10% in 2006 and 2007, and the male smoking rate fell from 44% in 2003 to 39% (White and Ross, 2013).¹⁶ Prior to this sharp decline (not displayed in Figure 1.3 because comparable data were not available beyond 2006), Thailand's smoking prevalence followed a fairly linear decline from 1991 to 2004 before stagnating between 2004 and 2006.

¹⁵The ASEAN Free Trade Area (AFTA) agreement, signed in 1992, reduces tariffs on tobacco products produced in the region to no more than 5%. Most tobacco products produced by transnational tobacco companies benefit from this rule.

¹⁶ These prevalences are based on the International Tobacco Control Southeast Asia survey, an ongoing nationally representative, longitudinal survey. Thus, the statistics are derived from a different data series from surveys used in Figure 1.3 and Figure 1.4.

Figure 1.3: Prevalence of Daily Smokers in Thailand, Total and by Sex, 1991-2009



Source: Health and Welfare Survey, 1991, 1996, 2001, 2006, Thailand National Statistics Office. WHO Global Adult Tobacco Survey, 2009. Includes smokers age 15 and older.

Thailand's high demand for quitting puts it years ahead of most other Asian countries on the path toward lower smoking rates. In 2009, half of Thai smokers reported a quit attempt in the previous 12 months, nearly 90% of which did not involve a smoking cessation aid or professional support (World Health Organization, 2009a). Smoking rates remain much higher in rural areas (Figure 1.4). According to official statistics from 2007, 13% of municipal residents age 11 years and older were regular smokers, compared to 19% of non-municipal residents.¹⁷ The age profile for smoking prevalence is an inverted U shape, with the highest prevalence among smokers between 40 to 50 years old (26%). However, the urban-rural gap widens with age, from 4% among 20 to 24 year olds to 10% among those age 60 years and older.

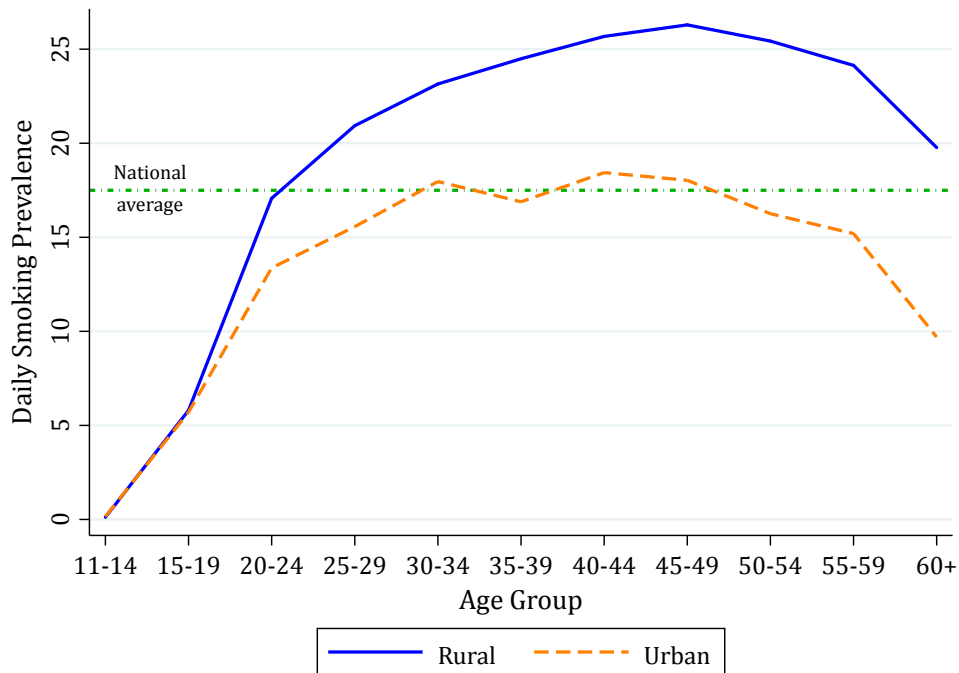
Thailand's relatively early adoption of tobacco control policies has made smoking cessation a more socially acceptable choice than in most SEA countries. To this end, Thailand offers more complete smoking cessation services than its neighbors. Yet, its smoking treatment programs remain underfunded, limited to a handful of hospitals and community pharmacies. Counseling is available in a few clinical settings; a national quitline offers motivational counseling; bupropion, nicotine gum, and the nicotine patch are available on

¹⁷Data collected for the 2007 Cigarette Smoking and Alcoholic Drinking Behaviour Survey. Available online at: <http://web.nso.go.th/en/survey/smoke/smoke07.htm>. Accessed June 10, 2008.

Chapter 1. Overview and Background

an out-of-pocket basis at hospital and community pharmacies; and varenicline is available in hospitals by prescription only. Existing services are priced beyond the reach of most Thai people, especially those who live outside of Bangkok. In addition, health policymakers have yet to formulate a comprehensive strategy for assisting rural smokers with quitting.

Figure 1.4: Age Profile of Daily Smoking Prevalence in Thailand, by Urbanicity, 2006



Source: Health and Welfare Survey, 2006, Thailand National Statistics Office.

Chapter 2

Literature Review on the Economics of Behavior Change

The present study aims to contribute to several distinct literatures: health economics, behavioral economics, and development economics. The review below draws on research from each of these fields. The chapter opens with a discussion of two systematic errors in decision making that impede smokers' ability to quit smoking: present bias and projection bias. The discussion focuses on 1) present-biased individuals' demand for commitment devices, especially a class of commitment devices called commitment contracts and 2) applications of present bias to smoking and other risky health behaviors. We then briefly consider projection bias. The chapter continues with a more general discussion of the effects of monetary incentives on health behavior change. It concludes with a review of the literature on two types of peer effects, peer pressure and social support, both of which may be mobilized in our study intervention.

2.1 Self-Control and Precommitment

2.1.1 Self-Control Problems

Many individuals struggle to resist temptation. In his masterpiece *Utilitarianism*, John Stuart Mill (1871) offered one illustration: “[individuals] pursue sensual indulgences to the injury of health, though perfectly aware that health is the greater good.” Mill went on to dismiss the challenge that dynamic inconsistency might pose to his utility theory, but researchers have since revisited the nature of preference reversals.¹⁸ Recently, behavioral economists have noted that standard economic models of utility maximization based on rational choice theory fail to account for issues of willpower, temptation, and dynamically inconsistent preferences (Rabin, 1998).¹⁹

¹⁸ Palacios-Huerta (2003) details how many famous economists from Adam Smith onward have written about time-inconsistent preferences.

¹⁹Self-control is the ability to control one's own behavior. Willpower is the ability to motivate oneself to carry out a specified course of action. We follow Loewenstein (2000) when he writes, “I use the term willpower in an old-fashioned and intuitive fashion, as a kind of inner force (power of will) that is exerted

Chapter 2. Literature Review

The puzzle of what explains individuals' self-regulation failures and related time-inconsistencies has preoccupied countless behavioral scientists over the past half century. Psychologists have led the way in proposing a number of theories for the origins of self-control. Here, we consider four of the most prominent schools of psychological thought on self-control. First, self-control may be viewed as a limited resource that is depleted during acts of self-regulation and decision making (Baumeister et al., 1998; Vohs and Heatherton, 2000). In this view, self-control operates like a muscle that fatigues (Muraven and Baumeister, 2000), and may even require glucose as an energy input for the exertion of willpower. For example, acts of self-control lowered blood glucose levels whereas consuming a sugary drink enhanced performance on lab tests of self-control (Gailliot et al., 2007). Second, an individuals' ability to delay immediate gratification is a skill or trait that develops early in childhood (Mischel, 1974). Of particular importance are the development of individuals' cognitive processes for countering temptation, such as attentional distraction and a focus on abstract ("cool") as opposed to arousing ("hot") features of an anticipated reward (Mischel, Shoda and Rodriguez, 1989). The ability to delay gratification as a young child correlates with improvements in a number of later-life outcomes, including SAT scores and educational attainment. Recently, proponents from both of these first two schools of thought have hypothesized a neurological basis for self-control (Mischel et al., 2011; Heatherton, 2011). Third, learning theorists posit that self-regulation is controlled by self-efficacy beliefs, that is, one's self-confidence in achieving a goal (Bandura, 1997). Self-efficacy beliefs regulate motivation for completing a task by determining the goals people set for themselves and the strength of commitment and effort exerted to attain those goals. Fourth, in one of the most authoritative treatises on the subject, Ainslie attributes self-control problems to an *intra*-personal bargaining problem between a present self and a stream of future selves (Ainslie, 1992). Faced with immediate rewards or immediate costs, the present self will steeply discount future payoffs and potentially make decisions that conflict with long-run and overall welfare. According to Ainslie's (1992) empirical research, the time discounting function in both humans and animals follows a hyperbolic path, such that valuations fall rapidly for even small periods of delay in the timing of rewards.

Economists have been directly and indirectly influenced by each of these psychological schools of thought. Development economists and others have recently directed their attention to the resource-depletion hypothesis of self-control as a way to understand socio-economic variation in decision making (Banerjee and Mullainathan, 2010; Spears, 2011; Bernheim, Ray and Yeltekin, 2013). The constraints that poverty imposes on low-income populations may leave these groups more cognitively depleted and thus more likely to succumb to temptation. Mischel's work, particularly on hot-cool processing, coincides with a strand of economic research that studies the contributions of affect and arousal to decisions and beliefs

with the purpose of controlling our own behavior." Self-control may entail the use of willpower or any of a number of substitutes, such as strategic behavior to avoid situations that might lead to temptation. We use self-regulation and self-control interchangeably.

(Loewenstein, 1996; Loewenstein, O’Donoghue and Rabin, 2003). In addition, economists are trying to quantify the longer-run effects of self-control and other non-cognitive skills on human capital formation (e.g., Heckman, Stixrud and Urzua, 2006). Economists have been more hesitant to embrace the work of Bandura, although the importance of beliefs in intertemporal trade-offs is reflected throughout a number of papers (Bénabou and Tirole, 2004; Battaglini, Bénabou and Tirole, 2005), and it is a focus of our present study. Ainslie’s work has been the most influential on the work of behavioral economists, such as on Thaler and Shefrin’s (1981) theory of self-control. A main attraction of Ainslie’s work is that his characterization of hyperbolic discounting has pointed toward a tractable economic model of self-control. We turn to that model next.

The hallmark of a self-control problem, known in the behavioral economics literature as *present bias*, is that a person systematically deviates from a plan considered optimal when formulated in the previous period. Present bias can impede a person’s ability to fulfill his or her *ex ante* preferences and can diminish a person’s long-run welfare (O’Donoghue and Rabin, 1999, 2001). Strotz (1955) was the first to formalize individuals’ dynamically inconsistent preferences in an economic model and to tie them to inefficient consumption decisions. However, the economics literature on self-control failed to develop over the next 25 years. Thaler and Shefrin (1981) revived economists’ interest in the topic, and the literature received a major jumpstart with the development of a tractable formal model by Laibson (1997). Laibson’s β - δ model of quasi-hyperbolic discounting, an adaptation of Phelps and Pollak (1968), generates time-inconsistent preferences by embedding in the standard utility function an additional discount factor on future utility, β :

$$U(\{c_t, \dots, c_\tau\}) = u(c_t) + \beta \sum_{\tau=t+1}^T \delta^\tau u(c_\tau) \quad (2.1)$$

where $\beta, \delta \in [0, 1]$. The model’s tractability derives from nesting the standard model ($\beta = 1$) as a special case within the more general model that allows for time-inconsistent preferences.²⁰ A time-inconsistent agent discounts future utility ($u(c_\tau)$) more than instantaneous utility ($u(c_t)$), leading to a preference for immediate gratification.

Agents may suffer from two problems: an inadequacy of willpower and an overestimation of the degree to which a person believes he or she possesses willpower. Using this idea, O’Donoghue and Rabin (1999, 2001) extend Laibson’s framework to distinguish among three types of economic agents: (1) standard exponential discounters who have total self-control, (2) *sophisticated* consumers who fully recognize their self-control problems ($\beta = \hat{\beta} < 1$), and (3) *naïve* consumers who are oblivious of their self-control problems ($\beta < \hat{\beta} = 1$).

²⁰ The exponential discount function was introduced along with the discounted utility model in Samuelson’s (1937) landmark paper. A key consequence of exponential discounting is its imposition of time-consistency on the choices of an agent. As recounted in Frederick, Loewenstein and O’Donoghue (2002), the exponential function was immediately adopted as empirical fact despite Samuelson’s disavowal of its accuracy. Sixty years later, Laibson relaxed the assumption of time-consistency.

Naïve consumers, who are unable to resist their impulses for immediate gratification today, may procrastinate on their goals indefinitely. Such agents may never fully learn about the nature of their self-control problem (Ali, 2011).²¹ Many studies find that agents are partially naïve ($\beta < \hat{\beta} < 1$), realizing they are present-biased but remaining overoptimistic about the degree to which they will remain so in the future (DellaVigna, 2009). Mahajan and Tarozzi (2011) overcome substantial identification challenges to estimate the distribution of agent types in the population, based on a sample of Indian adults. The authors estimate that roughly 40% of the population are time consistent; 50% are naïvely present biased; and 10% are sophisticated. Their model does not allow for partially naïve agents. More research is needed to understand how this typology applies to real-world decisions.

Gul and Pesendorfer (2001, 2004, 2005, 2007) have proposed an alternative economic model to quasi-hyperbolic discounting, based on choice-set-dependent preferences. Disutility is a function of the menu of items a person is offered. For example, an agent's welfare may diminish if a tempting option is added to the choice set. The temptation model is consistent with revealed preference in the sense that a person who gives in to temptation does so because the cost of temptation outweighs the cost of exerting self-control. Unlike the β - δ model, the Gul-Pesendorfer model allows for costly self-control. Planner-Doer models, also known as dual-self models, also have this feature (Fudenberg and Levine, 2006). Bryan, Karlan and Nelson (2010) provide a nuanced discussion of the different models. One major divergence is that welfare calculations from the β - δ model often take *ex ante* preferences as a person's underlying utility function, whereas calculations from the temptation model incorporate the preferences of the future self. For the remainder of this paper, we focus on the β - δ model because it is the dominant perspective in the empirical literature.

The empirical literature on the existence of present bias has multiplied in recent years. (See DellaVigna (2009) for a review of the literature.) Researchers have invoked self-control problems to explain a number of important economic phenomena: credit card borrowing (Ausubel, 1999; Heidhues and Koszegi, 2010), lifecycle savings (Angeletos et al., 2001), technology adoption (Duflo, Kremer and Robinson, 2011), and job search (DellaVigna and Paserman, 2005). Additional evidence for the behavioral model comes from studies that document individuals' demand for precommitment to a specified goal. This demand contradicts the predictions of the standard economic model in which agents have time-consistent preferences. We take up this evidence in the next subsection.

A handful of studies have applied the β - δ model to the health domain. Several others, discussed in the next subsection, infer present bias for a health-related task by observing individuals' demand for precommitment. DellaVigna and Malmendier (2006) convincingly show that individuals make sub-optimal decisions about gym attendance. They purchase monthly health club contracts when their attendance is infrequent enough to make per-visit

²¹ Ali (2011) characterize the situations in which incomplete learning occurs in a Planner-Doer model. Learning fails when the Planner receives delayed or incomplete feedback about the Doer's payoffs. The Planner cannot distinguish between the Doer having low self-control or high decision costs.

passes a cheaper alternative. The behavior of health club attendees is consistent with a model of present bias in which the contract serves as a commitment device to exercise more, and is incongruous with a standard model under realistic assumptions about gym members' expected future costs. Acland and Levy (2012) conducted a field experiment to estimate the magnitude of present bias, projection bias, and habit formation in gym attendance. The authors identify subjects' degree of naïveté by offering small incentives varied by time and amount and comparing subjects' predicted and actual response to the incentives. They find that subjects are highly overoptimistic (i.e., naïve) about their own self-control, over-predicting future gym attendance by a factor of three. Courtemanche, Heutel and McAlvanah (2011) find a correlation between body mass index and their estimates of both β and δ . They conclude that obesity is at least partly attributable to time preferences. Mahajan and Tarozzi (2011) identify separate hyperbolic discounting parameters for time-consistent agents, naïfs, and sophisticates as part of a randomized field experiment of anti-malarial bednets. The authors find that sophisticated agents are considerably more present biased ($\beta \approx 0.56$) than are their naïve counterparts ($\beta \approx 0.97$). Moreover, time preferences appear to be relatively more important in their sample than cost and risk parameters. Fang and Wang (2013) develop a structural model of discrete dynamic choice for individuals who have time-inconsistent preferences. The model separately estimates δ , β , and $\hat{\beta}$ for the case of mammography screening. The model indicates that the point estimate for $\beta \in [0.56, 0.71]$, whereas $\hat{\beta} = 1$ in all specifications. These results imply that many agents are naïvely present biased with respect to their decision to receive mammography screening, and presumably other forms of preventive health services.

Behavioral economists have long recognized the potential application of present bias to smoking and other addictive goods. Withdrawal symptoms and cravings make the delay of gratification exceedingly difficult. Physiological and psychological addiction may be viewed simply as a manifestation of present bias. In the case of smoking, present bias may severely curtail a person's investment in quitting, both in terms of the initiation and maintenance of a quit attempt. Over-consumption of tobacco relative to long-run preferences diminishes a smoker's long-run well-being (Gruber and Köszegi, 2001). Yet a smoker who wants to quit may forgo cessation in order to satisfy a nicotine craving.

Several papers have examined self-control problems in the context of cigarette smoking. Gruber and Köszegi (2001) show that observed smoking patterns, while not provably inconsistent with rational choice, fit a model of agents with time-inconsistent preferences. In particular, the hyperbolic discounting model can explain the forward-looking behavior of smokers in response to excise tax increases, previously claimed as support for the rational addiction model (Becker, Grossman and Murphy, 1994; Chaloupka, 1991). One implication is that optimal taxation of tobacco products under a present-bias model is much higher than under a model of standard preferences (Gruber and Köszegi, 2004; O'Donoghue and Rabin, 2006).²² Another piece of evidence comes from subjective ratings of happiness before and

²² However, Fletcher, Deb and Sindelar (2009) find that smokers with low self-control are less responsive

after the passage of tobacco control legislation. Those likely to have been smokers—the authors lacked data to identify smokers with certainty—report being happier *ex post*, which Gruber and Mullainathan (2005) interpret as support for the notion that the laws act as a form of commitment device for smokers. An anecdotal piece of evidence in favor of the behavioral model is that smokers make repeated costly quit attempts. This points toward potentially inefficient intertemporal consumption paths. In Thailand, 69% of smokers surveyed in 2006 attempted to quit in the prior year, yet less than 15% succeeded, based on nationally representative data (White and Ross, 2013). We find that Thai smokers in our study sample have a median of two past quit attempts, and 8% have had 10 or more past attempts.

To date, only one study has estimated the self-control parameter $\hat{\beta}$ for the case of smoking (Levy, 2010). Levy uses a structural model to estimate an annual $\hat{\beta} \in [0.70, 0.83]$, concluding that smokers exhibit moderate levels of present bias, on par with other domains. He decomposes cigarette prices into permanent and transitory components, and uses adult smokers’ responses to each component in order to identify the short-run and long-run discount factors, β and δ . Price variation due to taxes represents the permanent component, and fluctuation in tobacco leaf prices represents the transitory component. The shortfall in state budgets is used as an instrumental variable for taxes in order to isolate the effect of exogenous variation in cigarette prices on the probability of being a smoker.

2.1.2 Precommitment

A key implication of O’Donoghue and Rabin’s (1999) typology is that sophisticated consumers, who are aware of their self-control problems, will seek a “strategy of precommitment” (Strotz, 1955).²³ Commonly referred to as a *commitment device*, precommitment involves a person voluntarily agreeing to incur a penalty, often monetary in nature, for failure to achieve a goal (Bryan, Karlan and Nelson, 2010). As Strotz (1955) put it, the agent contrives “a penalty for his future self if he should misbehave.”

DellaVigna (2009) sets up a simple two-period model that highlights the reason sophisticated consumers have a taste for commitment devices. The model follows the consumption decisions of a person with a self-control problem tempted by a leisure good, such as smoking. Assume that the leisure good has an immediate payoff $b > 0$ at t_1 (e.g., satisfying a nicotine craving) and a future cost $c < 0$ at t_2 (e.g., withdrawal symptoms). In

to cigarette taxes, which presents a potential challenge for the theoretical work on present bias.

²³The temptation model of Gul and Pesendorfer (2004, 2001) also predicts a taste for commitment devices.

this case, the consumer’s *ex ante* utility diverges from the person’s actual utility:

$$\begin{aligned} \beta\delta b + \beta\delta c &\geq 0 \\ \Rightarrow \delta b + \delta c &\geq 0, && (\textit{ex ante utility}) \\ \delta b + \beta\delta c &\geq 0 && (\textit{actual utility}) \end{aligned}$$

Present-biased agents “overconsume” the leisure good relative to their *ex ante* preferences. The sophisticate is aware of this problem and seeks out a commitment device that helps the person stick to his or her *ex ante* preferred consumption path.

Commitment contracts are binding, enforceable commitment devices. They are arrangements between two or more parties, employed by an individual to restrict his or her own future choices (Bryan, Karlan and Nelson, 2010). First adopted by economists to boost individuals’ personal savings (Thaler and Benartzi, 2004), commitment contracts have been applied to a wide range of behaviors.²⁴ For example, Ashraf, Karlan and Yin (2006) provided some of the first field evidence, offering a commitment savings product to clients of a Philippine bank. Clients were not allowed to withdraw their deposits until they reached a pre-specified date or savings amount. Take-up for the product was 28%, and the accounts increased savings balances by 81% points after 12 months.

Health Commitment Contracts

Health behaviors have provided a fertile testing ground for the study of commitment contracts. Here, we review the literature on health commitment contracts, aside from those focused on smoking cessation, which we cover in the next subsection.

Building on DellaVigna and Malmendier’s (2006) findings suggestive of present bias in gym attendance, two studies have used commitment contracts to promote exercise. Goldhaber-Fiebert, Blumenkranz and Garber (2010) investigate the impact of certain contract design features. In particular, they allow users to set the terms of the contract, including duration and frequency, and experimentally manipulate the default option presented to users. The authors find that about half of users were heavily influenced by the default options, concluding that exercise contracts can be designed to promote a longer period of exposure to the contracts. Royer, Stehr and Sydnor (2012) compare individuals randomly assigned to a control group, an incentive group, or an incentive-plus-contract group, among a sample of workers at a large employer. The addition of the contracts did not boost attendance during the one-month intervention period, but it had a large impact on attendance in the post-treatment period. Whereas the effect in the incentive-only group faded to an insignificant level, the effect in the incentive-plus-contract group persisted as

²⁴ Commercial ventures have even sprung up that market commitment contracts to the general public, e.g., www.stickk.com and www.healthywage.com. Burger and Lynham (2010) details evidence from bookmakers who offer private-sector commitments for weight loss.

much as 20 weeks post-treatment.

Public health researchers were pioneers in the use of commitment contracts as part of weight loss programs. Early studies tended to lack strong methods; they often had a small sample size (Jeffery et al., 1984*b*), did not always include a control condition (Jeffery, Thompson and Wing, 1978), and sometimes used complicated incentive structures that made an evaluation difficult (Jeffery et al., 1984*b*). In one of the larger early studies, participants who deposited \$60 lost eight pounds after six months, compared to four pounds in a control group that deposited \$5 (Jeffery, Hellerstedt and Schmid, 1990). However, the groups were not randomly assigned, leading to selection on observables and potentially on unobservables.

Several more recent studies have also examined weight loss contracts. Cawley and Price (2011) compare a cash bonus to commitment contracts for weight loss in 17 worksites and find that the bonus led to high attrition, whereas the contracts limited take-up but promoted greater weight loss. However, the complicated reward structure, which varied by worksite and was not randomly assigned, did not allow for a clean comparison. Volpp et al. (2008*b*) find that 47% of obese participants in a commitment contract for weight loss reached their weight loss goal of 1 pound per week after 16 weeks, compared to 11% of participants receiving usual care. The commitment contract was supplemented with matching contributions and frequent feedback. The investigators extended the intervention to the same participants for a total of 32 weeks and then asked participants to weigh in eight months later. At 32 weeks, mean weight loss was 8.7 pounds in the treatment group and 1.2 pounds in the control group. However, no differences were observed eight months later (John et al., 2011). The same authors examine in greater depth the sample characteristics associated with making deposits in these two studies, and they find more consistent depositing among participants who are more educated and Caucasian (John, Loewenstein and Volpp, 2012). No socio-demographic characteristics were associated with intervention effectiveness.

Burger and Lynham (2010) examine data from 51 individuals who placed bets with a bookmaker that they would be able to lose a certain number of pounds. The weight loss needed to be verified by a physician. The payoffs averaged \$2,332. They find that weight loss over the course of a mean of 243 days amounted to 78 pounds on average from a base of 263 pounds. Despite this success, roughly 80% of bettors failed to meet the established goals. Cawley and Ruhm (2012) note that it is conceivable “many individuals considered themselves better off for having participated because they lost weight, even if they ‘lost’ their bet.”

Dupas and Robinson (2013) offered commitment contracts for health savings products to primarily female members of an informal savings cooperative in western Kenya. Participants were randomly assigned to one of four savings offerings: a locked box in which the participants were given a key (safe box), a locked box in which only project staff had a key, a side pot for a health product of their choice, and a health savings account as part of a peer savings group. Deposits in the final three options were earmarked for health expenses. At 12 months, overall take-up was 71% for the safe box, 66% for the lock box, 72% for the health pot, and 97% for the HSA. The earmarking feature only substantially helped certain individuals to

save money, namely those facing a health emergency and those who faced frequent financial demands from friends and family.

Mahajan and Tarozzi (2011) observe subjects' adoption of two types of commitment products involving anti-malarial bednets. Sophisticates did not show a strong demand for commitment, although demand was relatively high for wealthier and naïve households. These results do not conform to the theoretical predictions of which types of agents will demand commitment.

Precommitment and Smoking

Researchers have noted smokers' use of commitment devices in many contexts. First, in a U.S.-based sample, 81% of smokers reported using a non-binding commitment mechanism during a quit attempt, such as avoiding friends who smoke or places with smokers in order to steer clear of temptation (Khwaja, Silverman and Sloan, 2007). Second, many smokers use nicotine replacement therapies as a way to maintain self-control in the face of nicotine cravings and withdrawal symptoms. NRT is not strictly a commitment device, because it does not raise the price of certain future choices. Nonetheless, the demand for NRT is indicative of self-control problems and chemical dependence. Third, some smokers impose self-rationing on themselves by purchasing smaller quantities of cigarettes (e.g., packs rather than cartons) in order to avoid consuming more than they prefer *ex ante* (Wertenbroch, 1998). Fourth, smokers may view tobacco control laws as a form of commitment device to limit tobacco consumption. Gruber and Mullainathan (2005) draw this conclusion from their finding that cigarette excise taxes make predicted smokers happier.

As with weight loss contracts, public health researchers have experimented with commitment contracts for smoking cessation for many years, with mixed success (Tighe and Elliott, 1968; Paxton, 1980, 1981, 1983). The lack of rigor of this work leaves an observer unable to draw any firm conclusions. Paxton (1980) asked 60 smokers to deposit £20 (about \$40 in nominal terms) per month for two months, paid back in increments of £5 per week for each week the person abstained. Forfeited deposits were shared among participants who were smoke-free. The deposit group had a mean quit rate of nearly 80% after the two months of depositing, compared to about 55% for the no-deposit group, excluding those lost to follow-up (i.e., not evaluating the results on an intention-to-treat basis). Four months later, the groups had nearly identical quit rates of about 45%. The small sample size, non-random assignment, small deposit levels, and high quit rates among the controls—much higher than found in most studies—complicate inferences about the treatment effect. Paxton (1981) used three deposit procedures, varying the frequency and number of repayment installments. Again, assignment was non-random, and the study did not include a control group. Fewer, larger repayments were associated with higher short-term quit rates, but all groups performed similarly up to six months after enrollment. Paxton (1983) compared collecting deposits for four months instead of two months and found no difference in outcomes.

The CARES trial provided the only rigorous test of smoking cessation contracts, fielded

on Mindanao Island in the Philippines (Giné, Karlan and Zinman, 2010). Employees of a local bank recruited 2,000 participants off the street. The control group received an educational pamphlet on quitting. The treatment group was offered deposit boxes, which required an initial minimum balance of 50 pesos (about \$1). The smokers deposited money for six months, and the money's return was contingent on passing a biochemically validated test of abstinence after six months. The treatment group also received weekly home deposit collection from the bank as long as they did not miss three deposits in a row. About one in 10 smokers took up the deposit contracts. Average cumulative deposits amounted to about 20% of one month's income, implying that the contracts represented a meaningful financial commitment. According to the results from a surprise visit six months after the deposit period ended, the contracts raised the 12-month quit rate by 3.5 percentage points from an 8.9% base. The quit rates among the general population in Thailand are higher than this baseline rate (White and Ross, 2013), implying that, all else equal, Thai smokers should be more motivated to take up and take advantage of the commitment contracts. Another limitation of the study is that the authors collected very limited information on participants' baseline characteristics, which hindered their ability to explore the determinants of study participation and contract take-up.

Features of Commitment Contracts

Commitment contracts have been promoted and criticized on a number of grounds. In this subsection, we discuss several important features of commitment contracts.

Cost-effectiveness. A major argument in favor of commitment contracts is their potential cost-effectiveness. The incremental cost-effectiveness depends on the contracts' design, in particular, on the nature of any matching contributions included as part of the contractual agreement (Halpern, Asch and Volpp, 2012).²⁵ Relative to clinical approaches, commitment contracts do not have the same reliance on skilled personnel and use less expensive inputs. Commitment contracts may even generate net revenue, thanks to the forfeited deposits from the large number of contract users who typically fail to achieve their goal. We discuss this fail rate in greater detail below. Giné, Karlan and Zinman (2010) determine that a commitment contract for smoking cessation costs \$700 per quitter adjusted for cross-country purchasing power, which is highly cost-effective relative to clinical approaches (e.g., Curry et al., 1998; Song et al., 2002).

Acceptability. An outstanding question in the literature is how great is the demand for commitment contracts. Take-up rates of commitment products have varied greatly across setting and application. Some survey data suggests that most individuals have unfavorable views toward the use of commitment contracts for health behavior change (Promberger et al., 2011). More research is needed to understand the magnitude and nature of this demand.

²⁵ Madrian (2012) explores some practical considerations regarding the use of matching contributions to improve savings outcomes.

Under-commitment. Commitment contracts are designed to be a “libertarian paternalistic” solution,²⁶ leaving (a) agents without present bias unharmed, (b) sophisticated present-biased agents at their first-best outcome, and (c) fully naïve agents unharmed (but also unhelped). In practice, many individuals do not fit cleanly into one of these three buckets. Rather, many agents are partially naïve about their self-control (DellaVigna, 2009). Offering standard commitment contracts to this type of agent may leave her worse off than she would be without the possibility to commit. The agent puts her money into the contract, but does not purchase enough commitment because she underestimates her self-control problem. Thus, her tendency to delay costly investments prevents her from putting enough at stake to motivate herself (“under-commitment”) and she loses her money and fails to achieve their goal. For example, the CARES trial finds that 66% of smokers who took up a basic commitment contract for smoking cessation failed to quit (Giné, Karlan and Zinman, 2010). Under-commitment presents a fundamental problem for policy-makers aiming to give consumers the tools to help themselves.

We can formalize the notion of under-commitment using a two-period model similar to the one introduced earlier. Assume that an agent is partially naïve such that $\beta < \hat{\beta} < 1$ and faces the decision of investing in a quit attempt, which carries immediate effort, withdrawal, and craving costs c and future health benefits b . The person will have a demand for commitment if: $c < \hat{\beta}\delta b < \delta b$. However, the agent will under-invest (or under-commit) if the following condition holds:

$$\beta\delta b < c < \hat{\beta}\delta b < \delta b. \quad (2.2)$$

Realizing *ex ante* that she is present biased, this agent will be willing to take up a commitment contract ($c < \hat{\beta}\delta b$). However, the person’s overoptimism about her ability to follow through on her investment goal will lead her to under-commit. At the moment of investment in Period 2, the immediate cost looms particularly large and outweighs the discounted future benefit ($\beta\delta b < c$), and she will choose not to commit.

In our trial, we strengthen commitment with the aim of increasing goal attainment. We supplement a commitment contract for smoking cessation with social and monetary incentives. In terms of this simple model, the goal is to ensure that the combination of health benefits, social incentives (s), and monetary incentives (m) outweigh the quit costs, even if the person is overoptimistic:

$$c < \beta\delta(b + s + m) < \hat{\beta}\delta(b + s + m) < \delta(b + s + m). \quad (2.3)$$

The social and monetary incentives are not foolproof, but they may be able to push the marginal smoker past the most difficult stages of the quit attempt.

Interpretation. One limitation of many studies of commitment contracts, including

²⁶ Thaler and Sunstein (2003) coined this phrase to denote policy interventions that manipulate the choice environment, such as the default option, to facilitate better decision making, but at the same time leave intact individuals’ freedom to choose. Others have used the phrase *asymmetric paternalism* to imply that “irrational” decisions are thwarted and “rational” decisions promoted (Camerer et al., 2003).

the CARES trial (Giné, Karlan and Zinman, 2010), is that a deposit collector visits the participants on a regular basis. The act of deposit collection heightens a person’s salience for the stated goal and constitutes a social intervention of its own if participants perceive social pressure to give.²⁷ In the CARES trial and certain other studies, the authors cannot disentangle the social effects from the effects of the financial commitment, which confounds any clear interpretation of the findings as being the result of monetary commitment.

2.2 Projection Bias

Many people mispredict what their preferences will be in the future (Loewenstein and Schkade, 1999). In particular, individuals, especially those in a state of heightened emotion, may project their current preferences onto predictions of future utility, recognizing that their preferences will evolve but under-predicting the magnitude of the change (Loewenstein, O’Donoghue and Rabin, 2003). This so-called projection bias might lead smokers who are in an addicted state to under-appreciate what life would be like if smoke-free. Only a small literature has examined projection bias in field settings (Read and van Leeuwen, 1998; Conlin, O’Donoghue and Vogelsang, 2007; Acland and Levy, 2012; Simonsohn, 2010; Busse et al., 2012). Levy (2010) provides the only field evidence for smokers, concluding that U.S. smokers under-estimate their change in smoking tastes by 40–50%. We try to gather some of the first experimental evidence from a field setting of whether smokers fully value the benefits of quitting. Projection bias, if present, would suggest the need for interventions that alter smokers’ predictions of the gains of quitting.

2.3 Monetary Incentives for Health Behavior Change

Monetary payments have been used to promote a variety of personal health behaviors. A large body of literature demonstrates that individuals respond to incentives tied to health behaviors much as they do for other domains. That literature is too large to cover comprehensively here. In this section, we sample some of the more prominent studies in the literature.

2.3.1 Incentives for Health

One systematic review of randomized controlled trials finds that economic incentives improved health behavior 73% of the time (Kane et al., 2004). For example, conditional cash incentives have successfully promoted: safe sexual practices (de Walque et al., 2012), HIV testing (Thornton, 2008), adoption of technologies such as chlorinated water (Kremer et al.,

²⁷ In a related situation, social pressure has been implicated in altering the amount people give to charity during door-to-door fund-raising (DellaVigna, List and Malmendier, 2012).

2011) and child immunization rates and wellness check-ups (Gertler, 2004). Contingency management—a substance abuse treatment that uses cash incentives to promote drug abstinence—raised compliance 30% on average (Lussier et al., 2006).²⁸ These studies document the successful effects of incentives on individual health behaviors.

Charness and Gneezy (2009) paid college students to attend the gym a certain number of times per month during two experiments. In the first experiment, post-intervention attendance was higher for a group that received large incentives (\$125 for eight visits) compared to a no-incentive group and a small-incentive group (\$25 for one visit), although no difference existed between the latter two groups. In the second experiment, a different group of students were paid a uniform amount of money (\$175) for the same three attendance requirements as the first study (no requirement, one visit, or eight visits), in order to control for the possibility that the monetary payment rather than an acquired habit caused the observed results. The payments increased post-intervention attendance only for those in the eight-visit group who did not attend regularly beforehand. The authors conclude that financial intervention can be used to foster good health habits. Acland and Levy (2012) successfully replicate the findings of Charness and Gneezy (2009) from paying students \$100 to attend the gym eight times, although the magnitude of the incentive effects in the immediate post-intervention period is more muted. Acland and Levy continue to follow the participants for 33 weeks after the incentives end, 21 weeks longer than Charness and Gneezy, and find no significant differences between the treatment and control group in the later post-intervention period.

Finkelstein et al. (2007) offer different levels of monetary incentives for weight loss. The authors present evidence of modest weight loss at three months but no difference at six months for six-month financial rewards ranging from \$7 to \$14 per percentage point of weight reduction.

Some researchers have experimented with lottery-based systems as contingent incentives. For example, a lottery system was found to improve adherence to warfarin, an anticoagulant drug that prevents blood clots (Volpp et al., 2008*a*). Volpp et al. (2008*b*) include an intervention in which participants are eligible for a daily lottery if they meet their weight loss goal. A key advantage of lotteries as contingent incentives is their potential cost-effectiveness. The lotteries also make use of people’s tendency to over-estimate the probability of rare outcomes and desire to avoid regret (“loss aversion”) (Kahneman and Tversky, 1979). Halpern et al. (2011) find that unconditional fixed incentives for clinicians’ response to surveys are superior to low-probability and high-probability lotteries. However, Haisley et al. (2012) finds that a lottery, the entry to which was conditional on four to eight team members completing a task, was about one-third more effective at promoting personal health risk assessments than were grocery gift certificates and no additional incentives. More research is needed to understand the conditions under which different incentive schemes are effective.

²⁸ A meta-analysis indicates that contingency management is more effective for treating opiate use and cocaine use than tobacco use (Prendergast et al., 2006).

Subsidies have been used to increase adoption of health-related technologies, such as deworming pills and antimalarial bed nets (Kremer and Miguel, 2007; Cohen and Dupas, 2010). A related literature shows that conditional cash transfers can promote good health practices, and the transfers have improved a variety of health outcomes such as medical care utilization, immunization coverage, and anthropometric outcomes (Lagarde, Haines and Palmer, 2009). The cash transfers often require multiple household members to meet certain criteria. Thus, it is an exception to the aforementioned studies, in which payments or subsidies are not conditioned on the joint outcomes of people who are part of a group.

2.3.2 Incentives for Smoking Cessation

Economists have accumulated a vast literature documenting smokers' responsiveness to cigarette prices. Smokers' sensitivity to prices also has been demonstrated in a variety of settings, including in Asian countries such as China, Taiwan, and Thailand (Hu and Mao, 2002; Hsieh, Hu and Lin, 1999; White and Ross, 2013). Most estimates of the total price elasticity of demand for tobacco consumption, based on micro-level data, fall in the range from -0.2 to -0.6 (International Agency for Research on Cancer, 2011; Chaloupka and Warner, 2000), although some estimates deviate from this pattern by finding smaller elasticities (e.g., Lance et al., 2004).

Smokers' responsiveness to personal cash incentives has yielded more mixed results. A systematic review on competitions and cash incentives for smoking cessation concludes that, although incentives raise quit rates in the short term, these gains prove fleeting (Cahill and Perera, 2011). Incentives often attract smokers who are financially motivated but unmotivated to stay abstinent, increasing relapse beyond the reward schedule.²⁹

Troxel and Volpp (2012) reanalyze the data from Cahill and Perera's (2011) systematic review. Their main finding is that most studies are under-powered to detect small to moderate treatment effects. In most cases, the detectable odds ratio is greater than 5.0. The authors also note that many studies included in the systematic review suffer from high attrition rates, as high as 40-50% in some cases. The original systematic review has other limitations as well. It covers a range of study designs, including lotteries, commitment contracts, and contingent rewards. These might be expected to have different effects on smokers. Many also did not target the incentives specifically to those who expressed an *ex-ante* preference for quitting. It is not surprising for a person to relapse if he joined the study primarily to be eligible for the cash reward. As discussed in the next section, intrinsic motivation may be important for behavior change. Overall, these limitations support Troxel and Volpp's (2012) contention that the weak empirical designs of published studies do not allow researchers to infer the impact of monetary incentives on smoking cessation. Better-designed studies are needed.

²⁹ Crowding out of intrinsic motivation is an oft-cited reason for recidivism (Deci, Koestner and Ryan, 1999; Fehr and Falk, 2002). We review the evidence for crowding effects in the next subsection.

Of note, Volpp's own research is in line with the findings from (Cahill and Perera, 2011). Volpp et al. (2006) find that modest financial bonuses offered randomly through a U.S. Veterans Affairs hospital increase short-term cessation but not lasting quits. However, Volpp et al. (2009) find that larger financial bonuses (\$250 for six-month test passage, \$400 for 12-month test passage) offered through a workplace program increase both short-term cessation and lasting quits (with a treatment-on-the-treated effect of 5.8 percentage points).

Even if monetary incentives are not powerful enough to promote long-term quitting, in the short run they still may help projection-biased agents who under-value the benefits of quitting.

2.3.3 Intrinsic Motivation and Crowding Effects

Intrinsic motivation is the tendency to undertake an activity for its inherent desirability rather than for some external pressure or reward (Ryan and Deci, 2000*a*). One important aspect of voluntary commitment contracts is the integration of intrinsic motivation for change with external contract enforcement. According to the psychology literature, intrinsic motivation is essential to successful behavior change in general and to smoking cessation in particular (Curry et al., 2001; Curry, Grothaus and McBride, 1997; Deci, Koestner and Ryan, 1999). Likewise, the transtheoretical model, the dominant paradigm in health behavior change, suggests that intrinsically motivated individuals will be more successful.³⁰ A large literature in psychology suggests that extrinsic incentives can have unintended consequences; they can undermine, or "crowd out," task-specific intrinsic motivation (Deci, Koestner and Ryan, 1999). The monetary reinforcement for performing a task may decrease the effort that is put into the task.³¹

Economists have also studied how incentives can backfire in a principal-agent framework. Bénabou and Tirole (2003) models a case in which rewards serve as short-run positive reinforcers and long-run negative reinforcers. An agent tries to infer his or her own ability to complete a task based on the signal (reward offer) that the principal sends. Crowd-out is more likely in cases in which the agent has less information than the principal about task completion. The response also depends on how the incentives alter the agent's beliefs about the principal's motives and intentions.

Bowles and Polania-Reyes (2012) identify four overlapping mechanisms by which incentives crowd out social preferences (i.e., by which incentives and social preferences

³⁰The transtheoretical model views change as a process involving progress through a series of stages (DiClemente et al., 1991): precontemplation, contemplation, preparation, action, maintenance, and termination. Intrinsically motivated individuals in the transtheoretical model entail those who have contemplated change in behavior, those prepared for action, and those who have taken action. The evidence for stage-based interventions in changing smoking behavior is weak (Riemsma et al., 2003).

³¹Psychologists typically invoke self-perception theory or self-determination theory (or its sub-theory, cognitive evaluation theory) as arguments in favor of this claim (Bem, 1967; Ryan and Deci, 2000*b*). Note that the key tenet of self-perception theory—imperfect self-knowledge—is incorporated into the theoretical model in Chapter 3 to explain a key pathway through which social support may act.

are substitutes): 1) change in beliefs and preferences from inferring the intentions and beliefs of the principal or the nature of the task, 2) moral disengagement by signaling the appropriate situational behavior, 3) loss of intrinsic motivation, and 4) change in preferences by altering the perceived fraction of the population that has social preferences. Here, loss of intrinsic motivation refers to a situation where being compensated for an activity acts as “overjustification,” causing the agent to lose a sense of autonomy (Lepper, Greene and Nisbett, 1973). Bowles and Polania-Reyes (2012) review the literature on crowding effects based on the results from experimental games conducted in lab studies. They find that substantial evidence of crowd-out. Despite the strong findings from the lab, the field evidence of crowding effects is lacking (Cameron, Banko and Pierce, 2001). Other economists, notably Fehr and Falk (2002), have questioned the relevance and strength of the evidence base for economic applications. Studies fail to consider alternative interpretations for observed declines in effort following the removal of monetary rewards, such as negative reciprocity and loss aversion.

If the crowd-out hypothesis is applicable to the present study, then we expect to find higher relapse rates in the treatment group than in the control group.

2.4 Peer Effects

Peer effects encompass a range of concepts and potential causal pathways. This section narrows the focus to two constructs deemed most relevant for our present study: peer pressure and social support.

2.4.1 Peer Pressure

The social effects of peer pressure have been documented across a number of settings (Falk and Ichino, 2006; Mas and Moretti, 2009; Karlan, 2007; Gerber, Green and Larimer, 2008). Recognition of the importance of social pressure for increasing discipline and motivation dates back at least to the classic social psychology experiments of the 1950s and 1960s (Asch, 1951; Milgram, 1963). The Asch experiments provide a particularly striking example of the lengths to which some people go to gain *social approval*. Sociologists view peer pressure as important, in part because of its role in making social approval more salient. Social approval is the bedrock for sociological theories on social status, power, social norms, conformity, and reciprocity (Blau, 1964; Homans, 1961). Starting with Adam Smith, economists also have noted that social (dis)approval is a key motivating factor in non-market social interactions—see Fehr and Falk (2002) for a review of the literature.³² For example,

³²Fehr and Falk (2002) offers the following Adam Smith quotation, “We are pleased to think that we have rendered ourselves the natural objects of approbation, . . . , and we are mortified to reflect that we have justly merited the blame of those we live with” (Smith, 1759).

lab experiments find that people will sacrifice considerable amounts of money for the sake of social approval (Gächter and Fehr, 1999).

The interaction of social preferences with economic incentives is particularly relevant for the present research. A common thread running through such studies is the multiplicity of possible equilibria (Fehr and Falk, 2002; Bowles and Polania-Reyes, 2012). In particular, the introduction of economic incentives may reinforce or weaken the desire for approval. For example, parents who were subject to a fine for late arrival to picking up their child at day care were more likely to arrive late after the fine was introduced (Gneezy and Rustichini, 2000).³³ In the previous section, we summarized the arguments of Bowles and Polania-Reyes (2012) on the sign of the crowding effects. Fehr and Falk (2002) offer some additional insights on the circumstances when monetary incentives lead to an effort-enhancing social norm as opposed to an effort-decreasing norm. The authors suggest that the sign of the externality determines the type of effort norm. If hard work leads to a higher team bonus for some activity (a positive externality), the availability of the bonus should increase effort. In contrast, the late-arriving parents imposed a negative externality on day care staff, so the penalty lowered the parent's effort. Of course, the contingent cash bonus in the present intervention, described in Section 4.2.2, is a positive externality, which would be expected to increase effort, *ceteris paribus*.

Mutual monitoring is one important form of peer pressure. Rotating savings and credit associations (ROSCAs) are informal groups that embody the essence of mutual monitoring. Members contribute funds that are paid out to members on a rotating basis. Gugerty (2007) has proposed that ROSCAs serve as a commitment device for intertemporal savings. The commitment operates in part through monitoring and a public verbal commitment to save. All ROSCAs monitor participants' payments through a public process, even when a person contributes to her own pot. In many ROSCAs, members verbally commit to the use of some or all of the funds before they receive the pot. Groups often verify that their members meet their verbal promises. Yet, the specific reasons why ROSCAs have flourished around the world is a subject of debate (Bryan, Karlan and Nelson, 2010). One explanation views ROSCAs as formal contracts (Ambec and Treich, 2007). Another relies on the threat of social sanctions (Gugerty, 2007), which for example may prevent attrition from those members who receive the pot early on in the cycle. A third line of reasoning posits that ROSCAs impose discipline on members independent of peer involvement, namely by turning accumulated savings illiquid and holding members to a fixed schedule of payments (Basu, 2011). Resolution of this debate has important implications for whether or not to incorporate a peer component in the design of commitment devices.

Experimental evidence of mutual monitoring comes from a study in which microcredit clients were given a basic savings account and the opportunity to announce publicly to the microcredit group a savings goal for the coming week and the coming three-month credit cycle

³³ Rubinstein (2006) calls into question the study's results and reveals inconsistencies in the authors' data collection practices.

(Kast, Meier and Pomeranz, 2012). At each subsequent group meeting, members discussed whether each person met their previous week's goal. Members had to produce a bank deposit slip as proof. The group accountability intervention increased deposits three-fold over a low baseline level and increased the average balance in accounts by 65%. Among those whose self-assessed ability to reach their goals was higher than the average of their peers, their average monthly balance was 2.9 times higher in the peer treatment than with a regular savings account.

Joint liability is another strand of literature that is relevant for team contracts. Close-knit connections have better loan outcomes under joint liability, presumably because of improved monitoring and social support (Karlan, 2007). The strength of connections was measured by geographic distance and ethnic identity in Peru.

A growing literature documents peer effects on worker productivity. Workers increase productivity when working with more able friends and decrease when working with less able friends (Bandiera, Barankay and Rasul, 2010). Thus, the peer effects were heterogeneous. Strong peer effects on productivity also hold for cases in which colleagues may not be friends (Falk and Ichino, 2006; Mas and Moretti, 2009).

Team Incentives

Team incentives, which condition awards on team production, may trigger peer pressure by inducing a variety of responses: a sense of responsibility; feelings of guilt, shame, and embarrassment; fear of social sanctions; a desire to be liked or respected; and closer teammate monitoring. The literature on team compensation finds that these incentives can improve productivity (Hamilton, Nickerson and Owan, 2003; Jones and Kato, 1995; Knez and Simester, 2001).^{34,35} For example, (Bandiera, Barankay and Rasul, Forthcoming) evaluate the impact of rank and tournament incentives on productivity and team composition of workers at a fruit producer in the UK. The firm switched paying workers an individual piece rate to a team piece rate. Halfway through the season, the firm added incentives based on a team's productivity ranking relative to other teams. Later, the firm introduced a tournament in which the most productive team earned a bonus. The authors find that introducing rank incentives reduces average productivity by 14%, whereas introducing tournament incentives increases it by 24%. These findings highlight the importance of the structure of the team incentive scheme for promoting productivity.

Babcock et al. (2011) conduct two separate experiments that adopt a similar incentive scheme to the one we use. One experiment paid undergraduate students to study in the

³⁴ Group incentive schemes may also lead to free-riding (Olson, 1965). Shirking is not a concern in our setting, where the payoffs depend on both agents exerting effort.

³⁵ Our work relates to voluminous literatures in health and education on peer effects and the influence and relationships among social network ties (e.g., Sacerdote, 2001, 2011; Carrell, Hoekstra and West, 2011; Smith and Christakis, 2008); Leahey et al., 2010). In some cases, the underlying pathways may relate to peer pressure.

library, and the other paid students to attend the gym. The experiments had a similar setup, with participants randomly assigned to a control condition, individual treatment condition, or group treatment condition. Control participants in the pay-for-study (or pay-for-exercise) experiment earned a payment of \$2 (or \$0) per visit. Those in the individual treatment condition earned a \$25 bonus for attending the library (or gym) at least four (or five) times during a two-week period. Those in the group treatment condition earned a \$25 if both team members reached the same visit threshold. All participants were also eligible to win \$50 in a lottery. One distinguishing feature of the pay-for-study experiment is that those in the team condition were randomly assigned to have a teammate from the same class or an anonymous teammate from a different class. In the exercise study, teammates were drawn from the same class. Babcock et al. (2011) find that, compared to equal-sized individual incentives, the team incentives are more effective for studying and at least as effective for exercise, despite the team incentives necessarily having a smaller expected payoff. However, participants paired with an anonymous teammate were less effective at studying than were those in the individual or team treatments. The authors also estimate a parameter for the social effect as part of a structural model. Their structural estimates imply that individuals care about their teammates' payoff twice as much as their own payoff in the pay-for-study experiment and two-thirds as much in the pay-for-exercise experiment. With an anonymous teammate, the implied social factor is 0.86 but no longer significant. Teammates did not appear to coordinate their visit times, which the authors interpret as the team benefits not owing to social commitment or production complementarities. They conclude that some other factor, such as "guilt, shame, altruism, embarrassment, fear of reprisal, commitment devices unrelated to joint attendance, and other social factors" are possible mechanisms. A weakness of Babcock et al. (2011) is that the study tracks a small number of college students for one month only (two weeks post-enrollment) and does not include any outcomes after the incentives ended. A second weakness is that the study did not collect individuals' perceived beliefs about their teammates' performance; rather, the authors tested a number of scenarios under different assumptions about the beliefs participants held in order to bound the estimates. We build on this promising design to test team incentives in a realistic field setting designed to have (and test) longer-term effects. We also use subjects' reported beliefs about their teammate in order to pin down the magnitude of the social effects.

Social Commitment

Only a handful of studies examine the use of peer pressure as a commitment mechanism for present-biased individuals (Dupas and Robinson, 2013; Gugerty, 2007; Kast, Meier and Pomeranz, 2012; Kullgren et al., 2012; Dupas and Robinson, 2013). These studies conclude that social commitment and peer monitoring can help individuals to reach their goals, in most cases to save money as part of an informal savings group. Kast, Meier and Pomeranz (2012) find that self-help peer groups in Chile doubled savings when members had to publicly declare a weekly savings goal, whose attainment was publicly verified and acknowledged at

a future meeting. In a separate experiment, they conclude that inducing peer pressure by sending text messages about the participant's success to a non-participating friend is no more effective than sending reminders to the participant. We also test the effects of our intervention above and beyond verbal commitment (see Section 4.2.2). Dupas and Robinson (2013) find that a health savings product that offers credit and social commitment as part of a rotating savings and credit association (ROSCA) stimulated health investments, compared to several types of commitment savings products and a non-earmarked account. The authors conjecture that the credit aspect induced people to begin saving, and the social pressure aspect compelled them to make regular deposits. This rationale is similar to the present study, in which we offer monetary incentives to induce participation and then supplement monetary commitment with social commitment.

Using a design somewhat similar to ours, Jeffery et al. (1983) randomly assigned overweight men to a weight loss contract with six experimental conditions. The study had a $[2 \times 3]$ factorial design with two contract types (individual and group) and three contract sizes (\$30, \$150, and \$300). Half were assigned to a contract contingent on individual weight loss of 30 pounds, and half were assigned to a contract contingent on mean group weight loss of 30 pounds. The contracts covered a period of 15 weeks. The authors do not explicitly state the composition of groups, such as the number per group, although the groups likely correspond to the six treatment conditions (i.e., 13 to 17 participants per group). In addition, forfeited deposits were distributed equally among those who achieved the 30-pound goal. The authors do not state if participants were informed of this incentive in advance. As expected, take-up was inversely related to contract size, although the differences were insignificant, most likely because of the small sample size. Baseline weight was not balanced across treatment conditions, with mean weight increasing with contract size for both contract types. Despite the small sample size—and perhaps as a result of baseline differences—those individuals in the team contract condition lost more weight initially and sustained greater weight loss up two years after recruitment compared to the individual contract condition (14.4 lbs. vs. 8.1 lbs.). Larger contracts resulted in higher rates of contract goal attainment and greater post-treatment weight loss but these differences disappeared over time. Jeffery et al. (1984a) extend the follow-up period for the same study participants to two years. At that time, no differential effects were observed by contract size, but weight loss continued to be higher in the group contract condition than in the individual contract condition.

Our study adds to this nascent literature by clarifying the role peer pressure can play in adhering to health-promoting behavior.

2.4.2 Social Support

Psychologists characterize social support in a number of ways. One classification scheme differentiates three types of support (May and West, 2000): structural support, functional support, and the social environment. Structural support is the existence of family, friends, and other social networks within an individual's environment. Functional support

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is the quality of relationships within an individual's network, and has two components: instrumental support and emotional support. Instrumental support involves receiving practical assistance or information from a social network member and includes a person's willingness to engage in collective action, such as the team commitment contract tested here. Emotional support involves empathetic understanding. The social environment may be important for health behaviors, for example, whether or not friends and colleagues smoke. Most social support interventions, including the present one, try to influence the functional support available to a person.

Social support programs have strong links to attempts at changing health behaviors. For example, support groups such as Alcoholics Anonymous have recruited millions of members. New members are assigned a *sponsor*, who introduces the person to the group philosophy and provides guidance on how to maintain sobriety based on experience. In other words, the sponsor's primary function is informational exchange, or instrumental support. Many programs, such as Weight Watchers, also assign members to pairs.

Several studies show that social support in the form of group therapy for smoking cessation is superior to self-help, but its effectiveness relative to individual therapy has not been settled (Fiore et al., 2009; Stead and Lancaster, 2005). One attraction of a buddy system or encouraging partner support is the low marginal cost of adding the component to an existing intervention. Pairs of smokers or existing pair bonds may have the capacity to support and motivate each other to quit. However, the literature on buddy interventions for smoking cessation has yielded mixed results (May and West, 2000; Park, Tudiver and Campbell, 2012). Partner interventions may lead to higher short-term abstinence rates relative to individual therapy (West, Edwards and Hajek, 1998), but they have rarely demonstrated long-term effects. One limitation is the poor research methodology of many of the studies. Another limitation is that many interventions in this literature do not pair a person with an existing friend. One would expect that the level of emotional and instrumental support would be lower in random pairings than in existing relationships. The largest and best-designed trial to assess a social support intervention for smoking cessation found that the buddy system did not improve abstinence rates (May et al., 2006). However, all individuals in that study engaged in group therapy. If the group therapy already provided some degree of support, then it may have limited the scope for raising support levels using the buddy system.

In the previous section, we considered the interaction of peer pressure and incentives. There is one high-quality study that examines the interaction of social support and incentives. The authors test the use of incentives alone compared to incentives coupled with group therapy and find that social support provides an independent effect above and beyond the incentives, leading to higher long-term quit rates (Jason et al., 1997; McMahon and Jason, 2000). That study concludes that social support has a direct effect on smoking abstinence; it does not act as a mediator or effect modifier on the path between stress and quitting.

The collectivist tradition in Thailand and other parts of Asia may give special potency to group-based interventions attempted there (Hofstede, 1980). However, Asian cultures tend

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to be less comfortable with proactively seeking support from close network ties out of concern for negative relational consequences and disruption of group harmony (Kim, Sherman and Taylor, 2008). Psychologists have proposed and found some support for the idea that Asians rely on *implicit* emotional support, defined as the emotional support one obtains from social networks without disclosing one's problems (Kim, Sherman and Taylor, 2008).

Chapter 3

Theoretical Model

This study aims to test theoretical predictions developed in a series of papers on self-control (Bénabou and Tirole, 2004, 2002; Battaglini, Bénabou and Tirole, 2005). This chapter starts with an overview of our theoretical model based on the last, and most relevant, paper in the series. It then presents a technical elaboration of the model and the comparative statics as applied to our team commitment intervention.

3.1 Model Overview

Our social learning model of self-control in teams is adapted from the work of Battaglini, Bénabou and Tirole (2005). It yields predictions about how certain behavioral biases affect smokers and in turn how smokers afflicted with these biases will influence each other when placed in two-person teams analogous to our intervention.

A key feature of the model is that present-biased agents learn about their own likelihood of exerting self-control by observing the actions of a teammate. Social learning operates in our setting through two channels. First, teammates' actions directly enter each others' payoffs via the team bonus. A person's motivation and choice of effort will depend on her self-assessed probability of earning the team bonus, which in turn depends on how likely she deems her teammate to show self-restraint.³⁶ Second, a person may gain (or lose) self-confidence after observing the successes (or failures) of a teammate. This occurs because agents possess two traits: imperfect self-knowledge and imperfect recall of past actions.³⁷ Imperfect self-knowledge leads a person to try to intuit her ability to show self-control by examining her own past actions. She fears creating behavioral precedents, whereby a lapse today increases the likelihood of impulsivity in the future, leading to a concern for

³⁶ We assume in this section and in ?? that the agent is female, and her teammate is male.

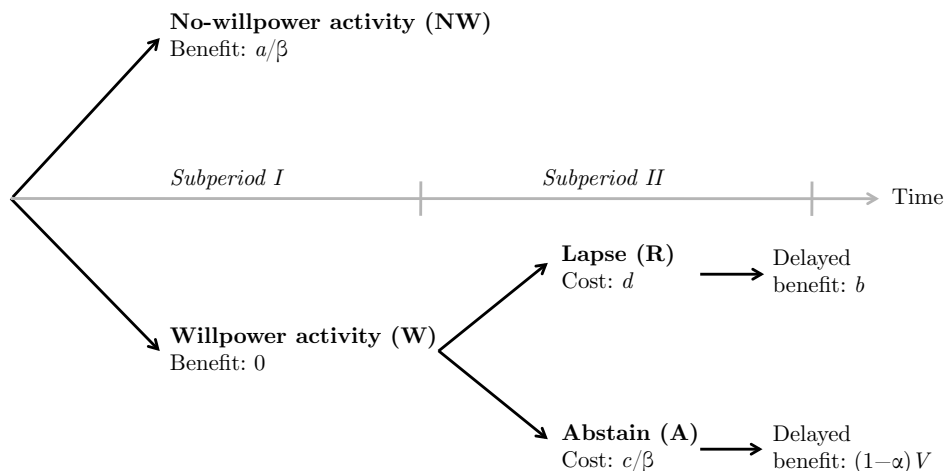
³⁷ The cognitive psychology literature has long studied imperfect self-knowledge and people's poor insight into their own cognitive processes (Bem, 1967; Nisbett and Wilson, 1977; Ross, 1977). Recall of cravings, pain, and discomfort tend to be systematically biased (Loewenstein, 1996; Loewenstein and Schkade, 1999; Kahneman, Wakker and Sarin, 1997). In addition, people selectively "forget" past lapses, often attributing successes to personal factors and failures to situational factors (Miller and Ross, 1975; Bradley, 1978). This can manifest itself as overconfidence in one's skills and abilities (Svenson, 1981). Several studies find that individuals are overoptimistic about their ability to exercise self-control, which is compatible with partial naïveté with respect to present bias (DellaVigna, 2009).

self-reputation (Bénabou and Tirole, 2004). However, imperfect recall of past actions means that a self-evaluation of one’s history is not reliable. Consequently, a person turns to others to glean information about her own ability to show self-control. The model characterizes the impact of teammates on individuals with weak self-control (“weak types”), for whom good news or bad news from a teammate can be decisive, as opposed to strong-willed agents (“strong types”) who resist temptation regardless of teammate type.

Battaglini, Bénabou and Tirole (2005) show that teams can produce positive or negative spillover effects for weak types. Although the positive aspects of teamwork are often touted, it is important to recognize that in theory team-based interventions could also be harmful. Encouraging reports of a teammate’s self-control increase one’s own chances of exerting self-control in a “good news equilibrium” and discouraging reports about a teammate’s self-control decrease one’s own chances of exerting self-control in a “bad news equilibrium”. At times, we refer to the positive spillovers from good news as an *encouragement effect* and the negative spillovers from bad news as a *discouragement effect*. According to the model, two factors determine the equilibrium state: 1) beliefs about a teammate’s self-control and 2) informativeness of a teammate’s actions. Beliefs matter, as stated above, because of teammates’ correlated payoffs and a person’s reputational concerns. Informativeness is based on the similarity of teammates, both in terms of how similar they perceive each other’s self-control to be and the strength of their social ties. As the “correlation” between teammates strengthens, Battaglini, Bénabou and Tirole (2005) show that self-restraint and welfare improve in the good news equilibrium and deteriorate in the bad news equilibrium.

3.2 Model Setup

We follow the general setup of Battaglini, Bénabou and Tirole (2005), hereafter BBT (Figure 3.1). We also embed peer pressure, financial commitment, and a projection bias parameter in the BBT model in order to expand the set of model predictions and to tailor the model to our team commitment context. Imagine a game with two periods, $t = 1, 2$, each with two subperiods. The dynamic setup enables agents to generate concerns for self-reputation and thus gives rise to informational externalities from teammates. A present self and a future self decide consumption of an addictive good at t_1 and t_2 , respectively. In the first subperiod, the agent decides whether or not to exert self-control over the addictive behavior, say smoking. Choosing to smoke, denoted no willpower (NW), delivers an immediate payoff a , whereas exercising willpower (W), delivers no immediate payoff. In the second subperiod, the decision maker lapses (R) or abstains from smoking (A). Abstaining has an immediate psychic and physical cost $c > 0$ from effort, nicotine cravings, withdrawal symptoms, and delivers a delayed benefit $V = V(H, m)$ that is a function of the health gains (H) and monetary rewards (m) contingent on quitting. During an unassisted quit attempt, giving up in the second subperiod entails no cost ($d = 0$), whereas $d > 0$ in the presence of social sanctions (s) or forfeited deposits from a commitment contract (k), both of which

Figure 3.1: Decision Tree of Payoffs for Any Given Period $t = 1, 2$ 

Note: Adapted from Battaglini, Bénabou and Tirole (2005). Key alterations include the addition of a projection bias parameter and the cost of a lapse d .

are discounted to the present. A lapse yields a delayed benefit b such that $a < b < V$. We follow BBT and assume that $b > a$, implying that some restraint has value as a signal to oneself and to others about the degree of self-control one possesses. Self-signaling restraint can induce a future self to show additional restraint.

The model incorporates behavioral parameters for present bias and projection bias. A hyperbolic discounting parameter $\beta \in [0, 1]$ captures the agent's present bias.³⁸ For a time-consistent smoker, $\beta = 1$. The present-biased smoker places undue emphasis on satisfying an immediate urge in the first subperiod relative to *ex ante* preferences and similarly discounts the future benefits of quitting too heavily in the second subperiod because the cravings and withdrawal are particularly salient ($\beta < 1$).³⁹ Following Loewenstein, O'Donoghue and Rabin (2003), we also add to the model a projection bias parameter $\alpha \in [0, 1]$ that represents the degree to which agents project their current preferences on predictions of future utility. In so doing, projection-biased smokers ($\alpha < 1$) under-value the

³⁸ Building on the work of Strotz (1955), Pollak (1968), and others, the β - δ model generates preference reversals by embedding in the standard utility function an additional discount factor β on utility earned in future time periods (Laibson, 1997). Hyperbolic discounting is also an empirical regularity (Ainslie, 1992).

³⁹ In principle, the self-control parameter could differ in each subperiod (Bénabou and Tirole, 2004). Because our main concern is the choice at the decision node between A and R we assume without loss of generality that β is fixed over time.

benefits V they will reap from abstaining, down-weighting them by a factor of $1 - \alpha$.⁴⁰ For a smoker without projection bias, $\alpha = 1$.

Two main features of the BBT model are: 1) state-contingent present bias and 2) imperfect self-knowledge about one's degree of present bias. Degree of self-control is represented as $\beta \in \{\beta_L, \beta_H\}$, where β_L implies weak self-control and β_H strong self-control.⁴¹ Smokers do not know their type at the start of Period 1; rather, they have common priors ρ and $1 - \rho$ on β_H and β_L . These beliefs may be interpreted in several ways. They correspond roughly to predicted self-control, $\hat{\beta}$, in the β - δ model (O'Donoghue and Rabin, 1999). As $\hat{\beta} \rightarrow \beta$, an agent is more aware of her time-inconsistency and more likely to seek a commitment device to maintain self-discipline. We later use the time path of these predictions to discern a person's degree of naïveté with respect to present bias. More generally, the priors may be interpreted as *self-efficacy beliefs* about quitting smoking. As discussed in Section 2.1.1, self-efficacy refers to self-confidence in one's abilities to undertake a set of actions (Bandura, 1998).⁴²

We first consider equilibrium in the absence of external incentives ($d = 0$) and in Section 3.4 we discuss the implications for our intervention when $d > 0$. In Period 1, abstaining is a dominant strategy for a strong-willed person (β_H), whereas a weak type (β_L) prefers not to exercise self-control in the absence of reputational concerns (i.e., if current behavior will not influence future decisions):

$$(1 - \alpha)V - \frac{c}{\beta_L} < b - d < (1 - \alpha)V - \frac{c}{\beta_H} \quad (3.1)$$

The exposition below concentrates on the decisions of weak-willed agents, whose choices depend on self-reputation and social spillovers. The maximum value of self-reputation is the discounted difference between choosing no self-control (NW) and choosing self-control but lapsing (Bénabou and Tirole, 2004), as seen in Equation 3.2. A weak type resists temptation (chooses A) in Period 1 if:

$$(1 - \alpha)V - \frac{c}{\beta_L} + \delta(b - a) > b - d \quad (3.2)$$

In other words, the person shows restraint when the benefits from abstaining, including from self-signaling, eclipse the craving costs.

⁴⁰ Predicted future benefits are a weighted sum of current and future tastes: $\hat{V}_1 = \alpha V_0 + (1 - \alpha)V_1$. We normalize $V_0 = 0$.

⁴¹ Bénabou and Tirole (2004) and Esther Duflo, Michael Kremer and Jonathan Robinson (2011) follow a similar approach. Alternatively, BBT specify that agents differ in the severity of their cravings and withdrawal, such that $c \in \{c_L, c_H\}$. We adopt the former approach, given that commitment contracts are hypothesized to relate to short-term time preferences. In contrast, pharmacological aids, such as nicotine replacement therapy, act by reducing craving costs c .

⁴² Self-efficacy is a more appropriate construct in this context than is self-esteem, which implies a person's overall sense of self-worth. We use self-confidence synonymously with self-efficacy.

At the start of Period 2, the smoker displays self-control only if sufficiently confident that her future self will resist temptation. Otherwise, the craving costs are not worth enduring. Let ρ' denote the person's updated prior in Period 2. *Ex post* the weak type, who is tempted to light up, chooses W if:

$$\rho'[(1 - \alpha)V - c] + (1 - \rho')(b - d) > \frac{a}{\beta_L} \quad (3.3)$$

Equation 3.3 implies a threshold condition for the level of self-confidence needed to choose W in Period 2: $\rho' > \rho^*$, where ρ^* is defined as:

$$\rho^*[(1 - \alpha)V - c] + (1 - \rho^*)(b - d) \equiv \frac{a}{\beta_L} \quad (3.4)$$

At the point of indifference between W and NW , the payoff from lighting up is balanced by the expected utility from attempting to exert self-control.

3.3 Equilibrium Self-Restraint

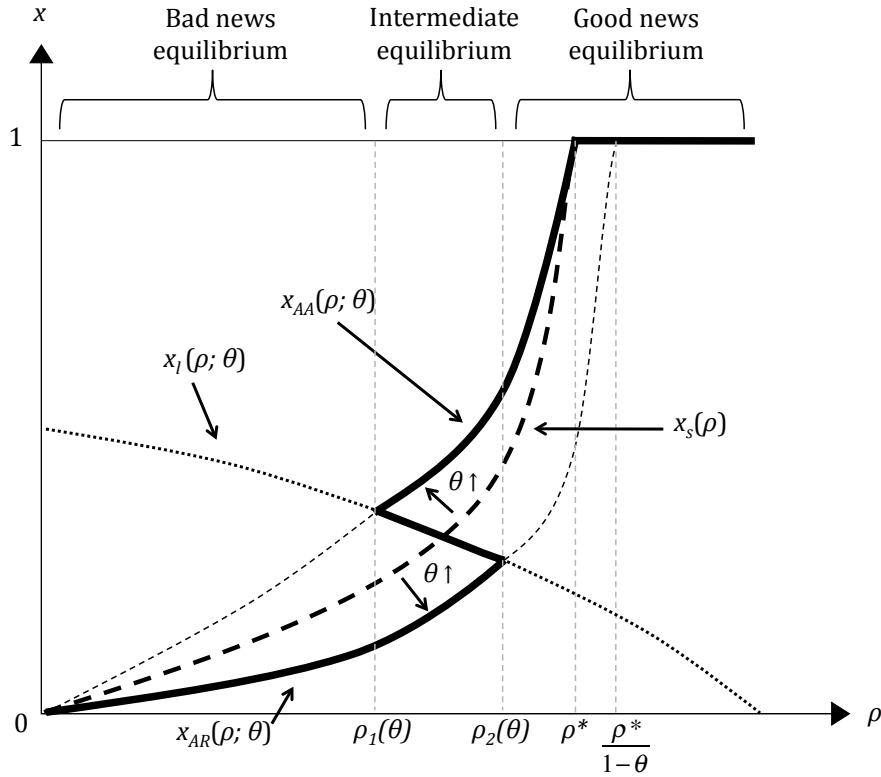
BBT characterize the equilibrium strategy for the subgame where the decision node between A and R has been reached in Period 1, using a perfect Bayesian equilibrium as the solution concept.⁴³ The outcome of this subgame determines the success of any quit attempt.

BBT adopt a single-agent benchmark for assessing equilibrium behavior. Let $x_s(\rho)$ represent the strategy of a single agent. In equilibrium, a strong-willed smoker always abstains in Period 1 (Equation 3.1). A weak-willed smoker abstains with probability 1 only if her confidence is sufficiently high, that is, if $\rho \geq \rho^*$. For lower levels of self-confidence such that $\rho < \rho^*$, the weak type will only show self-restraint (i.e., pool with the strong type) if observing abstinence at t_1 is sufficiently good news as to raise Self 2's posterior probability from ρ to ρ^* . At that point, the person would be willing to randomize between W and NW . BBT call this condition the *informativeness constraint*, $\Pr_{x,\rho}(\beta = \beta_H|A) = \rho^*$. It uniquely defines the equilibrium strategy for the weak single agent as an increasing function $x_s(\rho)$, shown in Figure 3.2. The probability of abstaining in Period 1 increases with self-confidence, starting at the origin and reaching one at $\rho = \rho^*$.

Turning to the two-agent case, the equilibrium outcome depends on expectations for a teammate's self-control and the similarity in the degree of self-control between teammates. Agents rely on observing the smoking decisions and display of self-control from teammates in order to learn about their own ability to quit. The extent to which a person learns from others depends on how relevant she views the display of self-control of those around her. A

⁴³ PBE is appropriate for cases in which an agent is one of several types (e.g., strong-willed and weak-willed) and information about type is incomplete.

Figure 3.2: Equilibrium Self-Restraint in a Homogeneous Pair



Note: Adapted from Battaglini, Bénabou and Tirole (2005). The upward-sloping dashed line (---) denotes the single-agent case; the solid line (—) denotes the two-agent case.

setting with homogeneous pairings provides the key testable predictions for our study.⁴⁴ Let members $i \in [1, 2]$ of dyad j have the same level of confidence level in each other's self-control, $\rho^1 = \rho^2 = \rho$. We further assume that the agents undertake the same strategy, $x^1 = x^2 = x$. Let $\theta \in [0, 1]$ be the degree of informativeness of a teammate's self-control, where $\theta = 0$ implies that a teammate's self-control is independent of the index person's beliefs and $\theta = 1$ implies that the teammate's self-control fully determines the index person's beliefs. BBT define θ as part of the conditional probabilities of being a strong or weak type:

$$\begin{aligned} \pi_{HH} &\equiv \Pr(\beta' = \beta_H | \beta = \beta_H) = \rho + \theta(1 - \rho) \\ \pi_{LL} &\equiv \Pr(\beta' = \beta_L | \beta = \beta_L) = \theta\rho + (1 - \rho) \end{aligned} \quad (3.5)$$

⁴⁴BBT extend the model to the case of heterogenous pairs and find qualitatively similar results, with somewhat richer predictions that we are under-powered to test. A person's *ex ante* welfare is hump-shaped with respect to her teammate's probability of exercising self-restraint in Period 2. A person maximizes *ex ante* welfare when paired with a teammate who has a slightly worse self-control problem than one's own, making his successes more encouraging and his failures less discouraging.

We can denote $\mu_{AR}(x; \rho, \theta)$ as the posterior probability that Agent 1 is a strong type, given that she abstained (chose A) but her teammate Agent 2 lapsed (chose R) in the first period and that weak types play A with probability x . Let $\mu_{AA}(x; \rho, \theta)$ be the posterior that both played A in the first period. The event AA is a “good news” state where the agent observes her teammate displaying self-control, and the event AR is a “bad news” state where the agent observes her teammate succumbing to cravings. BBT show that in equilibrium, the following equation holds:

$$x_{AR}(\rho; \theta) \leq x \leq x_{AA}(\rho; \theta), \quad (3.6)$$

where

$$\begin{aligned} x_{AA}(\rho; \theta) &\equiv \max\{x \in [0, 1] \mid \mu_{AA}(\rho; \theta) \geq \rho^*\}, \\ x_{AR}(\rho; \theta) &\equiv \min\{x \in [0, 1] \mid \mu_{AR}(\rho; \theta) \leq \rho^*\} \end{aligned} \quad (3.7)$$

Equation 3.6 says that a person whose teammate lapses has a weakly lower probability of self-restraint than a person whose teammate abstains. This condition defines two curves in Figure 3.2, a shift up of the single-agent curve in the good news state to $x_{AA}(\rho; \theta)$ and a shift down of the single-agent curve in the bad news state to $x_{AR}(\rho; \theta)$. Intuitively, bad news (teammate plays R) reduces a person’s reputational gain from playing A , a *discouragement effect* that lowers the person’s probability of abstaining. Good news (teammate plays A) does the reverse, leading to an *encouragement effect* that increases a person’s probability of abstaining. Both equilibria exist for an intermediate range of values $x_I(\rho; \theta)$, characterized in equilibrium as a downward-sloping curve. As θ increases, x_{AR} pivots down and x_{AA} pivots up. In other words, as a teammate’s actions become more informative, the probability of self-restraint improves with good news and deteriorates with bad news.

BBT formalize the equilibrium self-restraint as follows:

Proposition 1. *The set of equilibria is fully characterized by two threshold functions $\rho_1(\theta) : [0, 1] \rightarrow [0, \rho^*]$ and $\rho_2(\theta) : [0, 1] \rightarrow [0, \rho^*/(1 - \theta)]$ such that:*

- (i) *For $\rho < \rho_1(\theta)$ there is a unique equilibrium of the “bad news” type: $x = x_{AR}(\rho; \theta)$.*
- (ii) *For $\rho > \rho_2(\theta)$ there is a unique equilibrium of the “good news” type: $x = x_{RR}(\rho; \theta)$.*
- (iii) *For $\rho \in [\rho_1(\theta), \rho_2(\theta)]$ there are three equilibria: $x_{AR}(\rho; \theta)$, $x_I(\rho; \theta)$, and $x_{AA}(\rho; \theta)$.*

Moreover, for any $\theta > 0$, $\rho_1(\theta) < \rho_2(\theta)$, but as correlation converges to zero, so does the measure of the set of initial conditions for which there is a multiplicity of equilibria: $\lim_{\theta \rightarrow \infty} |\rho_2(\theta) - \rho_1(\theta)| = 0$

3.3.1 Projection Bias

The theoretical model assumes that the returns to quitting are subject to projection bias regarding the benefits of being smoke-free. Our framework provides an opportunity to test

this assertion using a difference-in-differences test developed by Acland and Levy (2012). Let $g = \{0, 1\}$, where 0 corresponds to no intervention and 1 corresponds to team commitment. Further, let $\omega_{t,g}(x; \rho, \alpha, \theta)$ be a weak agent's valuation at time $t \in \{pre, post\}$ of the net expected gains of choosing A . It follows that, if Self 1 plays strategy x and Self 2 plays a pure strategy following AA and RR , then a projection-biased agent's *ex ante* and *ex post* valuations are:

$$\begin{aligned}\omega_{pre,g}(x; \rho, \alpha, \theta) &= (1 - \alpha)V - b - \frac{c}{\beta_L} + \delta[(1 - \theta)\rho + (1 - (1 - \theta)x)(b - a)] \\ \omega_{post,g}(x; \rho, \theta) &= V - b - \frac{c}{\beta_L} + \delta[(1 - \theta)\rho + (1 - (1 - \theta)\rho)x](b - a).\end{aligned}\tag{3.8}$$

Ex ante a smoker in an addicted state discounts the benefits of being in a smoke-free state by $(1 - \alpha)$ (first equation above), whereas once the benefits V are realized *ex post*, participants value them fully (second equation above). We take advantage of the fact that the intervention exogenously increases the likelihood that treated participants will exit the addicted state relative to control participants, and thus the treatment group will be more likely to accurately perceive the benefits of being smoke-free. In other words, we hypothesize that the difference-in-difference in predictions of the gains to quitting, $(\omega_{post,1} - \omega_{pre,1}) - (\omega_{post,0} - \omega_{pre,0})$, is weakly positive for projection-based agents (Acland and Levy, 2012).

3.4 Comparative Statics

Table 3.1 summarizes the comparative statics that follow directly from the model. Our empirical model is under-identified for estimating the structural parameters from this model, although we hope to do so in future work. Our model's key testable prediction is that team effects are heterogeneous with respect to the "correlation" between a person and her teammate's confidence in showing self-control (θ). The model also suggests that the probability of showing self-restraint increases with: a person's self-confidence (ρ^1), a teammate's self-confidence (ρ^2), and the degree of self-control (β). Self-restraint decreases with the degree of projection bias (α). Several additional predictions are less model-specific. For example, self-restraint increases with the long-run payoff of abstaining from smoking ($V = V(H, m)$), where the benefits include both the health gains (H) and monetary rewards (m) contingent on abstaining. Self-restraint also increases with the cost of lapsing ($d = d(k, s)$), notably the amount of deposits committed to the person's savings account (k).

Team commitment contracts manipulate several model parameters. First, team commitment increases the cost of a lapse (d) through an increase in the social and monetary costs of failing to quit smoking. A person has control over the financial stake in quitting

Table 3.1: Comparative Statics from Theoretical Model

#	Parameter	Description	Shift in Pr(Self-restraint) if parameter increases
1	ρ^1	A person's self-confidence	+
2	ρ^2	A teammate's self-confidence	+
3	θ	“Correlation” in teammate's type	
		With “good news” (both confident)	+
		With “bad news” (both not confident)	–
4	α	Degree of projection	–
5	β	Degree of self-control	+
6	V	Long-run payoff from abstaining	+
7	H	Health gains from abstaining	+
8	m	Monetary rewards from abstaining	+
9	c	Cost of abstaining	–
10	d	Cost of a lapse	+
11	k	Amount of deposits	+
12	s	Social costs of failure	+

Note: A “+” shift indicates an increase in the probability of self-restraint, and a “–” shift indicates a decrease in the probability of self-restraint. Indenting of the description indicates that the subcategory is a function of the category in which it falls.

through the amount deposited in the commitment savings account. A weak type will become more likely to resist temptation as the account balance increases (as seen from Equations 3.2 and 3.3).

Second, the strength of social ties between teammates enters the model in two ways. On the one hand, a stronger partnership increases the social cost of failure as part of d , which is predicted to increase the likelihood of perseverance. On the other hand, stronger social ties will increase the informativeness of a teammate's actions (θ). In such a case, a stronger tie will accentuate the team effects, whether positive or negative. *Ex ante* a stonger dyadic relationship will make the pairing of two strong types stronger (via both channels), and will make the pairing of two weak types weaker as long as the informativeness of observing a close friend outweighs the social cost of letting down that friend.

Third, the team bonus enhances the returns to quitting (V). This feature is predicted to increase the probability of quitting, relative to a control group. Incentivizing the quit attempt is especially helpful for projection-biased smokers in an addicted state, who under-predict

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the extent to which they will enjoy being smoke-free. Team incentives also increase the degree to which a teammate's self-confidence matters for one's own effort choice (θ) by introducing correlated payoffs. As θ increases, the non-monotonic nature of the team effects are reinforced, strengthening the encouragement and discouragement effects. In the latter case, team commitment contracts may exacerbate self-control problems, particularly among pairs in which both members deliver bad news (i.e., in which both have low self-confidence).

Chapter 4

Experimental Design and Methods

This chapter provides a detailed description of the study design. We begin with the study's research questions and hypotheses and continue with a description of the study site and the field design. We then describe the empirical strategy for the study, starting with a description of the data, including the key variables and how each is measured. The section proceeds with a description of the estimating equations for testing the research hypotheses.

4.1 Research Questions and Hypotheses

Our study attempts to address several research questions, which in turn inform a set of research hypotheses.

1. Does demand exist for smokers to enter into team commitment contracts?

Hypothesis 1: Smokers are willing to take up the team commitment contracts.

The feasibility of the intervention rests on it being an acceptable, desirable approach for smokers.

2. Are team commitment contracts more (cost-)effective than the provision of basic counseling and education about smoking cessation?

Hypothesis 2a: Team commitment contracts lead to higher quit rates than receiving education and counseling only.

Only one study has demonstrated that individual commitment contracts improve the likelihood of quitting (Giné, Karlan and Zinman, 2010). Our study is the first to examine the value of team commitment contracts for smoking cessation.

Hypothesis 2b: Team commitment contracts are more incrementally cost-effective than receiving education and counseling only and popular clinical approaches for smoking cessation in Thailand.

Giné, Karlan and Zinman (2010) find that individual commitment contracts are an affordable approach. No study has compared the cost-effectiveness of commitment contracts to that of clinical approaches.

3. Do smokers display signs of decision-making biases?

Hypothesis 3a: Smokers are overly optimistic about likelihood of quitting.

We expect smokers to be naïvely present biased about their smoking behavior, consistent with the literature reviewed in Section 2.1, although direct evidence of naïveté for smoking is largely anecdotal.

Hypothesis 3a: Smokers are projection biased about how their preferences for smoking will change after they quit.

Levy (2010) provides the only field evidence of projection bias in smokers.

4. What types of smokers and deposit patterns are most likely to result in a successful quit attempt, by treatment condition?

Hypothesis 4a: The following baseline characteristics positively interact with the treatment condition to increase the likelihood of quitting: (a) intention to quit, (b) subjective predictions for quitting, and (c) inconsistent time preferences.

Understanding the types of participants who benefit from commitment contracts is crucial for targeting the roll-out of contracts to smokers in other contexts. The intervention is expected to help those who want to quit, those who have confidence in their ability to quit, and those who have present bias.

Hypothesis 4d: Quitters will contribute more money and contribute more frequently to their commitment savings accounts than do non-quitters.

Previous studies have found a similar relationship. It is important to confirm that the relationship holds for team contracts as well. Moreover, the results will indicate if the shorter deposit length compared to the Philippines study preserves the relationship between deposit intensity and quitting.

5. Do teammates affect each other's outcomes?

Hypothesis 5a Quitting increases with the strength of teammates' social ties.

Most partner interventions form pairs of strangers. It is important to gauge if stronger bonds are more effective.

Hypothesis 5b A teammate’s outcome causally affects an index person’s outcome.

The potential of team contracts, and team interventions in general, rests in part on the estimation of this parameter.

Hypothesis 5c Team effects are nonlinear with respect to baseline quit predictions.

This prediction, which arises directly from the theoretical model discussed in Chapter 3, has implications for how individuals might be sorted into pairs for maximizing the number of successful quitters.

4.2 Study Design

4.2.1 Study Site

We recruited smokers from villages in six subdistricts in central Thailand (Figure 4.1).⁴⁵ Each village has about 500 residents and 400 adults, and most people from the same village know each other.⁴⁶ Median household income in the area is roughly \$10 per day (Thailand National Statistics Office, 2008). Even though the study area lies within 100 miles of Bangkok, the local economy is predominantly agrarian. The area includes a mix of majority-Buddhist and majority-Muslim communities, and, for many residents, community life is oriented around religious activities and celebrations held at the local Buddhist temple or mosque. Four of the subdistricts lie within the catchment area of the region’s major academic medical center, where the study team was based.

Thailand was an early adopter of tobacco control regulations in the region, starting in the early 1990s. Regulations include pictorial warning labels on cigarette packs, relatively high excise tax rates, bans on the display of tobacco at the point of sale, and comprehensive advertising bans. Thanks in part to these policies, daily smoking prevalence among men fell from 56% in 1991 to 37% in 2006 (Levy et al., 2008). The female smoking prevalence has remained under 5%. Roughly 41% of Thai men are daily smokers, compared to 36% of urban men (World Health Organization, 2009a).⁴⁷ As many as half of Thai smokers use hand-rolled tobacco that can cost as little as \$0.10 per pack-equivalent, as opposed to

⁴⁵ The subdistricts, which span three districts in Nakhon Nayok province, are: Bueng San, Chumpon, Khao Phoem, Klong Yai, Ongkharak, and Pak Phli. Four of the six subdistricts lie within Ongkharak district.

⁴⁶ According to village-level census data provided by *tambon* officials, the mean population of study villages is 542 residents, with a range from 190 to 1,450. The mean number of adults is 390, with a range from 146 to 956.

⁴⁷ Globally, the smoking prevalence in rural areas is also higher in rural areas than in urban areas (25.8% versus 24.3%), according to the 2003 World Health Survey. Statistic available at: http://www.who.int/gho/urban_health/risk_factors/tobacco_text/en/index.html. Accessed on February 12, 2012.

Figure 4.1: Study Sites



Note: In the picture of Nakhon Nayok province on the right, each of the four blocks of subdistricts (*tambon*) represents a district (*amphur*). Study areas are colored in green, numbered, and listed below the map. The maps are available at: <https://commons.wikimedia.org/> and <http://amphoe.com/>. Accessed on April 17, 2013.

manufactured cigarettes that cost roughly \$2 per pack (Hammond et al., 2008). Consumption of hand-rolled tobacco is concentrated in rural areas, such as the study communities.

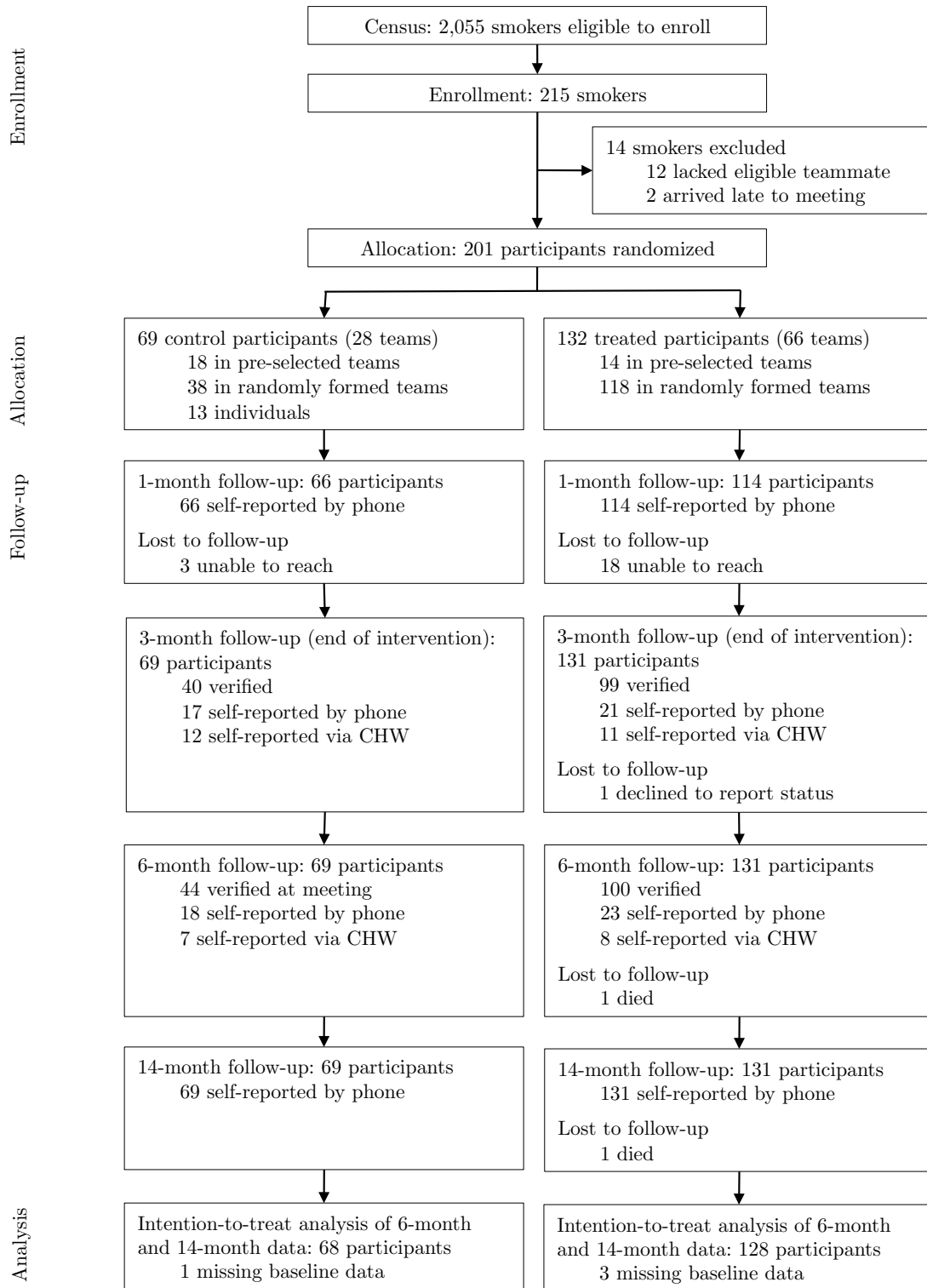
Demand for quitting is relatively high in Thailand. Half of smokers reported a quit attempt in the prior year, nearly 90% of which did not involve a smoking cessation aid or professional support (World Health Organization, 2009a). Smoking cessation programs in Thailand have expanded in recent years but are still limited to a handful of hospitals and community pharmacies, most of which are located in urban areas, yet quit rates rose as high as 10% in 2007 (White and Ross, 2013). Thailand's early adoption of tobacco control policies, high demand for quitting, and low use of professional services for smoking cessation make it an excellent setting for testing innovative approaches to promote quitting.

4.2.2 Study Procedures

Figure 4.2 shows the experimental design. Prior to recruitment, 253 community health workers (CHWs) were paid to undertake a census of smokers in their village, in order to target recruitment efforts and to measure trial participation. In Thailand, CHWs have an assigned *kum* of roughly 10-15 households that typically includes their own house, in which they conduct a variety of health promotion activities. We asked CHWs to survey and recruit smokers living in their *kum*. A CHW is a position of respect within the community and tends to be held by civic-minded individuals, mostly women. CHWs reported a total of 2,055 smokers from 42 villages. Research staff held informational meetings within each study village, and CHWs also recruited smokers to enter the trial. All current smokers aged 20 and older who resided in a study community were eligible to enroll. Smoking status at enrollment was based on self-report and verified with eyewitness reports by CHWs. During enrollment meetings held from December 2010 to March 2011, 215 smokers from 30 of 42 eligible villages enrolled in the trial. In 12 villages, CHWs did not recruit any participants.⁴⁸ The meetings were held in public spaces within each village, in order to minimize the time and travel costs associated with the intervention. Anecdotally, the on-site enrollment substantially boosted participation. Prior to randomization, participants completed a screening questionnaire and provided written informed consent. All 215 enrollees signed a form agreeing to take up the intervention (i.e., to pay the minimum required deposit) if assigned to the treatment group. Participants were told during the consenting process that they would be invited to return for urine testing at three months and six months, although specific testing dates were not announced until the week of the follow-up.

⁴⁸ Slack demand in these villages resulted from a lack of interest or effort from CHWs in some cases and a lack of interest from smokers in others.

Figure 4.2: Study Profile



The study followed a two-step stratified randomization procedure: 1) assignment to a two-person team and 2) random allocation to the treatment and control group. In the first step, participants were able to select a teammate prior to enrollment (“pre-selected” pairs) or to be randomly assigned to a teammate at enrollment. Randomly formed teams were stratified by village and sex.⁴⁹ For village-sex strata with an odd number of at least three non-pre-selected enrollees, the “extra” person was retained in the sample ($n = 13$), and faced the same treatment allocation probabilities as those randomly assigned a teammate and those in a pre-selected pair. For village-sex strata with one person, the person was dropped from the sample ($n = 12$), because he or she had no probability of being assigned a teammate (e.g., the lone female recruit from a given village). We dropped two additional participants who arrived to the enrollment meeting after randomization had been completed. The final sample included 201 participants, 188 of whom were assigned to a dyadic team.

In the second step, teams were randomly allocated to the control group or treatment group in a 1:2 ratio.⁵⁰ Note that control group members were also assigned a teammate, either one they pre-selected or a “synthetic teammate” whose identity was never revealed and used only for analysis. Control group members were not informed that they had been assigned a synthetic teammate. Pre-selected teams assigned to the control group were not given any instructions regarding whether to interact with their teammate.⁵¹ At each enrollment meeting, a programmer implemented the random team and allocation sequences using computer-generated random numbers, concealing the random allocation sequence from other field staff and participants. The field coordinator received assignments from the programmer and then informed participants of their allocation.

While the randomization procedure took place, a smoking cessation counselor led a group counseling session for all participants.⁵² At the end of each session, each participant signed and retained a certificate stating “I promise to quit smoking within three months to improve my health and that of my family.” Thus, our intervention tests the effect of team commitment contracts above and beyond a verbal commitment. The field coordinator then announced treatment status assignment, and the control group was dismissed. The control group had no intervention-related activities following enrollment, aside from a second round of counseling at three months. Treated participants completed another questionnaire (Baseline Questionnaire, in Appendix A.2), learned their teammate’s identity, met briefly with their teammate to discuss plans (e.g., proposed frequency of contact and preferred nature of their

⁴⁹ We decided to stratify by sex in order to be sensitive to gender roles in Thai society. In retrospect, we believe that participants would have tolerated having a teammate of opposite sex.

⁵⁰ We used an imbalanced allocation ratio in order to increase the number of teams receiving the intervention in our pilot study and to improve power for sub-analyses involving treated teams only.

⁵¹ Presumably, some of these teammates provided each other with social support during the quit attempt, although the project made no effort to encourage or discourage these social interactions.

⁵² The content of the counseling was based on a training module provided to the counselors by the Thai Health Professional Alliance Against Tobacco, a national organization that has been responsible for training Thai clinicians in smoking cessation.

interactions), provided a baseline deposit, and then were dismissed.

In addition to the control group’s offerings, the treatment group received three components, the combination of which we call *team commitment*. First, each treated individual opened a commitment savings account with the project at enrollment. The project set a minimum opening balance of \$1.67 (50 Thai baht) for each account. For 10 weeks after enrollment, a CHW visited the participant weekly to collect additional, voluntary contributions to the account. A triple-entry receipt system (with copies for the participant, CHW, and field coordinator) was used to track deposits, and the project collected deposits and a copy of the receipts from CHWs biweekly. The project added a \$5 starter contribution to each treated participant’s account and an extra \$5 (THB 150) if the person reached an account balance of \$5. The deadline for reaching this second match was randomized, such that each treated team was randomly assigned in a 1:1 ratio to have a deadline of one month or three months after enrollment.⁵³ The participant could not withdraw from the account during the intervention period and had the deposits and matching contribution refunded only if the person had quit smoking as assessed at three months. Second, if the person and his or her teammate both abstained from smoking at three months, each received a cash bonus of \$40 (THB 1200), about 16% of median monthly household income.⁵⁴ Third, the project sent weekly text messages to boost the frequency and intensity of deposits and to increase the strength and salience of teammate monitoring and support.

Two to four weeks after enrollment, we contacted participants by phone to collect the self-reported quit status of the participant. For convenience, we refer to these phone calls as the one-month follow-up. Then, participants returned to the same meeting site three months after enrollment. At that time, all participants received cessation counseling. Treated participants also received financial rewards if they had quit, as described above. Quitting is defined as the seven-day point prevalence of biochemically verified abstinence. In other words, “quitters” had to self-report abstaining from smoking for at least seven days and to pass a urine test. We independently verified the self-reports against eyewitness reports from community health workers. With the exception of one or two participants, these reports concurred. Participants were tested for smoking abstinence three months and six months after enrollment using a NicCheckTM urine test for nicotine and cotinine, a metabolite

⁵³ The time-limited match manipulates the timing of the deadline while holding constant the incentive package. The early deadline is designed to stimulate depositing and thereby to nudge smokers toward setting an earlier quit date than they otherwise would, because they would have more to lose by procrastinating. Participants assigned to the later date are predicted to delay making deposits in order to wait and see if they can quit. However, the smaller financial commitment feeds back to delay the quit date. After three months, they are predicted to be less likely to have quit and less likely to have triggered the second match. The design is in the spirit of Duflo, Kremer and Robinson (2011), who show that time-limited deadlines help to counter procrastination.

⁵⁴ By comparison, Volpp et al. (2009) offered some of the largest cash incentives for quitting to date: roughly 27% of household income (our calculations). Note that the expected value of a team bonus is considerably lower than an individual bonus of equal size after accounting for the teammate’s probability of failure.

of nicotine. Participants went one at a time into public bathroom facilities to provide urine samples. Research staff monitored participants to ensure that they did not carry any containers into the bathroom. The same research staff were used at enrollment and follow-up, allowing them to verify the identity of the participant with near certainty. The color-coded urine test strips give results in less than 15 minutes. According to the manufacturer, the test has both a sensitivity and specificity of 97% and a detection period of three to four days for a smoker of five to 10 cigarettes per day and five to six days for a smoker of 20 to 30 cigarettes per day.⁵⁵ Participants and field staff were not informed of the detection period. The assessor of the urine test was blinded to treatment allocation. Urine containers were labeled with a unique identification number assigned to each participant. Anyone who disputed the test results could request a second test, although field staff encountered only one dispute during the two rounds of testing. For all participants who did not attend either the three-month or six-month meeting, the field coordinator contacted the person by phone or else through a CHW to ascertain the person's self-reported smoking status. All individuals who reported having quit were visited at home to verify their status by urine test.⁵⁶

At six months—that is, three months after all incentives were awarded—field staff biochemically assessed abstinence. The six-month visit dates were announced less than a week in advance, reducing the ability of smokers to abstain right before the tests. Brief surveys were administered at the three-month and six-month follow-up meetings. Scheduled urine testing at 12 months was replaced by telephone follow-up at 13-16 months (denoted hereafter as 14 months) due to severe flooding in the study area in fall 2011. We paid an inconvenience fee of \$3 per follow-up meeting attended to the control group at three and six months and to the treatment group at six months. Importantly, at both the six-month and 14-month follow-ups, there are no differential incentives between the control group and treatment group to game the urine test or to misreport smoking status. Any difference in abstinence rates at those time points can reasonably be attributed to the intervention.

4.3 Data

Our analysis draws on several kinds of data. Field workers administered four rounds of surveys to participants: (1) a screening and baseline survey at enrollment, (2) a three-month survey at the conclusion of the deposit intervention, (3) a six-month survey, and 4) a 14-month survey. Participants also reported their smoking status by phone at one month. The questionnaires draw a number of questions from the International Tobacco Control

⁵⁵ The detection period is based on a phone conversation with Don Mossman, founder of NicCheck™.

⁵⁶ None of these participants passed the urine test. One subject declined to report his smoking status at three months. We count him as a continuing smoker in our intention-to-treat analysis. We doubt that any quitters lied about their quit status in order to avoid the test. First, they were not told in advance that they would be visited and tested if they reported having quit. Second, they had strong social incentives, namely saving face with CHWs and other participants, to report themselves as having quit.

Southeast Asia (ITC-SEA) survey, an ongoing nationally representative, longitudinal survey. The symmetry allows for a direct comparison between the characteristics of the study sample and the general Thai population.

Another data source comes from the deposit collection visits from community health workers. CHWs were charged with visiting participants on a weekly basis. In practice, some CHWs admitted visiting participants every other week. During each visit, CHWs recorded the deposit amount and responses to some basic questions about the participant: whether the participant smoked in the last week, the number of cigarettes smoked in the last week, whether the person had contact with his or her assigned teammate in the last week, and whether the person believed his or her teammate had smoked in the prior week.⁵⁷

Three to five months after enrollment, the research team conducted a series of semi-structured qualitative interviews with trial participants ($n = 15$) and deposit collectors ($n = 12$). The participant interviews were designed to enrich the research team's understanding of the intervention's impact by detailing the experiences of participants during the intervention and participants' opinions and beliefs about elements of the study design. The sample of participants was randomly selected, stratified by subdistrict, quit status, and receipt of the bonus, although certain participants were not available, in which case the study used a convenience sample of substitutes.⁵⁸ The deposit collectors included two deposit collectors from each subdistrict.

4.3.1 Analytic Variables

Quit status, collected at each follow-up visit, is the primary dependent variable. Quit status is inferred from a urine test of nicotine and cotinine levels. We focus on quit status, rather than daily cigarette intake, because quitting is verifiable. Social desirability bias may lead some participants to systematically underreport their cigarette consumption. The urine test strips are not sensitive enough to detect differences in number of cigarettes consumed.

The primary independent variable is the intention-to-treat random assignment of participants to the treatment and control group, a dichotomous variable. The baseline questionnaire captures a number of standard socio-demographic variables, including sex, age, marital status, monthly household income, highest educational attainment, religion, and occupation. Participants also reported their self-rated health status.

The screening and baseline questionnaires collected several variables that describe smoking status and history. One key variable is average daily cigarette intake. Consumption is a useful measure of a respondent's level of addictedness to nicotine. Another indicator of addiction that we control for is the the number of years since the person initiated smoking. Respondents also reported the type of tobacco used, including whether they primarily

⁵⁷ We began collecting data on the number of cigarettes smoked midway through the intervention.

⁵⁸ Most of these substitute respondents were randomly selected, although in a couple of cases, the person was purposefully selected because other participants were not available.

use handrolled or manufactured cigarettes for those who use both. About half of all Thai smokers use handrolled cigarettes (World Health Organization, 2009a). Cheap, handrolled tobacco may provide less of a motivation to quit, because the financial savings from quitting would be smaller. Type of tobacco also serves as a proxy for cigarette prices. The price difference between handrolled and manufactured cigarettes dwarfs the price difference across brands. Also, regulations curtail the amount of price variation that exists in Thailand. For example, the law dictates that market prices for a brand cannot vary geographically.

Respondents reported their quit history as the number of quit attempts, top-coded at 10. We consider the person’s smoking environment as the number of other adult smokers living in the same household and the number of a person’s five best friends who smoke, recoded as a dichotomous measure equal to 1 if all five smoke. Another set of survey questions collects information on quit beliefs. The respondents reported their plans to quit in the future, recoded as a dichotomous measure equal to 1 if the person plans to quit within six months.⁵⁹ We also asked smokers how important quitting is to the person.

A key variable in our analysis is the question of smokers’ beliefs in their ability to quit smoking, as measured by a self-assessed prediction of the probability of not smoking in three months’ time. The person reported a subjective probability of quitting using an integer scale from 0 to 10. This variable corresponds closely with the *ex ante* value of the parameter ρ , described in the theoretical model. Outcome expectations are tightly related to self-efficacy beliefs (Bandura, 1998). The baseline questionnaire also asks all individuals in the treatment group to provide social predictions. In particular, respondents assessed the likelihood that each participant from the same village would be able to quit in three months’ time. Thus, at baseline, each person provides a measure of his or her own predictions for quitting as well as his or her predictions for the ability to quit of all others from the same village.

We measure time preferences in several ways. First, we use an approach common in the literature, trying to detect preference reversals in trading off money over time (Benzion, Rapoport and Yagil, 1989; Shelley, 1993; Ashraf, Karlan and Yin, 2006). The hypothetical questions take the form: “Would you prefer \$ X guaranteed today, or \$ Y guaranteed in a month?” and then “would you prefer \$ X guaranteed in six months or \$ Y guaranteed in seven months?”, where $X < Y$. As Ashraf, Karlan and Yin (2006) does, we use this information to identify those who are *patient* (take the delayed reward in both scenarios) *impatient* (take the immediate reward in both scenarios), *hyperbolic* (take the immediate reward now, delayed reward later), or *incoherent* (take the delayed reward now, immediate reward later). Note that incoherence is also a form of time-inconsistency.⁶⁰ This measurement of time-inconsistency also has been validated in rural India using real stakes (Bauer, Chytilová and Morduch, 2012). Second, we use self-reported impulsivity as a measure of a smoker’s ability to set goals and to exert self-control. We draw eight questions on impulsivity from

⁵⁹ Quit intentions is of central importance in the public health literature for classifying smokers within the transtheoretical model of behavior change (DiClemente et al., 1991).

⁶⁰ A limitation of these questions is that present bias, and discounting more generally, applies to consumption, not to income.

a larger set used by Khwaja, Silverman and Sloan (2007), who find that impulsivity is a strong predictor of decisions to smoke. Questions include statements such as: “I plan for the future,” and “If I get money, I spend it too quickly.”⁶¹ Third, we use the length of the financial planning horizon as a predictor of a person’s time discounting. Khwaja, Silverman and Sloan (2007) suggest that financial planning horizon captures an element of intertemporal decision making that is independent of time discounting and longevity expectations. They find that current smokers have shorter financial planning horizons than do non-smokers and former smokers.

4.4 Empirical Strategy

4.4.1 Take-up of the Intervention

We measure trial take-up as the subset of smokers living in the study area who consented to enter the trial. The total number of smokers in the area is drawn from the census conducted by community health workers prior to recruitment. Each consenting individual agreed in writing to contribute at least \$1.67 to the commitment savings account if assigned to the treatment group.

We next determine the relationship between trial take-up and seven socio-demographic and smoking characteristics: age, sex, subdistrict, years since smoking initiation, number of cigarettes per day, type of tobacco used, and desire to quit smoking. Missingness of the covariate data is a potential concern. Only two-thirds of the census cases have complete data. Thus, we run the regression using complete case analysis and multiple random imputation of missing values. The multiple imputation uses chained equations, with 50 iterations of imputations following 100 iterations for the burn-in period. We impute age, daily cigarette intake, and years since initiation using a negative binomial model; we impute type of tobacco using a multinomial logit model; and we impute sex and desire to quit using a logit model. The regression of trial participation on these covariates corrects for clustering at the village level.

4.4.2 Treatment Effects on Smoking Abstinence

We estimate the intention-to-treat effect that our team commitment intervention has on smoking abstinence. The outcome $QUIT_{ijt} \in \{0, 1\}$ depends on a latent variable $QUIT_{ijt}^*$ of the propensity for individual i in pair j at month $t \in \{3, 6, 14\}$ to abstain from smoking.⁶²

⁶¹ Khwaja, Silverman and Sloan (2007) report that the questions on impulsivity were provided by behavioral economist George Loewenstein.

⁶² Throughout, we present the linear form of our models, although many of our models use a logit estimator.

The latent variable model is:

$$QUIT_{ijt}^* = \beta_0 + \beta_1 TREAT_j + \mathbf{X}_{ij} \beta_2 + \epsilon_{ijt} \quad (4.1)$$

where $TREAT_j$ is an indicator variable for assignment to the intervention group; \mathbf{X}_{ij} is a vector of baseline socio-demographic, smoking, and trial characteristics listed in Table 5.1; and ϵ_{ij} is a stochastic error term. The average treatment effect of the team commitment intervention, relative to the control group, is β_1 . We run Equation 4.1 for biochemically verified seven-day smoking abstinence at three months and six months and for self-reported seven-day smoking abstinence at one month and 14 months. We take the verified, six-month results as our best measure of the intervention’s impact on longer-run behavior change. For this regression and all others, we cluster standard errors at the team level, unless otherwise specified.

4.4.3 Cost-Effectiveness

Cost per marginal quitter refers to additional quitting in the intervention group compared to the control group. We calculated the cost per marginal quitter for our team commitment intervention and for two of the most common smoking cessation aids in Thailand: nicotine gum and varenicline, a physician-prescribed medication.⁶³ We also compare these estimates to the cost per marginal quitter for a basic commitment contract, as reported in the CARES trial by Giné, Karlan and Zinman (2010). We denominate all costs in U.S. dollars, adjusted for differences in purchasing power parity (PPP) ($\$1 = \text{THB } 17.09$).⁶⁴ All costs from Thailand are roughly half as large if we instead use the currency exchange rate ($\$1 \approx \text{THB } 30$). In other words, PPP adjustment is a more conservative approach.

The costing for our intervention uses a programmatic perspective. Cost items include incentives (team bonus and matching contributions), personnel (full-time field coordinator, nurses who served as smoking cessation counselors, and deposit collectors), urine testing supplies, office supplies, text messages to participants and project-related phone calls, transportation of field staff, and forfeited deposits from continuing smokers, and excludes the subjects’ own costs of quitting and survey costs. We also include a scenario of the feasible incremental cost per quitter if we had made three minor changes that should not alter the intervention’s effectiveness, namely paying the deposit collectors piece rate rather than a fixed amount, hiring the field coordinator for a full-time equivalent of two months instead of three months, and buying the urine test strips locally. The estimated costs for the pharmacological interventions are based on each product’s costs, as marketed and sold

⁶³ Varenicline is marketed in the U.S. under the brand name of Chantix™ and in Thailand as Champix™. Several brands of nicotine gum are available in Thailand; we estimated the costs for Nicomild™, one of if not the lowest-priced manufacturers in the country.

⁶⁴ The PPP exchange rate for 2010 is taken from the World Bank’s World DataBank, accessed on May 26, 2012, and available at: <http://databank.worldbank.org/ddp/home.do>.

in Thailand at the time of the trial. We assume a 12-week course of each pharmacological aid, in line with the standard of care in Thailand at the time of the intervention.

Effectiveness is reported as the average treatment effect from logistic regressions. The exception is for the basic commitment contract, for which we use the treatment-on-the-treated effect reported in Giné, Karlan and Zinman (2009, 2010). We use two effectiveness measures for each pharmacological approach, one derived from available local studies and one from multi-country meta-analyses.

Additional details on inputs into our calculations are provided in Table 5.4.

4.4.4 Behavioral Biases

We use participants' self-predictions about quitting to test for the presence of naïveté with respect to their present bias and projection bias with respect to the benefits of quitting. Participants predicted the probability that they would not be smoking in three months, elicited at baseline, three months, and six months. We used a visual scale labeled from 0–100% to elicit the predictions, and participants had to report beliefs in 10% increments. At baseline, treated participants also gave social predictions of the probability each participant from their village would not be smoking in three months. For members $i \in 1, 2$ of dyadic teams $j = 1, \dots, J$, let ρ_{1j}^1 be the index person's self-prediction, ρ_{1j}^2 be the person's prediction for her teammate, and ρ_{2j}^3 be the teammate's self-prediction.

As a first step, we plot the distributions of predictions about the index person, as reported by the index person and others. We disaggregate the social predictions into those made by friends versus acquaintances to rule out that any observed differences are driven by access to differential information about the index person and her ability to quit. Next, we track how the self-predictions evolve over time and how they compare to subsequent quit behavior. The time path informs whether participants revise any overly optimistic beliefs once the participants gain experience with the costs of quitting. If smokers hold rational expectations, post-intervention beliefs will correspond to later observed behavior, in expectation, whereas divergence between predictions and behavior is indicative of partial naïveté regarding present bias. We also implement the difference-in-differences test of projection bias described in Section 3.3.1. The intervention exogenously leads smokers from the treatment group to be more likely to exit an addicted state and, consequently, to perceive more accurately the benefits of being smoke-free. The double-difference of quit predictions (by pre- vs. post-intervention and treatment vs. control group) is weakly positive for projection-biased agents. Importantly, this setup sweeps out any time-invariant or group-invariant factors and is robust to any degree of present bias.

4.4.5 Usage of Contracts

We track the balance of participants' commitment savings accounts in aggregate and by week. During each weekly visit, community health workers recorded the amount deposited,

the person’s self-reported smoking status, whether the person had talked to her teammate that week, and whether the participant believed that her teammate had smoked that week.

We analyze the effects of randomly assigning teams to a one-month deadline or a three-month deadline (“no deadline”) by which each person must reach an account balance of \$5 in order to earn a project-sponsored matching contribution of \$5. (See Footnote 53 for the rationale behind the manipulation.) We test whether the deadline leads to more deposits in the first month and whether it promotes quitting.

We run two sets of regressions for the deposit analysis. The first set, run at the person level, looks at the relationship between aggregate deposit patterns (e.g., total number of deposits and total account balance) and smoking abstinence at three months. The second set of regressions, run at the person-week level, are based on weekly deposit behavior. For the regressions of weekly smoking abstinence, we regress smoking abstinence that week on various deposit characteristics. We run three specifications for the regressions of smoking abstinence that week: 1) week dummies and the full set of control variables, 2) week dummies, the controls, and lagged smoking status reported the week before, and 3) week dummies and individual fixed effects. For the regressions of the decision to make a deposit that week, we run regressions with week dummies and controls and regressions with week dummies and individual fixed effects.

4.4.6 Team Effects

In this subsection, we start by providing information on the social characteristics of teams, including the strength of social ties between teammates and their frequency of contact, both at baseline and during the intervention. Next, we test if a teammate’s quit status has a causal impact on one’s own quit status. We then test for the heterogeneity of these team effects as our model predicts. Finally, we calculate the quit rate under different assignment rules for matching individuals into teams. For these analyses, we focus attention on team effects at the intervention’s completion (3-month end point) and omit the time index in the equations for notational simplicity.

We observe how teammates strategically respond to each other’s behavior, using weekly information on teammates’ smoking status and contributions to their commitment savings accounts. Let $QUIT_{ijt}^*$ be a person’s self-reported smoking status in Week t of the 10-week intervention period. We model a person’s behavior A_{ijt} using three different estimators: a pooled model with baseline controls, a pooled model with controls and a lagged dependent variable, and an individual fixed effects model. These equations take the following form:

$$QUIT_{ijt}^* = \beta_0 + \beta_1 A_{ijt} + \mathbf{X}_{ij} \beta_2 + \phi_t + \epsilon_{1jt} \quad (4.2)$$

$$QUIT_{ijt}^* = \beta_0 + \beta_1 A_{ijt} + QUIT_{ij(t-1)} + \mathbf{X}_{ij} \beta_2 + \phi_t + \epsilon_{1jt} \quad (4.3)$$

$$QUIT_{ijt}^* = \beta_0 + \beta_1 A_{ijt} + \phi_t + \mu_i + \epsilon_{1jt} \quad (4.4)$$

We also test similar models of a person’s decision to make a deposit.

We then test the effect on smoking abstinence of the strength of social ties between teammates. According to our theoretical model, the sign of the effect is ambiguous and depends in part on whether a person is in a good news or bad news equilibrium. We use several measures of the strength of teammates’ social ties, including whether a teammate is pre-selected, the geographic distance between teammates’ houses, the nature of their pre-trial relationship (acquaintance, close friend, or relative), the frequency of social contact prior to the trial, and whether prior to team assignment the index person listed her teammate as her closest, top two closest, or top five closest friends, among those participants enrolled in the trial. We restrict the sample to randomly formed teams for each of these analyses, except for the test of the effect of pre-selecting a teammate.

We posit that teammates have a causal influence on each other’s quit behavior. A major challenge in the estimation is the joint determination of teammates’ behavior, leading to potential simultaneity bias and omitted variables bias (e.g., correlated shocks). To infer the causal effect of a teammate’s quit status, we use the mean quit predictions of all others from the same village (from all teams $k \neq j$) for that teammate $\bar{\rho}_{ik}^2$ as an excluded instrument for the teammate’s subsequent quit status at follow-up. The exclusion restriction is met among those randomly matched with a teammate. We specify our model below as a two-stage least squares (2SLS) procedure, although we also run a bivariate probit estimator that some research suggests is more robust (Bhattacharya, Goldman and McCaffrey, 2006). The reduced form effect of a teammate’s quit predictions on the index person’s quit status is:

$$QUIT_{1j}^* = \alpha_0 + \alpha_1 \rho_{1j}^1 + \alpha_3 \bar{\rho}_{ik}^2 + \mathbf{X}_{ij} \alpha_4 + v_{1j} \quad (4.5)$$

The first and second stages for the two-stage setup are:

$$\begin{aligned} QUIT_{2j}^* &= \beta_0 + \beta_1 \rho_{1j}^1 + \beta_2 \bar{\rho}_{ik}^2 + \mathbf{X}_{ij} \beta_3 + v_{1j}^1 \\ QUIT_{1j}^* &= \zeta_0 + \zeta_1 \rho_{1j}^1 + \zeta_3 \widehat{QUIT}_{2j}^* + \mathbf{X}_{ij} \zeta_4 + v_{1j}^2 \end{aligned} \quad (4.6)$$

where v_{1j}^1 and v_{1j}^2 are the first- and second-stage error terms and \widehat{QUIT}_{2j}^* is the fitted value of a teammate’s quit status. The coefficient ζ_3 is the causal effect of teammate’s quit status on the index person’s quit status. Our bivariate probit specification allows for correlation between v_{1j}^1 and v_{1j}^2 . We bootstrap the standard errors on the bivariate probit estimates using 1,000 replications, as bootstrapping helps account for the overly narrow confidence intervals produced by the estimation procedure (Chiburis, Das and Lokshin, 2012).

Next, we test whether a person’s own quit beliefs at baseline help to predict subsequent quit behavior:

$$QUIT_{1j}^* = \alpha_0 + \alpha_1 \rho_{1j}^1 + \mathbf{X}_{ij} \alpha_2 + \epsilon_{ij} \quad (4.7)$$

For consistency with subsequent estimations, we restrict the sample to members of randomly formed teams in the treatment group.

We then examine the impact on a person's quit status of a teammate's self-predictions ρ_{2j}^2 . Although the index person's self-predictions ρ_{1j}^1 may be endogenous, the effect of a teammate's self-predictions is cleanly identified among the subset of randomly formed teams:

$$QUIT_{1j}^* = \alpha_0 + \alpha_1 \rho_{1j}^1 + \alpha_2 \rho_{2j}^2 + \alpha_3 (\rho_{1j}^1 \times \rho_{2j}^2) + \mathbf{X}_{ij} \alpha_4 + \epsilon_{ij} \quad (4.8)$$

In an alternate specification, we consider the quit predictions for a teammate from the viewpoint of the index person ρ_{2j}^2 . We also test specifications that substitute into Equation 4.8 the mean quit predictions of all others for the index person $\bar{\rho}_{ik}^1$, the teammate's prediction for the index person ρ_{2j}^1 , and the degree of overconfidence of the index person, as represented by the difference between her self-prediction and the mean predictions of all others for the index person $(\rho_{1j}^1 - \bar{\rho}_{ik}^1)$.

Based on the theoretical model and the empirical literature (e.g., Bandiera, Barankay and Rasul, 2010; Babcock et al., 2011), we expect that the team effects may be heterogeneous. To test the potential heterogeneity induced by teammates' quit predictions, we first dichotomize baseline self-predictions at the median (between predictions of 70% and 80%): $\tilde{\rho} \in \{\underline{\rho}, \bar{\rho}\}$, where $\underline{\rho}$ is a Low type and $\bar{\rho}$ is a High type. Let $r_{ijm} = \mathbb{1}\{\tilde{\rho}_{1j}^1 \times \tilde{\rho}_{2j}^2\} = \{r_{ij1}, r_{ij2}, r_{ij3}, r_{ij4}\}$, corresponding to pair types $\{(Low, Low), (Low, High), (High, Low), (High, High)\}$, where the first item in parentheses denotes Agent 1's type and the second Agent 2's type. Then, we run the model:

$$QUIT_{1j}^* = \theta_0 + \theta_1 r_{1j2} + \theta_2 r_{1j3} + \theta_3 r_{1j4} + \mathbf{X}_{ij} \theta_4 + \epsilon_{1j} \quad (4.9)$$

In this equation, a negative coefficient on r_{1j2} implies that less confident individuals are differentially affected by a teammate's type and a post-estimation test of $\theta_2 < \theta_3$ would support the presence of differential effects for more confident individuals. To further assess the consequences of different pairing regimes, we use the fitted values from a regression with $(\tilde{\rho}_{1j}^1 \times \tilde{\rho}_{2j}^2)$ to predict the overall quit probability under two scenarios: 1) if all participants had been assigned to a teammate of the same type, i.e., (Low, Low) and (High, High) and 2) if all teams were of the opposite type, i.e., (Low, High) and (High, Low).

Chapter 5

Impact Evaluation

5.1 Trial Take-Up and Sample Characteristics

According to the household census, 2,055 smokers lived in the 42 study communities. However, only 86.6% of community health workers returned data collection forms (97.3% in the 30 villages where at least one smoker enrolled in the trial). The household census and village-level population data imply an adult smoking prevalence in the study area of 23.3% for males, 1.8% for females, and 12.1% overall.

The trial enrolled 215 smokers from 30 villages, a participation rate of 10.5% among census takers, nearly identical to the percentage reported in the Philippines CARES trial, which tested a basic commitment contract for smoking cessation. Unlike the CARES trial, take-up of our trial is not strictly a measure of demand for commitment, as our participants may have enrolled in order to qualify for monetary incentives. Take-up may be interpreted as a measure of demand for the team commitment intervention. We can adjust for the incomplete census reporting to estimate an alternate measure of trial take-up. Assuming random non-reporting ($= 2,055/0.866$), trial take-up is 9.1%, although this likely understates participation, as smokers not counted in the census were not likely invited to enroll in the trial. Among the 30 villages where at least one smoker enrolled in the trial, the participation rate is 13.3%. Among smokers who reported pre-trial plans to quit, the participation rate is 39.1%. This latter figure indicates that the trial successfully recruited our target population of smokers who want to quit.

Table 5.1 shows baseline characteristics of participants and non-participants living in the study area. Participants are mostly men, mostly middle-aged, long-time smokers of three decades on average, and a majority use hand-rolled tobacco. The major difference between the groups is that less than 20% of non-participants expressed an interest in quitting, whereas more than 80% of participants did. This indicates that the intervention attracted a group of fairly motivated smokers, as expected.

Table 5.1: Balance of Baseline Characteristics

	Non- participants	Trial participants		<i>t</i> -test of (1) vs. (2) (<i>p</i> -value)	<i>t</i> -test of (3) vs. (4) (<i>p</i> -value)	
		All	Control group			Treatment group
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A. Socio-demographic characteristics</i>						
Male	0.926 (0.262)	0.872 (0.334)	0.868 (0.341)	0.875 (0.332)	0.001	0.884
Age	45.21 (15.06)	51.06 (13.86)	51.07 (14.04)	51.05 (13.82)	< 0.001	0.993
Monthly household income, in \$100s		3.838 (4.971)	3.513 (2.809)	4.011 (5.805)		0.506
Education						
0-3 years		0.469 (0.500)	0.485 (0.503)	0.461 (0.500)		0.747
4-6 years		0.260 (0.440)	0.324 (0.471)	0.227 (0.420)		0.142
7+ years		0.270 (0.445)	0.191 (0.396)	0.313 (0.465)		0.069
Currently married		0.791 (0.408)	0.794 (0.407)	0.789 (0.410)		0.934
Buddhist vs. Muslim		0.689 (0.464)	0.691 (0.465)	0.688 (0.465)		0.958
Works in agriculture		0.633 (0.483)	0.603 (0.493)	0.648 (0.479)		0.532
Self-rated health is good to excellent vs. fair to poor		0.296 (0.458)	0.324 (0.471)	0.281 (0.451)		0.539
<i>Panel B. Smoking characteristics</i>						
Average cigs. smoked per day	13.86 (7.41)	12.79 (9.79)	14.24 (11.15)	12.02 (8.93)	0.077	0.132
Type of tobacco used						
Manufactured cigs. only	0.301 (0.459)	0.301 (0.460)	0.294 (0.459)	0.305 (0.462)	0.634	0.878
Handrolled cigs. only	0.585 (0.459)	0.480 (0.460)	0.485 (0.459)	0.477 (0.462)	0.010	0.908
Both handrolled and manufactured cigs.	0.114 (0.317)	0.219 (0.415)	0.221 (0.418)	0.219 (0.415)	< 0.001	0.977
Number of past quit attempts		2.676 (2.728)	2.824 (2.938)	2.598 (2.617)		0.582
Number of years since initiated smoking	20.49 (13.28)	31.31 (14.87)	31.93 (14.47)	30.98 (15.12)	< 0.001	0.674
Prediction of Pr(Quit) in 3 months		0.796 (0.208)	0.799 (0.193)	0.795 (0.217)		0.918
Planning to quit smoking within 6 months vs. not	0.196 (0.397)	0.821 (0.384)	0.853 (0.357)	0.805 (0.398)	< 0.001	0.404

Continued on next page

Chapter 5. Impact Evaluation

Table 5.1 – *Continued from previous page*

	Non- participants	Trial participants		<i>t</i> -test of	<i>t</i> -test of	
		All	Control	Treatment	(1) vs. (2)	(3) vs. (4)
			group	group	(<i>p</i> -value)	(<i>p</i> -value)
	(1)	(2)	(3)	(4)	(5)	(6)
Belief that quitting is very important to me vs. not		0.765 (0.425)	0.735 (0.444)	0.781 (0.415)		0.472
Number of other adult smokers in the household		0.658 (1.033)	0.632 (1.196)	0.672 (0.940)		0.800
All of person’s 5 best friends are smokers vs. not		0.515 (0.501)	0.574 (0.498)	0.484 (0.502)		0.237
<i>Panel C. Trial characteristics</i>						
Preselected teammate vs. randomly assigned		0.158 (0.366)	0.265 (0.444)	0.102 (0.303)		0.003
Number of observations	1145	196	128	68		

Note: Mean and standard deviation (in parentheses) of each variable are reported. Only a subset of variables were collected in the census for non-participants, i.e., those smokers living in the study area who did not enroll in the trial.

In Table 5.2, we examine the correlates of trial take-up. Relative to the population of smokers from the study communities who opted not to participate, those who took up the trial were more likely to be women, more likely to use both manufactured and handrolled tobacco products, and more likely to want to quit smoking. Based on prior work, we believe that dual users of both tobacco product types in Thailand are highly price-sensitive (White and Ross, 2013). As such, the monetary incentives from the intervention may be especially appealing to this subgroup. Smokers who expressed a desire to quit were 22.1% more likely to participate in the trial according to the complete case analysis and 17.7% more likely according to the multiple imputation analysis. At the time the census was taken, smokers did not have details on the nature of the intervention. It is reassuring to know that the trial successfully recruited individuals who had an *ex ante* desire to quit.

Table 5.2: Correlates of Trial Participation

	Complete Cases	Multiply Imputed Cases
	(1)	(2)
Male	-0.110*** (0.034)	-0.076*** (0.026)
Age (squared)	-0.006*** (0.002)	-0.002** (0.001)
Years smoking (squared)	0.010*** (0.002)	0.005*** (0.001)
Cigs. per day (squared)	-0.003** (0.001)	-0.002** (0.001)
Want to quit	0.221*** (0.029)	0.177*** (0.023)
Tobacco type		
Manufactured (ref)	-- --	-- --
Handrolled	-0.032 (0.023)	-0.023 (0.016)
Both	0.122*** (0.032)	0.091*** (0.026)
Subdistrict		
Subdistrict 1 (ref)	-- --	-- --
Subdistrict 2	0.082 (0.062)	0.056 (0.039)
Subdistrict 3	0.058 (0.064)	0.031 (0.031)
Subdistrict 4	0.133* (0.068)	0.107*** (0.039)
Subdistrict 5	0.125* (0.066)	0.089* (0.046)
Subdistrict 6	0.043 (0.085)	0.034 (0.052)
Number of observations	1359	2055
Number of clusters	38	42
Mean of dep. variable	0.158	0.105

Note: Average marginal effects from logit models of trial participation. Model 2 shows results from multiple imputation using chained equations. Robust standard errors clustered at the village level are in parentheses. Significance: * 0.10 ** 0.05 *** 0.01

Baseline socio-demographic and smoking characteristics between the treatment and control groups were similar (Table 5.2).^{65,66} One notable exception is that, by chance, more pre-selected teams were assigned to the control group. Due to this imbalance and also to the endogeneity of pre-selecting a teammate, most of the analyses described below are restricted to randomly formed teams.

Sample attrition was negligible over the course of the trial. Virtually all participants had their smoking status elicited at three, six, and 14 months, and no significant differences existed in response rates by treatment status (Table B.2). However, not all responses at three and six months were biochemically verified. As described in the Study Procedures above, participants who did not attend the follow-up meetings were contacted by field staff. Those participants who claimed to have quit were visited within 48 hours to confirm the self-reports. At three months, 75.0% of the treatment group took the urine test for nicotine and cotinine, compared to 58.0% of the control group. The higher response rate in the treatment group is likely attributable to the end-of-intervention monetary incentives available to treatment group members who had quit. The response rate continued to be higher in the treatment group at six months: 75.8% in the treatment group versus 63.8% in the control group. It is not clear what may account for this persistent, albeit marginally significant difference at six months.

5.2 Treatment Effects on Smoking Abstinence

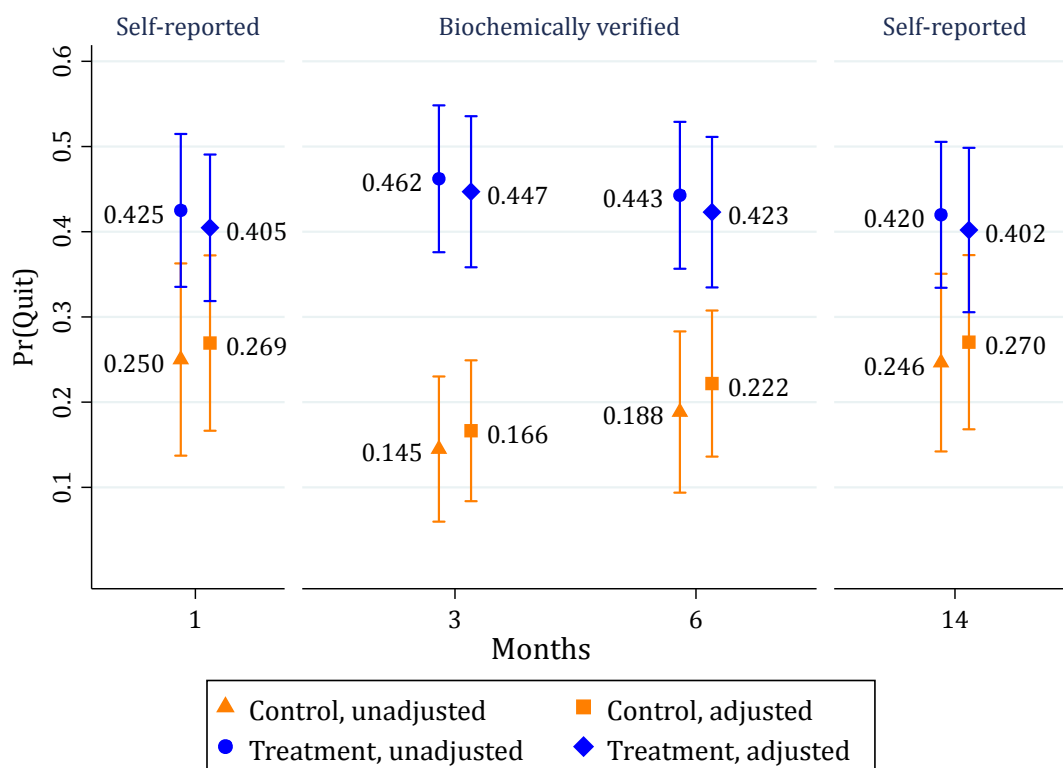
Figure 5.1 shows the main impact evaluation results. The figure includes unadjusted and regression-adjusted fitted quit probabilities by treatment status and month. After one month, 42.5% of the treatment group ($n = 51$) and 25.0% of the control group ($n = 15$) self-reported having quit. The quit percentages at one month are highly similar to what we observed during biochemical verification at three and six months. This pattern indicates that the intervention's impact on initiation of quit attempts occurred immediately or soon after enrollment.

At the intervention's end, three months after enrollment, 46.2% of the treatment group ($n = 61$) and 14.5% of the control group ($n = 10$) had quit. The share of contract users who quit at the end of the intervention period was significantly greater than the 34.1% in the Philippines CARES trial ($t(131) = 2.78, p < 0.003$). At the primary end point of six months, 44.3% of the treatment group ($n = 58$) and 18.8% of the control group ($n = 13$)

⁶⁵ We do not control directly for each person's tobacco expenditures at baseline, but by controlling for tobacco type and cigarette consumption, we functionally do so, because tobacco prices vary little across geographic areas in Thailand (White and Ross, 2013).

⁶⁶ There has been substantial debate in the epidemiology literature about whether to report p -values of differences in means by treatment status (Altman, 1985). The CONSORT guidelines specify that these statistics be omitted. We have elected to include the p -values in our balancing table as is the convention in the economics literature.

Figure 5.1: Predicted Probability of Smoking Abstinence, by Month and Treatment Status



Note: Adjusted probabilities are derived from the logit models in Table 5.3. Error bars represent a 95% confidence interval, based on standard errors clustered at the team level. The horizontal axis is not drawn to scale.

had quit. During the three months after incentives ended, nine treated participants (14.8%) relapsed. Thirteen treated participants (21.3%) relapsed between three and 14 months. These are relatively modest relapse rates; a large majority of quitters in the treatment group did not relapse after the end-of-intervention incentives were awarded.

Analyses of intervention effects on quitting are performed on participants who had complete baseline data (Table 5.3; full results in Table B.3). At one month, the average treatment effect of 13.5% is statistically significant ($p < 0.033$). Controlling for baseline factors, the intervention increased quitting by 28.1% points at three months and by 20.1% points at six months. These translate into increases in quitting of 169% at three months and a near doubling (90.5%) at six months, three months after the incentives had ended. The intervention's effects persisted to 14 months (42.0% quit), based on unconfirmed self-reports, although the share of control group members reporting having quit increased (24.6%), such that the average treatment effect of 13.2% points is marginally significant ($p = 0.051$).

Table 5.3: Average Treatment Effects at 1, 3, 6, and 14 Months

	Self-reported	Biochemically verified		Self-reported
	Abstinence at	Abstinence at	Abstinence at	Abstinence at
	1 month	3 months	6 months	14 months
	(1)	(2)	(3)	(4)
Treatment	0.135** (0.063)	0.281*** (0.058)	0.201*** (0.056)	0.132* (0.068)
Control variables	Yes	Yes	Yes	Yes
Number of participants	177	197	196	196
Number of teams	114	120	120	120
Mean of dependent variable	0.237	0.147	0.191	0.250
Pseudo- R^2	0.31	0.29	0.32	0.21

Note: Average marginal effects are calculated from logit models, controlling for all baseline variables listed in Table 5.1, as well as subdistrict, cessation counselor, and quadratic terms for age, income, and cigarettes smoked per day. Robust standard errors, clustered at the team level, are given in parentheses. Smoking abstinence is defined as the seven-day point prevalence. Significance: * 0.10 ** 0.05 *** 0.01.

The effectiveness of our behavioral intervention is on par with pharmacological treatments for smoking cessation. Meta-analyses find that the risk ratios of smoking abstinence at six months or more for varenicline and nicotine replacement therapy, compared to placebo or a control group, are 2.27 (95% CI 2.02–2.55) and 1.58 (95% CI 1.55–1.66) (Stead et al., 2008; Cahill, Stead and Lancaster, 2012), whereas our team commitment intervention has a risk ratio of 2.35 (95% CI 1.39–3.98) at six months. Likewise, these meta-analyses imply that varenicline and NRT have average treatment effects at six months of 0.166 (95% CI 0.123–0.209) and 0.142 (95% CI 0.067–0.217). Our intervention compares quite favorably.

5.3 Cost-Effectiveness

We compare the incremental cost-effectiveness for our team commitment intervention, a basic commitment contract from the CARES trial, nicotine gum, and varenicline. Table 5.4 details the cost per recipient of each intervention. Our team commitment intervention is substantially less expensive to provide in Thailand (\$71 per recipient) than are nicotine gum, varenicline, or a basic commitment contract. The cost differences between our intervention and the basic commitment contracts used in Giné, Karlan and Zinman (2010) stem from our reliance on CHWs, rather than professional staff, to serve as deposit collectors. In addition, we use a three-month deposit period, rather than the six-month period used in the CARES trial. The table also shows that the effect size for our intervention is slightly smaller in the CARES trial but much larger than the pharmacological approaches. The exception is that a small trial of nicotine gum in Thailand found an effect size equivalent to an average treatment effect of 0.373 (Rungruanghiranya et al., 2008). In contrast, the effect size for our intervention is 0.254 at six months.

Figure 5.2 shows a forest plot of the incremental cost-effectiveness results. Our team commitment intervention cost \$281 per additional quitter (95% CI 187–562). With three simple logistical changes listed in Table 5.4, we believe that the intervention could feasibly be conducted for \$195 per additional quitter (95% CI 130–390).⁶⁷ In comparison, the individual commitment contracts fielded in the Philippines CARES trial cost \$700 per additional quitter (Giné, Karlan and Zinman, 2010), with an exceptionally large confidence interval because the treatment-on-the-treated effect used to generate the estimate comes from instrumental variables estimation. To the extent that the point estimates between trials differ, albeit insignificantly, the difference results from the cost differences described in the prior paragraph. The cost per additional quitter for a 12-week course of nicotine gum in Thailand is \$2,260 (95% CI 1,301–8,586) using effectiveness data from Thailand (Rungruanghiranya et al., 2008), and \$1,780 (95% CI 1,414–2,401) using effectiveness data

⁶⁷ We also calculate the cost per marginal quitter using self-reported smoking abstinence at 14 months, which fits more closely with the duration of the CARES trial but less so with the estimates for the pharmacological approaches. The actual team commitment intervention would cost \$412 (95% CI 223–2,690), and the feasible intervention would cost \$286 (95% CI 155–1,869).

from a multi-country meta-analysis (Stead et al., 2008). The analogous estimates for a 12-week course of varenicline in Thailand are \$790 (95% CI 524–1,607) using effectiveness data from Asian smokers (Wang et al., 2009) and \$2,073 (95% CI 1,357–4,388) using effectiveness data from a multi-country meta-analysis (Cahill, Stead and Lancaster, 2012).

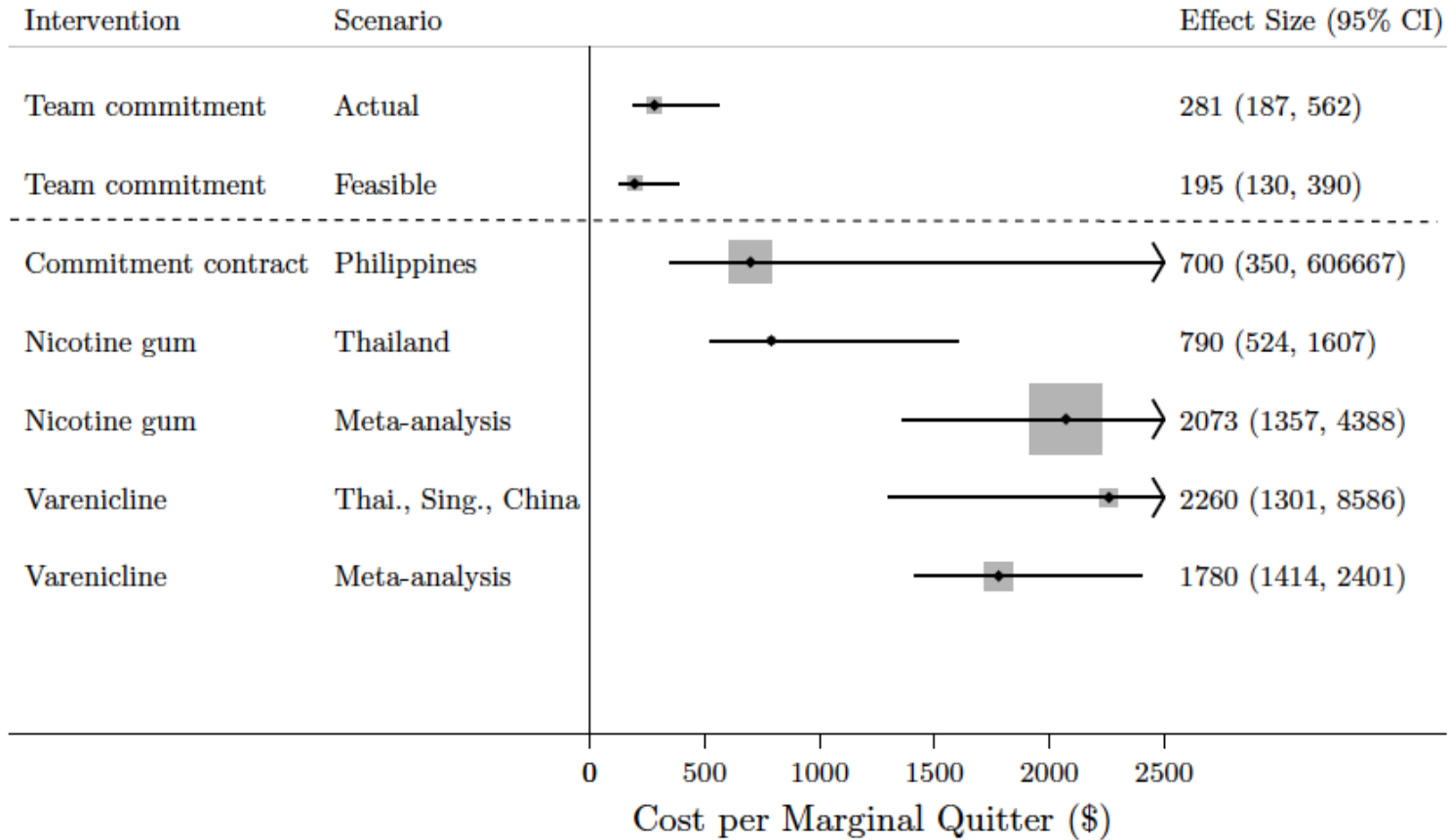
Some caution is needed in interpreting the large differences in incremental cost-effectiveness across interventions. One important caveat is that the interventions' effectiveness is evaluated on different samples often drawn from different countries. Moreover, the control groups across interventions are not equivalent. In some cases, control groups received no intervention; in others, they received counseling; and in still others, they received an active treatment. Even still, we used meta-analyses to try to determine the average cost-effectiveness of the pharmacological approaches across many studies and find that these approaches do not compare favorably to our intervention.

Table 5.4: Inputs into Analysis of Cost per Marginal Quitter by Intervention

Intervention	Cost per recipient in Thailand		Effectiveness				
	Cost (\$)	Notes/sources	Scenario	Quits in control	Quits in interv'n	Effect size (95% CI)	Notes/sources
Team commitment (actual)	71	Includes team bonus, matching contributions, forfeited deposits, personnel (field coordinator, counselors, deposit collectors), urine test supplies, transport, text messages, and office supplies.	Thailand	13/69 (18.8%)	58/131 (44.3%)	0.254 (0.127–0.381)	Urine test-confirmed 7-day abstinence at 6 months. Unadjusted effect clustered by team.
Team commitment (feasible)	50	Same as above, except pay deposit collectors piece rate, hire field coordinator full-time for 2 months instead of 3, buy test strips locally.	Thailand	13/69 (18.8%)	58/131 (44.3%)	0.254 (0.127–0.381)	Urine test-confirmed 7-day abstinence at 6 months. Unadjusted effect clustered by team.
Basic commitment contract	218	Author's calculation based on reported cost per quitter and point prevalence of abstinence (Giné, Karlan and Zinman, 2010).	Philippines	55/616 (8.9%)	Account users: 29/83 (34.9%)	0.312 (0.00036–0.623)	Urine test-confirmed point prevalence at 12 months. Effect size is treatment-on-the-treated effect (Giné et al., 2009, 2010).
Nicotine gum	365	12-week course of Nicomild, a low-, cost provider of nicotine gum in Thailand. Unit price of \$1.50 (THB 45) per 9-piece pack, as reported on Nicomild Web site.	Thailand	2/21 (9.5%)	10/20 (50.0%)	0.373 (0.184–0.563)	CO-confirmed point prevalence at 24 weeks (Rungruang. et al., 2008).
			Multi-nat'l meta-analysis	37/436 (8.5%)	101/454 (22.2%)	0.142 (0.067–0.217)	Point prevalence for nicotine gum at 6+ mos., 7 studies (Stead et al., 2008). SEs clustered by study.
Varenicline	835	12-week course of varenicline, marketed in Thailand as Champix Unit price of \$2 (THB 60) per day, as reported by the Clear Skies smoking cessation clinic located in the study area.	Thailand, China, Singapore	63/165 (38.2%)	42/168 (25.0%)	0.130 (0.034–0.227)	CO-confirmed continuous abstinence at 24 weeks (Wang et al., 2009).
			Multi-nat'l meta-analysis	331/2754 (12.0%)	954/3412 (28.0%)	0.166 (0.123–0.209)	Continuous abstinence at 24+ weeks, 14 studies (Cahlil et al., 2012). SEs clustered by study. Point prevalence not available.

Note: Costs are adjusted for the purchasing power parity exchange rate of THB 17.09 to \$1 in 2010, based on World Bank data. Effect sizes are reported as average marginal effects based on logistic regressions, except as noted for the basic commitment contract.

Figure 5.2: Cost per Marginal Quitter, by Type of Intervention



Note: Cost per marginal quitter refers to additional quitting in the intervention group compared to the control group. Our team commitment intervention is displayed above the dotted line. Effect sizes are based on average marginal effects from logistic regressions (or the treatment-on-the-treated effect, in the case of the Philippines intervention). Markers are weighted by sample size. See Table 5.4 for details on calculations and data sources.

Chapter 6

Analysis of Secondary Outcomes

6.1 Evidence of Behavioral Biases

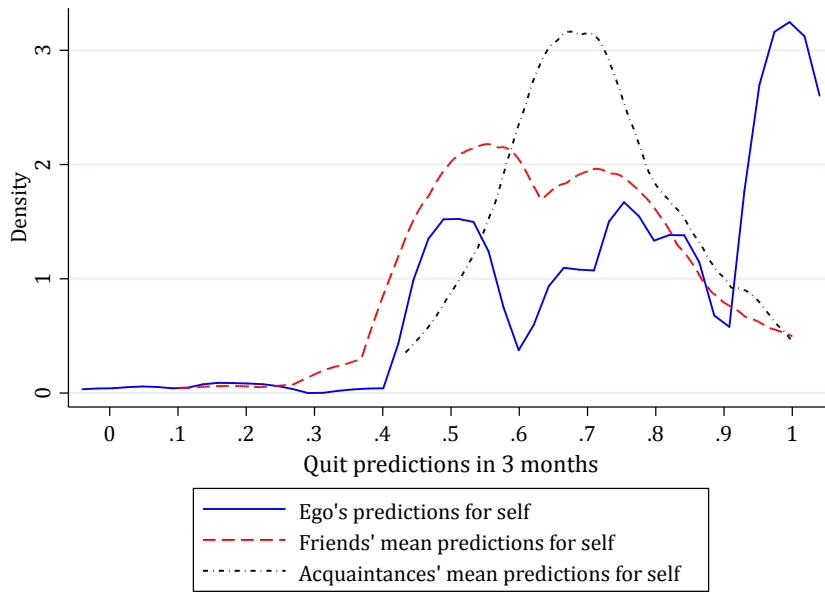
6.1.1 Overoptimism

A unique aspect of our data set is the inclusion of a person’s self-predictions for quitting, as well as the social predictions of other participants for that individual. We can compare the two predictions as one measure of overconfidence. Later, we compare a person’s self-predictions for quitting to that person’s actual quit behavior. Taking together, these measures provide information on the degree to which study participants hold overoptimistic or partially naïve beliefs regarding their ability to follow through on their plans to quit smoking.

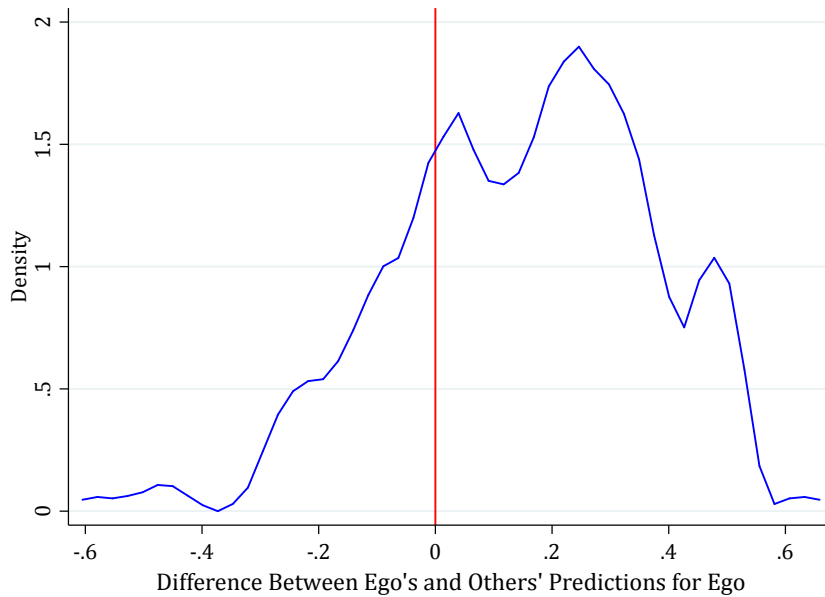
Participants showed far more confidence in their own ability to quit smoking than others had in them (Figure 6.1a). The distribution of participants’ self-predictions is highly right skewed, such that a full 38% of participants expected to quit in three months with 100% certainty. In contrast, friends displayed considerably more pessimism toward the index person (to whom we refer in the figures as “ego”). The distribution of friends’ predictions is bimodal, with peaks around 50% and 75% and without the heaping at probability 1. Acquaintances, who have less informative priors regarding the index person’s abilities, give social predictions that follow a relatively normal distribution. A full 73% of participants are overconfident relative to the mean predictions of others, with the mean index person overshooting by 15% points and the modal person by 20% points (Figure 6.1b). In the next chapter (see Table 7.5), we look at overconfidence in a regression context.

In Figure 6.2, we directly compare a person’s self-predictions to her subsequent quit behavior. Under a standard economic model, an individual’s prediction of future utility and consumption will match her realized utility and consumption in expectations. Predictions and realizations of smoking consumption diverge greatly in our sample. On average, participants held beliefs at baseline that were more than two times too optimistic. Whereas the mean participant gave herself a 79% chance of quitting prior to the intervention, only 35% of participants actually succeeded. The social predictions from Figure 6.1a, in particular those from friends, better reflect subsequent quit behavior, although they too are overly

Figure 6.1: Distribution of Baseline Predictions about Quitting



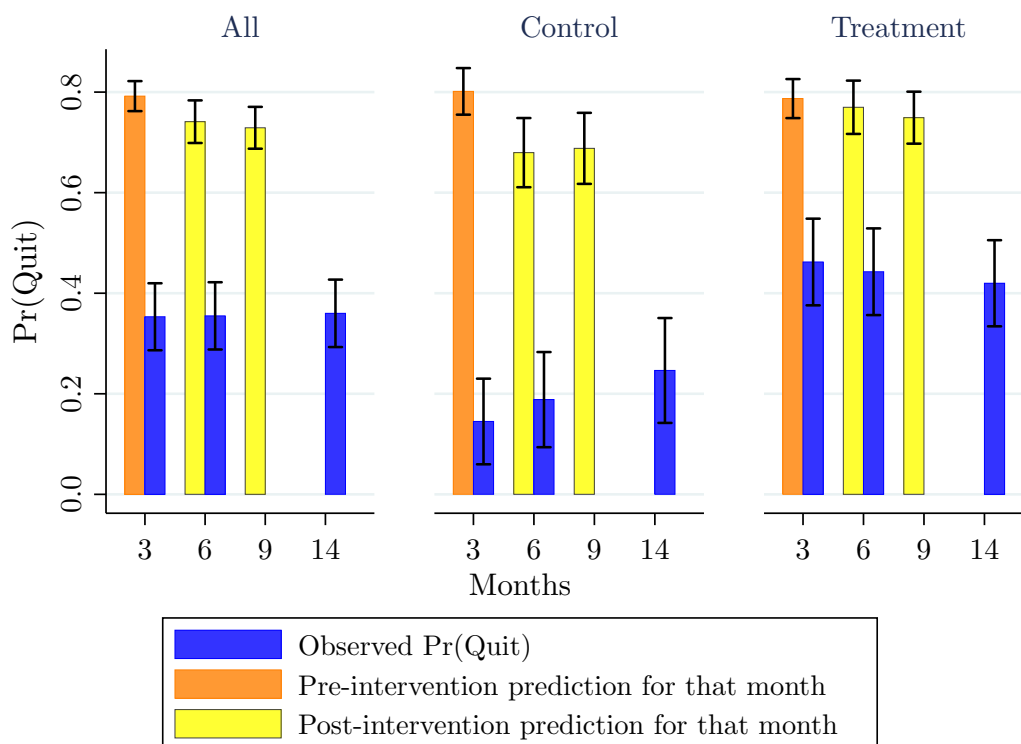
(a) Ego's, friends', and acquaintances' predictions for ego



(b) Difference between ego's self-predictions and others' mean predictions for ego

Note: Baseline predictions of the probability that the person will not be smoking in 3 months. “Ego” refers to the index person. Friends refer to the five closest social ties from the same village who enrolled in the trial. The distributions are kernel densities from an Epanechnikov function with optimal bandwidth.

Figure 6.2: Predicted vs. Observed Smoking Abstinence, by Month and Treatment Status



Note: Error bars represent a 95% confidence interval. Predictions of the probability that a person will not be smoking in 3 months were elicited at baseline, 3 months, and 6 months. This figure plots predictions at their target month (e.g., at 3 months for baseline predictions). The horizontal axis is not drawn to scale.

optimistic.⁶⁸

Participants revised their predictions downwards following the intervention. Presumably, participants better understood the nature of their time preferences and the cost function they were facing. Controlling for baseline characteristics, revisions between the baseline and three-month predictions are modest, amounting to only 6.1% points (Column 1, Table 6.1). This adjustment accounts for roughly 14.1% of the 43.4%-point misprediction at baseline. In other words, participants' beliefs grew more realistic, but continued to be severely overoptimistic. Such failure to correct mistaken beliefs is highly suggestive that many

⁶⁸ Research on social predictions is limited. Dunning et al. (1990) also finds that people are overconfident about their peers' abilities.

participants are at least partially naïve regarding their lack of self-control.⁶⁹ Moreover, even after two rounds of mostly failed quit attempts, participants continue to cling to overoptimistic beliefs when elicited after six months. That learning about self-control is so limited in our environment highlights the degree to which naïve beliefs can persist over long periods of time.⁷⁰

6.1.2 Projection Bias

We use the self-predictions to implement Acland and Levy’s double-differences test of projection bias. The goal is to determine whether participants project their current beliefs on their predictions of their future tastes. Intuitively, a confirmatory finding implies that smokers expect that quitting smoking would be less enjoyable than it actually is. Such mispredictions could stand in the way of smokers initiating meaningful quit attempts. We observe that, post-intervention, treated participants revise their quit predictions upwards by 7.9% points, compared to the control group (Column 3, Table 6.1). This marginally significant estimate is consistent with projection bias, in which continuing smokers fail to value fully the benefits of being smoke-free. The magnitude of the revisions we observe amount to about 40% of our average treatment effect. We can also compare the by-group differences at three months and at six months (Column 4). The interaction effect is larger for the three-month predictions, although we fail to reject that the two estimates are significantly different. The revision at three months of 9.5% points translates into a revision of about 47% of the average treatment effect. Ours is the first test of projection-biased smokers using experimental data of which we are aware, although Levy (2010) uses quasi-experimental methods to estimate that smokers underestimate their change in tastes by 40–50%. Thus, our estimates are quite similar to the estimates from that study, and we conclude that on average smokers show signs of projection bias.

6.2 Time Preferences

In this section, we explore the relationship between our measures of time preferences and the smoking decisions of participants. We are particularly interested in testing the theoretical link between time-inconsistent preferences and ability to follow through on a plan. As discussed in Section 4.3.1, we measure time preferences in three main ways: in terms of a

⁶⁹ We have other corroborative evidence of naïveté. Our sample consists largely of long-time smokers who have incurred multiple (median of two) costly failed quit attempts in the past. At baseline, 57% of smokers identified “habit or physical addiction” or temptation from “people around you were smoking” as a primary reason for past failure. The latter is distinct from “desire to be social.” “Stress” accounted for most other responses, and could also include a time-inconsistent dimension.

⁷⁰ Ali (2011) provides a theoretical framework for why individuals may not learn about their self-control problems.

Table 6.1: Change in Quit Predictions over Time

	(1)	(2)	(3)	(4)
Post-intervention time dummy	-0.066*** (0.021)		-0.118*** (0.034)	
Time dummies				
0 months (ref)				
3 months		-0.061** (0.024)		-0.125*** (0.037)
6 months		-0.070*** (0.024)		-0.112*** (0.039)
		[0.662]		[0.722]
Treatment	0.029 (0.027)	0.029 (0.027)	-0.020 (0.032)	-0.020 (0.032)
Post × Treatment			0.079* (0.043)	
3 months × Treatment				0.095** (0.048)
6 months × Treatment				0.064 (0.049)
				[0.483]
Constant	1.106*** (0.189)	1.106*** (0.190)	1.140*** (0.187)	1.139*** (0.188)
Number of person-months	540	540	540	540
Number of participants	197	197	197	197
R^2	0.26	0.26	0.26	0.27

Note: Coefficients are derived from OLS models of self-predictions of the probability a person will not be smoking in 3 months, controlling for all covariates listed in Table 5.1, subdistrict, cessation counselor, and quadratic terms for age, income, and cigarettes smoked per day. Predictions of the probability that a person will not be smoking in 3 months were elicited at baseline, 3 months, and 6 months. Robust standard errors, clustered at the individual level, are in parentheses. The p -value from a post-estimation Wald test of equality between the 3-month and 6-month coefficients is in brackets. Significance: * 0.10 ** 0.05 *** 0.01.

person's self-reported impulsivity, time tradeoffs of money, and length of financial planning horizon. One limitation is that we only collected time preferences from our treatment

group. Thus, we cannot investigate the interaction between time preferences and access to a commitment mechanism.

In Models 1 and 2 of Table 6.2, we create an index for each of eight behaviors for which a person reported being impulsive. In the unadjusted regression model, the presence of substantial impulsivity is associated with a 37.5% point decrease in the probability of quitting at three months. After controlling for our full set of covariates, the coefficient halves in magnitude and is no longer significant, whereas reporting exactly one impulsive behavior was associated with increased quitting. We hypothesize that a little impulsivity increases the likelihood of quitting because such individuals may be more sophisticated about their self-control problems. This also points to the weakness in relying on self-reports for measuring impulsivity. Naïve agents may fail to recognize that they have behaved impulsively in the past.

We then ask participants if they would trade off a reward now versus a larger reward in a month and then the same reward in six months versus the same larger reward in seven months. According to those results, we find that 59.8% of participants are patient, 11.0% hyperbolic, 21.3% impatient, and 7.9% incoherent. Only incoherence was strongly associated with smoking behavior. Those who selected incoherently (delayed reward now, immediate reward in the future) were 28–37% points less likely to quit. An incoherent response signals that the person did not understand the question and may not have understood the rationale behind the intervention as a whole.

The length of financial planning horizon had a counterintuitively inverse association with smoking behavior in our data. Those individuals who planned years in advance were significantly less likely to quit at three months. This finding contradicts previous studies (Khwaja, Silverman and Sloan, 2007). We do not have an explanation or justification for this observed relationship.

6.3 Usage of Contracts

6.3.1 Deposits and Quit Status

Commitment contracts are designed to increase users' motivation to persevere. In this section, we analyze the usage of the commitment savings accounts and its relationship to participants' ability to follow through on their quit attempts. In Chapter 7, we examine how participants respond to their teammates' depositing behavior.

All but two treated participants ($130/132 = 98.5\%$) took up the commitment savings account, i.e., made at least the minimum required deposit at enrollment. Table 6.3 provides descriptive statistics related to the accounts. The vast majority of participants gave the minimum required amount of \$1.67 (50 baht) at enrollment. Overall, 86% accumulated a total balance in excess of the required amount, indicating that most participants used their

Table 6.2: Time preferences and quit status
(Treated Teams)

	(1)	(2)	(3)	(4)	(5)	(6)
Impulsivity index						
0 behaviors (ref)						
1 behavior	0.141 (0.094)	0.199* (0.110)				
2+ behaviors	-0.375*** (0.104)	-0.170 (0.244)				
Time preferences						
Patient (ref)						
Hyperbolic			0.085 (0.128)	-0.085 (0.128)		
Impatient			-0.005 (0.101)	-0.017 (0.091)		
Incoherent			-0.287*** (0.133)	-0.374*** (0.111)		
Financial planning horizon						
Next few months (ref)						
Next year					-0.131 (0.122)	0.100 (0.144)
Next few years					-0.303** (0.118)	-0.204* (0.116)
Control variables						
Number of participants	132	129	127	125	118	116
Number of teams	66	66	66	66	65	65

Note: Coefficients are expressed as average marginal effects calculated from logit models. Even-numbered models control for all covariates listed in Table 5.1, subdistrict, cessation counselor, and quadratic terms for age, income, and cigarettes smoked per day. Robust SEs, clustered at the team level, are in parentheses. Significance: * 0.10 ** 0.05 *** 0.01.

account. In total, the median balance was \$7.58, roughly 3% of median monthly income and far less than the 20% roughly estimated in the Philippines CARES trial (Giné, Karlan and Zinman, 2010). However, the level differences point toward larger deposits in our trial. In

the CARES trial, users had a median balance of \$4.16 after 10 weeks.⁷¹

At least three factors may explain the large mean differences between our trial and the CARES trial in the account balance as a percentage of income. First, our 10-week deposit period is less than half the duration of the 26-week period used in the CARES trial.⁷² Second, though we are unable to test this possible explanation, the presence of the team bonus may have crowded out participants' incentive to deposit. If a person requires a certain stake in a quit attempt in order for it to succeed, the cash bonus may substitute for the need to commit financially. The substitutability and complementarity of commitment contracts and cash incentives has not been addressed in the literature. Relatedly, if our participants added the team bonus to their mental account for money at stake, then the proportional differences between our study and the CARES trial would shrink substantially. The team bonus amounted to roughly 8% of median monthly income in expected value.⁷³ Third, participants may have felt less need to deposit because personal tobacco expenditures are relatively low in our communities due to the common use of cheap hand-rolled tobacco. At baseline, participants estimated that they spent an average of \$4 on tobacco per week.

Figure 6.3a shows the distribution of total deposits at the end of the 10-week deposit period by three-month smoking status. Both distributions show positive skew. Moreover, the distribution of deposits shifts right for those who quit smoking at the end of the intervention period (Kolmogorov-Smirnov test for equality of distributions: $p < 0.001$). The median quitter had a final balance of \$10.00, nearly double the \$5.67 deposited by the median continuing smoker ($p < 0.01$). In the CARES trial, quitters at six months had a median balance of \$9.06 and continuing smokers at six months had a median balance of \$2.38 after 10 weeks.

Figure 6.3b displays the average weekly deposits, by three-month smoking status. Week 0 denotes the week of enrollment. Even at Week 1, a large gap exists between successful quitters and continuing smokers at three months, and the difference persists throughout the deposit period. A positive relationship between depositing and quitting is consistent with the hypothesized relationship in which monetary commitment facilitates quitting, although the observed correlation must be interpreted carefully. Causality may be bi-directional: larger deposits may increase the chance of quitting through greater commitment, or quitting may increase the probability of depositing by reducing uncertainty.

An interesting feature of the deposit patterns in Figure 6.3 is that continuing smokers contributed a steady amount of money throughout the intervention period. Even in Week 10,

⁷¹ Our calculations are based on data available at: <http://www.aeaweb.org/aej-applied/>. Accessed February 14, 2011.

⁷² We used a shorter deposit period because in the CARES trial the deposit gap between successful quitters and continuing smokers opened up during the first month of the deposit period and remained fairly stable.

⁷³ This takes into account participants' mean quit predictions for themselves (80% likelihood) and for their teammates (67% likelihood).

Table 6.3: Usage of Deposit Accounts

	Number of accounts	25th pctile.	Mean	Median	75th pctile.	Standard deviation
<i>Panel A. Balance and deposits</i>						
Opening balance*	132	1.67	1.96	1.67	1.67	1.20
Smokers at 3 months	71	1.67	1.82	1.67	1.67	0.88
Quitters at 3 months	61	1.67	2.12	1.67	1.67	1.49
Total number of deposits	132	4.00	7.58	10.00	11.00	3.98
Smokers at 3 months	71	1.00	6.41	9.00	11.00	4.38
Quitters at 3 months	61	7.00	8.93	11.00	11.00	2.97
Balance at 3 months	132	5.00	8.59	7.33	11.17	5.84
Smokers at 3 months	71	1.67	6.48	5.67	9.67	5.48
Quitters at 3 months	61	7.00	11.05	10.00	13.83	5.31
<i>Panel B. Matching contribution</i>						
Proportion assigned to 1-month deadline for the match [†]	132	0	0.52	1	1	0.50
Proportion who earned the match [‡]	132	0	0.55	1	1	0.45
Smokers at 3 months	71	0	0.42	0	1	0.50
Deadline	30	0	0.30	0	1	0.47
No deadline	41	0	0.51	1	1	0.51
Quitters at 3 months	61	0	0.69	1	1	0.47
Deadline	38	0	0.53	1	1	0.51
No deadline	23	0	0.96	1	1	0.21

Note: \$1 equal to 30 Thai baht.

* The minimum opening balance was \$1.67 (50 baht).

† Each participant was randomly assigned by team to a 3-month deadline (“no deadline”) or 1-month deadline by which the person must reach a \$5 (150 baht) balance in order to receive a \$5 matching contribution.

‡ To earn the matching contribution, the participant had to reach a balance of \$5.

when many smokers must have suspected that they would not be able to quit successfully before the intervention ended, half of all continuing smokers contributed to their account. A standard economic model would predict that continuing smokers would not contribute, with the exception of those smokers who still expected to quit before the three-month urine tests. We may interpret this anomaly in one of several ways. First, participants (or perhaps the community health workers who served as deposit collectors) may be confused about the

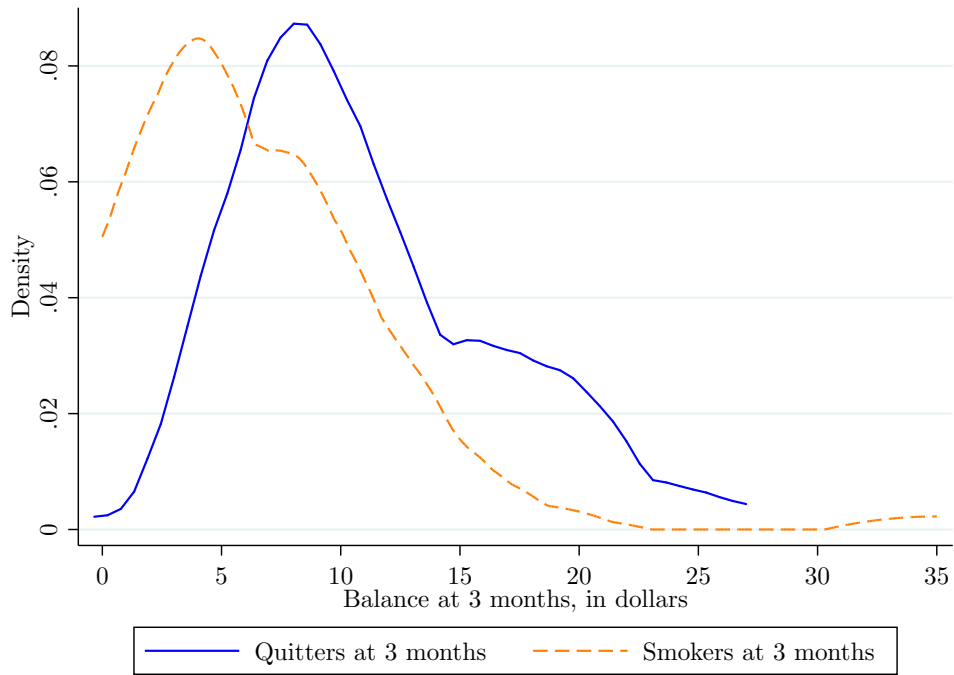
terms of the contract. Anecdotally, some participants expressed confusion about whether depositing was voluntary. Second, the participants may have succumbed to social pressure from the community health workers. If a CHW showed up at a participant's doorstep, the participant may have felt obliged to make a deposit. DellaVigna, List and Malmendier (2012) estimate that the social pressure from charity solicitations is \$1–4 among a U.S. sample, as compared to \$0.50 in our sample of much lower income individuals. The social pressure cost could be much higher in our sample because participants knew the solicitors. Third, the participants may have viewed the contribution as a charitable donation to the project. Charitable giving is an integral part of Thai culture.

In Table 6.4, we analyze the association between deposits and quit status in a regression framework. As stated earlier, these associations do not imply a causal relationship between making deposits and quitting. Each additional deposit and each additional \$1 of deposits are related to a 1.8%-point and 3.0%-point increase in the likelihood of quitting. Given a \$4 difference in mean amount deposited between quitters and smokers, this differential is associated with an increase in the likelihood of quitting of 12% points.

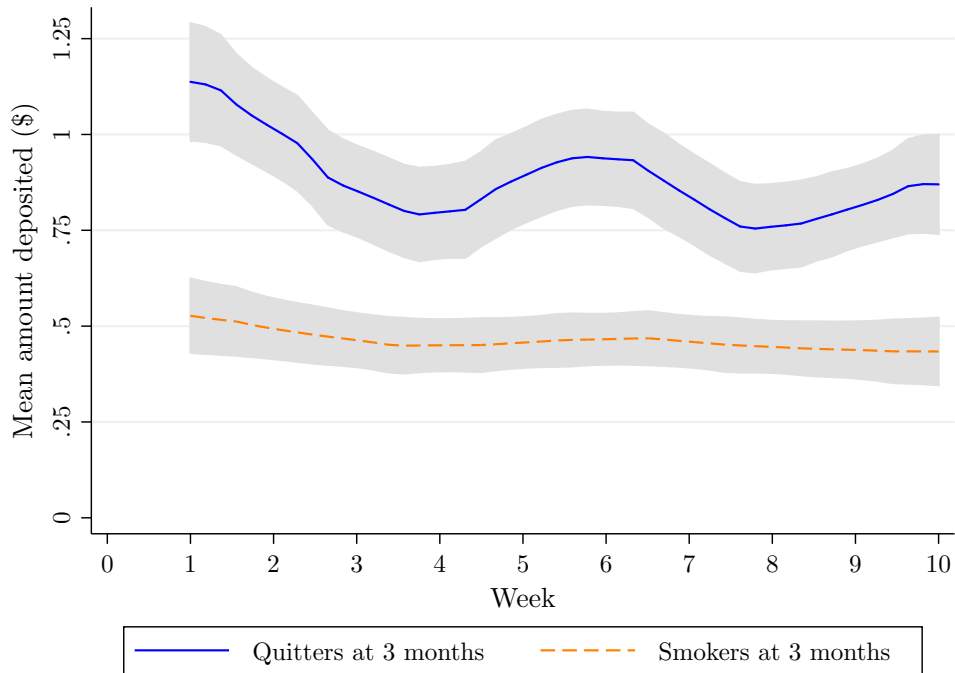
A more precise way to examine the influence of depositing on smoking behavior is to look on a week-by-week basis. We use four main explanatory variables: amount deposited that week, amount deposited the week before, whether a deposit was made that week, and whether a deposit was made the week before. All of our models include week dummies. Model 1 includes our full set of control variables; Model 2 includes the control variables and the person's quit status in the prior week; and Model 3 includes individual fixed effects. The effect sizes vary greatly by model. In particular, once we take account a person's lagged quit status in Models 2 and 3, the effect sizes shrink from 11–25% points to 3–7% points. The individual fixed effects models yield noisy estimates, and only the variable for making a deposit in the prior week is statistically significant. Making a deposit last week translates into a 9.3%-point increase in the likelihood of not smoking this week, although the confidence interval is wide, covering 1–17% points.

We asked participants how they viewed the contract as part of the qualitative interviews. Participants expressed diverging views on the influence of making deposits on their behavior. Some participants stated that the financial commitment was critical to their success: “Depositing money totally changed my thoughts. It always urged me every time when the village health volunteer visited and collected the money.” Similarly, another said: “When the project first gave advice about quitting smoking, I did not think much about the money. But when I kept making deposits, I wanted to quit even more.” Other participants were skeptical about the role of depositing *per se* on their behavior: “Sometimes I forgot for a while that I needed to quit smoking, but when the collector came, that reminded me that I had to quit smoking. Depositing money did not actually urge me that much. In general, it was just to remind myself.”

Figure 6.3: Deposits by 3-Month Smoking Status



(a) Balance at 3 months



(b) Mean amount deposited per week

Note: Panel (a) includes kernel densities from an Epanechnikov function and optimal bandwidth of 2.00. Panel (b) is based on a kernel-weighted local polynomial regression using an Epanechnikov kernel and optimal bandwidth of 0.75. The gray bands represent a 95% confidence interval.

Table 6.4: Multivariate Analysis of Depositing

	Quit status		
	(1)	(2)	(3)
<i>Panel A. Total deposits</i>			
Number of deposits	0.018*		
	(0.011)		
	[129]		
Account balance at 3 months	0.030***		
	(0.008)		
	[129]		
Match deadline vs. no deadline	0.095		
	(0.106)		
	[129]		
Earned the match (\$5+balance)	0.246***		
	(0.080)		
	[129]		
<i>Panel B. Deposits by week</i>			
Amount deposited that week	0.182***	0.050***	0.016
	(0.035)	(0.018)	(0.021)
	[1128]	[916]	[1128]
Amount deposited the week before	0.148***	0.033***	-0.027
	(0.035)	(0.010)	(0.023)
	[1007]	[916]	[1007]
Made a deposit that week vs. not	0.253***	0.067**	0.093**
	(0.072)	(0.026)	(0.040)
	[1128]	[916]	[1128]
Made a deposit the week before	0.175**	0.057**	-0.039
	(0.070)	(0.025)	(0.051)
	[1007]	[916]	[1007]
Week dummies (Panel B only)	Yes	Yes	Yes
Control variables	Yes	Yes	
Quit status in prior week		Yes	
Individual fixed effects			Yes

Note: Each coefficient comes from a separate regression. In Panel A, observations are at the person level, and quitting refers to 3-month abstinence. In Panel B, observations are at the person-week level, and quitting refers to abstaining that week. Robust SEs, clustered at the team level, are in parentheses. The number of observations from each regression is in brackets. We omit the enrollment week from all models and Week 1 from models with lags. Models 1, 2, and 4 report marginal effects from logit models. Model 3 is a linear probability model. Significance: * 0.10 ** 0.05 *** 0.01.

6.3.2 Effects of Randomly Assigned Deadlines

Time-limited deadlines can be powerful motivators for present-biased individuals to complete a task (Duflo, Kremer and Robinson, 2011). As part of a novel experimental manipulation, we tested whether a time-limited deadline for a project-sponsored matching contribution could nudge participants in the treatment group toward depositing earlier, thereby increasing their financial commitment to quitting and accelerating the quit dates that participants set. Larger and more frequent contributions early on in the deposit period may give participants more to lose from procrastinating, whereas participants assigned to no deadline might take a wait-and-see approach to depositing and setting a quit date.

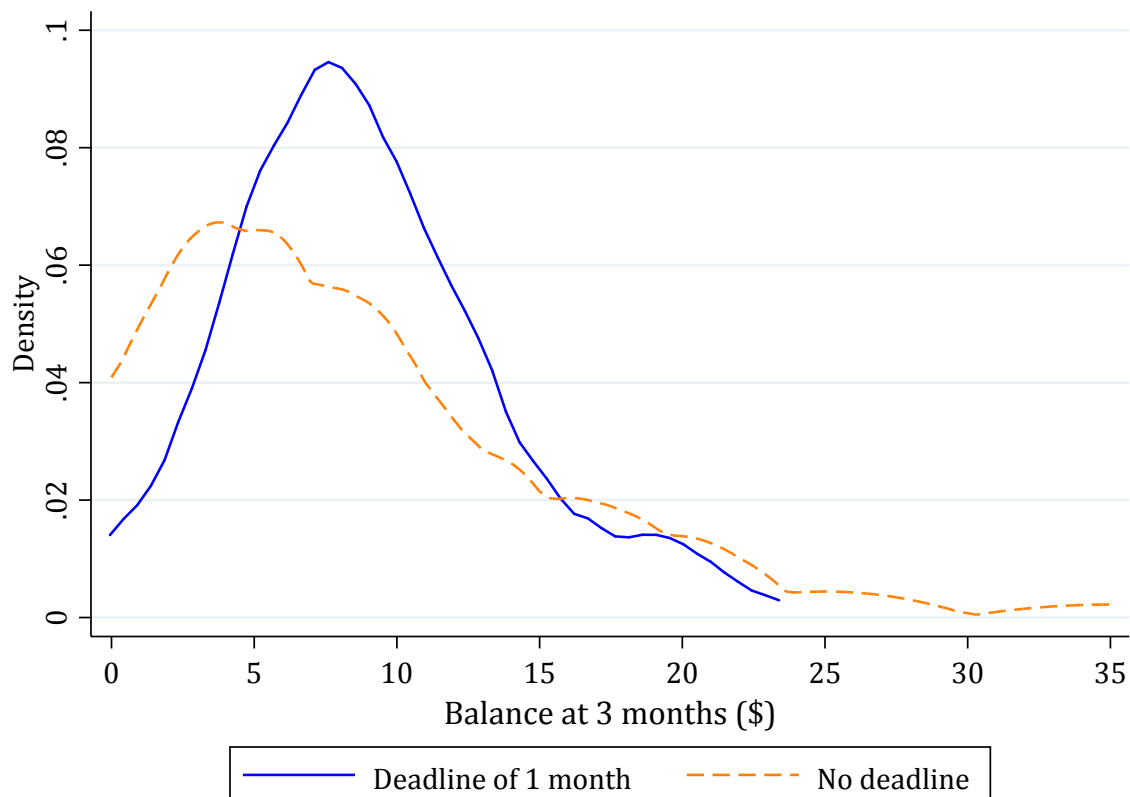
The time-limited group of participants had similar mean deposits and greater modal deposits than the no-deadline group (Kolmogorov-Smirnov test for equality of distributions: $p = 0.050$) (Figure 6.4), even though the latter had two extra months to reach the match trigger. The deadline group also made more deposits in the first month than the no-deadline group, although there was not a difference in the amount deposited during the first month (results not shown).⁷⁴ In an unadjusted regression model, those assigned to the matching contribution were significantly more likely to quit smoking by the end of the intervention period (0.199, SE 0.094), but the effect becomes insignificant after controlling for baseline characteristics (Table 6.4). Thus, we fail to find consistent evidence that the deadline improved outcomes. Even still, those who earned the matching contribution were far more likely to quit smoking. We believe that at least three considerations may have attributed to the null effect of deadlines on quitting in the adjusted model. First, the complexity of the intervention may have confused participants. We informed participants of their deadline status toward the end of the enrollment meeting, and participants may have lost track of how it fit into the overall intervention. Second, the matching contribution is only 12.5% of the team bonus. A larger matching contribution may have been more motivating. Third, some deposit collectors only visited participants every other week (despite instructions to visit weekly). In particular, some deposit collectors did not begin weekly visits until several weeks into the intervention, which would differentially hurt those in the deadline group.

6.4 Text Message Reminders

An important challenge for our study is explaining the large treatment effects in Section 5.2. One possibility is that neither the monetary commitment nor the teamwork motivated our participants to quit smoking. Rather, the third element of the intervention, the text message reminders, may be responsible. Several studies, notably Karlan et al. (2012), demonstrate the powerful effects that simple reminders can have on individuals whose attention span is finite. Simple nudges may be especially effective for present-biased agents

⁷⁴ Thus, we had no first stage to instrument the effect of depositing on quitting.

Figure 6.4: Distribution of Account Balances at 3 Months, by Deadline for Matching Contribution



Note: Based on a kernel density with an Epanechnikov kernel function and optimal bandwidth of 1.72.

(Duflo, Kremer and Robinson, 2011). Text messaging programs have also been proven to promote smoking cessation (Free et al., 2011; Rodgers et al., 2005). To harness the power of reminders, we sent weekly text messages to participants during the 10-week deposit period.

We cannot fully explore the causal pathways that contribute to the large treatment effects. That said, the text message reminders do not appear to drive our results. During the three-month follow-up survey, we asked participants about the text messages. About 80% of individuals who took the survey (78/96) reported owning a cell phone. In contrast, 100 of the 132 participants in the treatment group provided a cell phone number at baseline. Yet, only half of these participants ($n = 50$) stated that they had received any of the text messages. Thus, only 37.9% of the treatment group reported receiving at least one reminder.

In sub-analyses (results not shown), we examine the association between the text message

Chapter 6. Analysis of Secondary Outcomes

reminders and quitting. We find that treated participants who were sent text messages were not more likely to quit smoking at the end of the intervention (marginal effect -0.016, SE 0.105). However, treated participants who reportedly received the messages were more likely to quit (0.202, SE 0.098). Of course, this subsample likely differs in important observable and unobservable ways from the subsample that was sent the messages but did not receive them. The receivers are likely younger, wealthier, more educated, and so on. Nonetheless, when we exclude these 50 participants from the treated sample, the average treatment effect of the intervention remains the same magnitude (0.250, SE 0.059).

Chapter 7

Team Effects

In this section, we document the effects that teammates had on each other at the end of our intervention. We rely primarily on exogenous team formation to identify these team effects.

7.1 Descriptive Team Characteristics

Table 7.1 lists team characteristics measured at baseline and after the intervention, overall and by three-month quit status. We include pre-selected and randomly formed teams in this sample. Only 12 participants in the treatment group (10.6% of the full sample, 10.2% of the analytical sample) pre-selected a teammate. The majority of participants felt comfortable with being randomly assigned a teammate from the same village. Pre-selecting a teammate did not predict quitting among the treatment group, although we do find a significant positive effect among the full sample (Table B.3). Teammates tended to live about 1 km apart. About 55% of treated participants had a close friend or relative as a teammate. Only two participants reported that their teammate was a stranger. About half of teammates interacted with their teammate more than weekly prior to the start of the trial, and a quarter of participants interacted with their teammate monthly or less (including never). At baseline, we asked participants to enumerate their five closest friends in order, among their fellow villagers who participated in the trial. One-third of participants were matched with their closest friend, and another quarter of participants were matched with their second or third closest friends. None of these aspects of team relationships significantly varied by three-month quit status.

Next we turn to the social characteristics of teams after enrollment. These relationships are endogenous and are meant to be interpreted as correlational, not causal. They provide valuable information on how the social component of the intervention was carried out in practice. Of those in the treatment group, 27.3% (36/132) earned the team bonus, significantly greater than what would be predicted by chance. Among quitters in the treatment group, 59% received the team bonus. We can use the synthetic and pre-selected pairings in the control group to show that these team outcomes were not evenly dispersed by treatment status, and thus that the pairings contributed to greater concordance of outcomes. In the control group, 3.6% of individuals were in pre-selected or synthetic teams in which both

members quit at six months, 32.1% in teams in which one quit and one smoked, and 64.3% in teams in which both failed to quit. In contrast, the breakdown for the treatment group is significantly different: 26.2%, 36.9%, and 36.9%, respectively ($\chi^2(2) = 17.1, p < 0.001$). That treated participants were far more likely to be in teams in which both members quit and less likely to have both smoke seems to indicate, at first pass, that the encouragement effect of having a teammate who succeeds outweighs any discouragement effect from having a teammate who fails.

Table 7.1: Team Characteristics

	<i>N</i>	All	Quit status at 3 months		<i>t</i> -test of (3) vs. (4)
			Smoke	Quit	(<i>p</i> -value)
	(1)	(2)	(3)	(4)	(5)
<i>Panel A. Baseline team characteristics</i>					
Pre-selected teammate	132	0.106	0.127	0.082	0.409
Distance between houses (km)	130	0.994 (2.013)	0.945 (1.972)	1.050 (2.074)	0.769
Pre-trial relationship					
Acquaintances/strangers	132	0.341	0.282	0.410	0.123
Close friends	132	0.280	0.282	0.279	0.970
Relatives	132	0.288	0.268	0.311	0.582
Frequency of pre-trial contact					
Never	117	0.171	0.228	0.117	0.111
Monthly or less	117	0.103	0.070	0.133	0.264
At least 2 times/month	117	0.103	0.123	0.083	0.486
At least weekly	117	0.145	0.105	0.183	0.235
More than weekly	117	0.479	0.474	0.483	0.918
Teammate is <i>n</i> th closest friend [†]					
1 st	132	0.318	0.268	0.377	0.181
2 nd	132	0.129	0.127	0.131	0.941
3 rd	132	0.114	0.085	0.148	0.259
4 th	132	0.062	0.073	0.050	0.601
5 th	132	0.038	0.028	0.049	0.532
<i>Panel B. Post-enrollment team characteristics</i>					
Earned team bonus	132	0.273	0.000	0.590	< 0.001

Continued on next page

Table 7.1 – *Continued from previous page*

	<i>N</i>	All	Quit status at 3 months		<i>t</i> -test of (3) vs. (4)
			Smoke	Quit	(<i>p</i> -value)
	(1)	(2)	(3)	(4)	(5)
Frequency of post-enrollment contact					
None	117	0.145	0.175	0.117	0.372
Monthly or less	117	0.137	0.123	0.150	0.672
At least 2 times/month	117	0.086	0.105	0.067	0.460
At least weekly	117	0.162	0.123	0.200	0.262
More than weekly	117	0.470	0.474	0.467	0.940
Teammate asked/tried to convince me to quit					
Never	102	0.235	0.333	0.167	0.051
1 time	102	0.167	0.119	0.200	0.285
2-3 times	102	0.324	0.357	0.300	0.548
4+ times	102	0.275	0.190	0.333	0.114
Teammate gave me advice about how to quit					
Never	102	0.304	0.405	0.233	0.065
1 time	102	0.137	0.071	0.183	0.108
2-3 times	102	0.343	0.405	0.300	0.277
4+ times	102	0.216	0.119	0.283	0.048
Teammate calmed me down when stressed/irritated					
Never	101	0.337	0.439	0.267	0.073
1 time	101	0.257	0.244	0.267	0.800
2-3 times	101	0.238	0.244	0.233	0.904
4+ times	101	0.168	0.073	0.233	0.035
Teammate smoked with me since enrollment					
Never	102	0.676	0.595	0.733	0.145
1 time	102	0.088	0.143	0.050	0.106
2-3 times	102	0.137	0.167	0.117	0.475
4+ times	102	0.098	0.095	0.100	0.937

† Among those who participated in the trial

Note: Standard deviations in parentheses. The table includes pre-selected and randomly formed teams.

The frequency of contact during the intervention period mirrored the patterns of pre-trial contact. Participants do not appear to have sought out their teammate more than they

otherwise would, although our categorical data are not as granular as we might like. About three-quarters of participants had teammates who asked or tried to convince them to quit. Some direct peer pressure was exerted on these individuals. Most of this subgroup received multiple entreaties from their teammate. About 70% of participants received advice about quit strategies from their teammate. Those who received the most advice were more likely to quit by the end of the intervention. Two-thirds of participants reported that their teammate had calmed them down when feeling stressed or irritated. Those who received the most support were more likely to quit by three months. Finally, one-third of participants lit up with their teammates after enrolling in the study. This highlights a challenge for team interventions. Teammates may enable each other to engage in negative behaviors, just as they can deter each other.

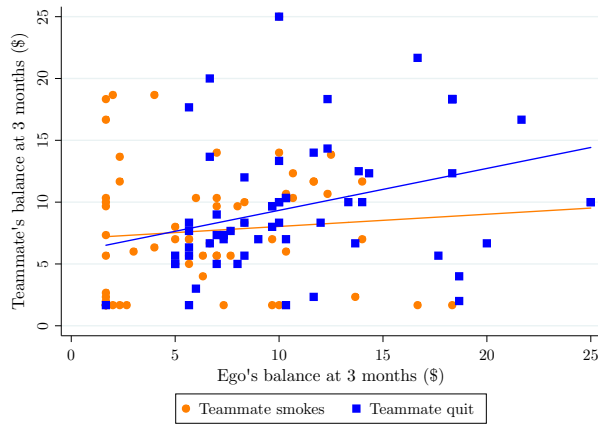
During the qualitative interviews, some participants attributed their success to the team aspect of the intervention. One participant said, “I like [team] competition because I would procrastinate if I had to quit all by myself. I would wait and never think that I will actually do it today. This time was like many other times that I told myself and failed. I succeeded this time because I said that it must be today.” Other participants credited the bonus with strengthening the social interactions with the teammate: “I thought about the bonus all the time because I knew that I could definitely quit....This also made me talk to my teammate more because both of us would get the bonus if we succeeded. We tempted each other using this bonus.” Other participants were more ambivalent: “My partner and I rarely talked. It would be better if my teammate was someone who is closer to me because I’d dare talk to him more.... But this could also affect me if I couldn’t quit but my teammate could, and I knew I’d dragged my teammate down. He wouldn’t get the bonus because of me.”

7.2 Strategic Behavior of Teammates

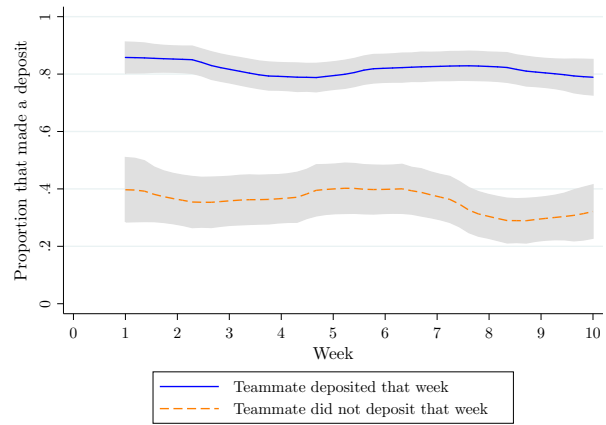
The timing of participants’ decisions to abstain from smoking or to make a deposit can help us to infer teammates’ strategic responses to each other. In particular, we can observe if participants act in concert. We can capture the temporal association between teammates’ behavior using weekly information that community health workers collected during each deposit collection visit. The CHWs asked if participants had smoked that week and if they believed that their teammates had smoked that week.

Figure 7.1 displays the graphical relationships between teammates’ deposit patterns. A person is more likely to make a deposit if his or her teammate: made a deposit that week, made a deposit during the prior week, or is believed not to have smoked that week. The bivariate differences are significant in all three cases and of a large magnitude in the case of a teammate’s depositing decision.

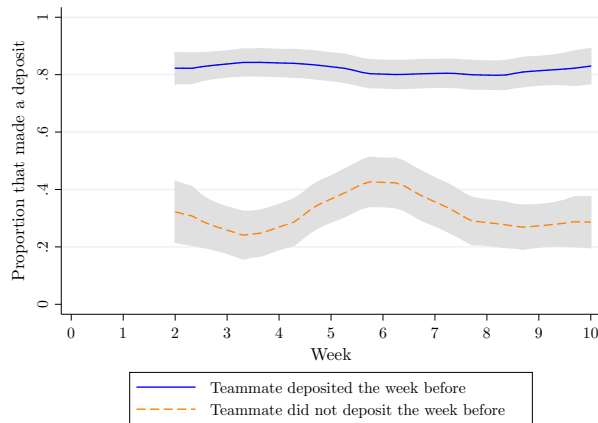
Figure 7.1: Association Between Teammates' Deposit Patterns



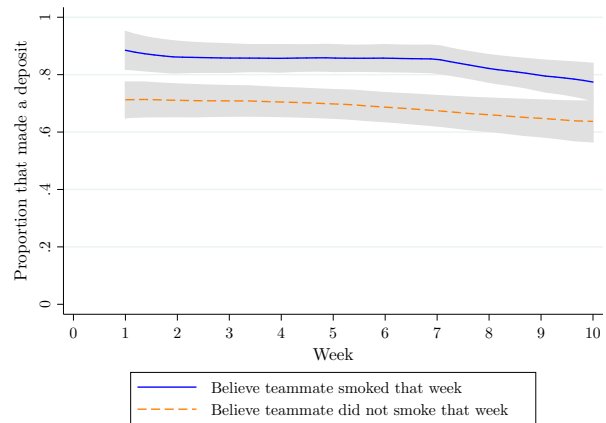
(a) Own vs. teammate's balance at 3 months



(b) Proportion who made a deposit, by teammate's deposit status that week



(c) Proportion who made a deposit, by teammate's deposit status the week before



(d) Proportion who made a deposit, by own reports about teammate's smoking status that week

Note: Panels (b) to (d) are based on a kernel-weighted local polynomial regression using an Epanechnikov kernel. Gray bands represent a 95% confidence interval. Panel (d) excludes individuals who are unsure of their teammate's smoking status.

Regression analyses confirm that participants behave in ways that appear to be in response to their teammates' actions (Table 7.2). A person is 20–30% points more likely to

make a contribution to his or her savings account if the person's teammate made a deposit that week (Models 4 and 5). A teammates' believed or self-reported quit status in a given week relate closely to an index person's smoking decisions. If a person believed that his or her teammate had not smoked that week or if the teammate had self-reported not smoking that week, the index person was 20-23% points more likely to abstain from smoking that week in the individual fixed effects model (Model 3) and 8% points more likely to abstain in the lagged dependent variable model. Angrist and Pischke (2009) argue that these two estimators can bound a causal effect (p. 245–46).⁷⁵ The teammates' lagged smoking status also predicts the index person's quit status in a given week, although the coefficients are not consistently significant across all specifications.

7.3 Causal Effect of Teammates

We investigated the effect of the strength of teammates' social ties on quitting at 3 months (Table 7.3). Of our seven measures of social tie strength, only two were significant. Participants paired with their closest or one of their five closest friends in the trial were 21.3% and 22.8% points more likely to quit smoking at three months. Endogenously formed, pre-selected teams did not out-perform randomly formed teams, and the sign of the coefficient is negative. Yet, in the regression-adjusted model for the full sample of treatment and control participants, preselecting a teammate reduces the likelihood of quitting by a highly significant 22% points (Table B.3 in Appendix B). The lack of a consistent finding that endogenously formed teams improve performance may stem from several possibilities. Close friends may be better able to ignore the social costs of failing to quit, under the belief that their friendship can withstand the disappointment. Alternatively, close friends may enable each other to smoke, for example, sharing a cigarette during social gatherings. As we saw in the last subsection, about one-third of participants smoked with their teammates after enrolling in the trial. When we look at that percentage by type of pairing, we see that 25.6% of randomly formed, treated teams smoked together after enrollment as compared to 83.3% of preselected, treated teams.

⁷⁵ However, we do not instrument for the lagged dependent variable with a lag from time $t - 2$ because we do not consider it to be a credible instrument. Thus, we do not make any causal claims from the lagged dependent variable models.

Table 7.2: Association Between Teammates' Behavior by Week

	Ego's quit status			Ego made a deposit	
	(1)	(2)	(3)	(4)	(5)
Teammate made a deposit that week vs. not	0.099 (0.062) [1007]	0.019 (0.019) [916]	0.051* (0.026) [1007]	0.297*** (0.053) [1290]	0.186*** (0.037) [1290]
Teammate made a deposit the week before vs. not	0.077 (0.058) [1007]	0.012 (0.020) [916]	-0.032 (0.032) [1007]	0.267*** (0.053) [1161]	-0.061 (0.037) [1161]
Teammate reported not smoking that week	0.204*** (0.077) [1069]	0.079** (0.035) [870]	0.231** (0.116) [1069]	0.044 (0.052) [1126]	0.012 (0.026) [1126]
Teammate reported not smoking the week before	0.137** (0.065) [890]	-0.014 (0.021) [870]	0.102* (0.080) [890]	0.030 (0.053) [1004]	0.028 (0.032) [1004]
Ego believes teammate did not smoke that week	0.227*** (0.066) [999]	0.075** (0.036) [824]	0.195** (0.076) [999]	0.056 (0.046) [1001]	-0.001 (0.029) [1001]
Ego believes teammate did not smoke the week before	0.150** (0.059) [828]	-0.014 (0.019) [826]	0.103* (0.055) [828]	0.053 (0.048) [892]	-0.006 (0.033) [892]
Week dummies	Yes	Yes	Yes	Yes	Yes
Control variables	Yes	Yes		Yes	
Quit status in prior week		Yes			
Individual fixed effects			Yes		Yes

Note: Each coefficient is drawn from a separate regression. Observations are at the person-week level, and quitting refers to abstaining from smoking as self-reported that week. Robust SEs, clustered at the team level, are in parentheses. The number of observations from each regression is in brackets. We omit the enrollment week from all models and Week 1 from models with lags. Models 1, 2, and 4 report average marginal effects calculated from logit models, including our full set of controls. Models 3 and 5 are linear probability models with individual and week fixed effects.

Significance: * 0.10 ** 0.05 *** 0.01.

Table 7.3: Effect of Social Ties of Teammates on 3-Month Quit Status

	Randomly formed teams in the treatment group						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Pre-selected teammate	-0.120 (0.151)						
Distance between teammates' houses (km)		0.005 (0.029)					
Pre-trial relationship with teammate							
Acquaintances/strangers (ref)							
Close friends			-0.056 (0.127)				
Relatives			-0.072 (0.130)				
Talked at least weekly to teammate pre-trial				0.128 (0.095)			
Teammate is closest friend in trial					0.213** (0.109)		
Teammate is 1 of 2 closest friends in trial						0.167 (0.105)	
Teammate is 1 of 5 closest friends in trial							0.228** (0.105)
Number of participants	132	116	108	104	118	118	118
Number of teams	66	58	54	58	59	59	59
Log likelihood	-90.8	-80.3	-74.6	-71.1	-79.6	-80.1	-78.7

Note: Coefficients are expressed as average marginal effects, based on logit models, using robust standard errors clustered at the team level. Significance: * 0.10 ** 0.05 *** 0.01.

We use an instrumental variables (IV) estimator to determine the causal effect of a teammate’s quit status at three months on the index person’s contemporaneous quit status.⁷⁶ The excluded instrument is other participants’ mean predictions for one’s teammate, excluding the predictions of the index person and teammate.⁷⁷ We restrict the analysis to the sample of randomly assigned teams in the treatment group among whom this instrument is randomly assigned.

We first investigate how balanced the baseline characteristics are for the sample assigned to a teammate assessed by others to have an above-median probability of quitting versus a teammate who has a below-median probability (Table B.4). Baseline characteristics are fairly well balanced, with no p -values below 0.05 and two of marginal significance. Ultimately, the exclusion restriction is untestable, but this check that the instrumental variable is independent of observed characteristics provides some assurance that the IV may also be independent of unobserved characteristics correlated with quitting.

The results of the IV estimation are provided in Table 7.4. In the reduced form equation, the coefficient of interest implies that a 10%-point increase in others’ mean predictions for one’s teammate leads to about a 6%-point increase in the index person’s abstinence. Models 3 and 4 show the first stage of the two-stage procedure, which allows us to assess the strength of the instrument. A major concern of instrumental variables methods is that a weak instrument will amplify any bias in the reduced form equation. Stock and Yogo (2002) provide the critical values for the first-stage Wald F -statistics to determine the expected actual size of a nominal 5% significance test. We are not aware of any comparable values for a first stage with a binary dependent variable. As such, we focus on the linear probability model in Model 3. The F -statistic of the excluded instrument indicates that it is moderately strong ($F(1, 58) = 11.6$). According to Stock and Yogo (2002), the expected actual size of the critical value is 10-15%. The corresponding test for our probit model is: $\chi^2(2) = 8.7$. We also run the Anderson-Rubin test of the endogenous regressor in our structural equation, which is robust to the presence of weak instruments. Using a size-corrected p -value, we find that our coefficient is significantly different from zero ($\chi^2(1) = 4.04, p < 0.044$). Moreover, the standard errors from the naïve probit estimator (Model 7) and the bivariate probit estimator (Model 6) are of similar magnitude. Put together, these results give a measure of confidence that our estimates are not severely biased from use of a potentially weak instrument.

The second-stage estimates imply that a teammate who quits smoking increases the index person’s likelihood of quitting by 53.6% in the OLS model and 39.2% in the bivariate probit model. Both coefficients are statistically significant, although the former is only marginally significant. The estimated coefficients are extremely large relative to the roughly 20% average treatment effect. We can interpret this local average treatment effect (LATE) as the effect that teammates have on marginal participants for whom others’ assessments of

⁷⁶ We also interacted the excluded instrument with our measure for the strength of baseline social ties, but did not detect any significant interaction effects, possibly due to a lack of statistical power.

⁷⁷ In tables and figures, we refer to the index person as “ego”.

their teammate as being of good or poor quality were decisive. We estimate that this group of compliers constitutes 28.2% of the treatment group when we dichotomize our instrument.⁷⁸ In contrast to the large LATE, the naïve estimator in Model 7 gives a smaller, insignificant coefficient. The downward bias in the naïve estimator is somewhat puzzling and goes against our priors.

⁷⁸ We can identify the population shares of different types of agents, under the assumption that our instrument is valid. Let $T_i \in [0, 1]$ be observed treatment status for individual i and $Z_i \in [0, 1]$ be the dichotomized values of our instrument. Then, we denote *never-takers* as $\pi_n = \Pr(T_i = 0|Z_i = 1)$, *always-takers* as $\pi_a = \Pr(T_i = 1|Z_i = 0)$, and *compliers* as $\pi_c = 1 - \pi_n - \pi_a$ (Imbens and Rubin, 1997).

Table 7.4: Effect of Teammate's Quitting on Ego's Quitting at 3 Months
(Randomly Formed Teams in the Treatment Group)

	Ego's quit status (Reduced form)		Teammate's quit status (First stage)		Ego's quit status (Second stage)		
	OLS	Probit	OLS	Probit	Bivariate		
					2SLS	probit	Probit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Teammate's quit status					0.536*	0.392***	0.177
					(0.279)	(0.123)	(0.118)
Mean predictions of others for teammate	0.628*	0.584*	1.172***	1.206***			
	(0.327)	(0.314)	(0.344)	(0.336)			
Ego's self-predictions	0.470**	0.467**	0.292	0.303	0.314	0.251	0.399**
	(0.185)	(0.186)	(0.209)	(0.196)	(0.234)	(0.206)	(0.193)
Constant	-0.297		-0.584		0.017		
	(0.359)		(0.362)		(0.292)		
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of participants	117	117	117	117	117	117	117
Number of teams	59	59	59	59	59	59	59
<i>F</i> statistic of instrument			11.6	8.7			

Note: The sample is restricted to *randomly formed* treated teams. Coefficients are reported as average marginal effects, along with robust standard errors clustered at the team level. All models control for sex, age, income, cigarettes per day, and type of tobacco. The two-stage least squares (2SLS) and bivariate probit models in Columns 5 and 6 instrument for teammate's quit status at 3 months using all participants' mean quit predictions for the teammate at baseline, excluding the predictions of the index person and the teammate him/herself. Model 6 includes bootstrapped standard errors. Model 7 is the naïve estimator. Significance: * 0.10 ** 0.05 *** 0.01.

7.4 Heterogeneous Team Effects

Next, we characterize the nature of the team effects using participants' quit predictions. Table 7.5 displays the relationships between baseline quit beliefs and subsequent smoking behavior. All models are restricted to treated teams in which pairs were randomly assigned and control for our full set of baseline characteristics. In sharp contrast with our theoretical model, a person's baseline self-predictions have no predictive power for her quit status three months later (Model 1). Yet, a teammate's baseline self-predictions lead to a significant increase in the index person's likelihood of quitting. Increasing the teammate's prediction by 10% points corresponds to a 4.5%-point increase in the index person's quit probability (Model 2). In the context of our theoretical model, we might interpret this relationship as a person's will being fortified after observing her teammate's self-confidence. If a teammate displays self-assuredness, then the index person might consider herself to have a greater likelihood of earning the team incentives, leading to increased effort and motivation on the part of the index person. As all other participants increase their evaluation of the index person's chances of quitting, she becomes much more likely to quit—in roughly a 1:1 correspondence (Model 4). We also analyze the relationship between a participant's overconfidence in quitting, defined as the difference between a person's self-predictions and those of all others for the person (Model 6). As a person's self-predictions increase 10% points, the positive effect of the self-predictions almost exactly counter the negative effect of the overconfidence, such that as a person's overconfidence increases, his or her probability of quitting does not change. A teammate's predictions for the index person likewise relate to the person's quit status at three months (Model 7). In contrast, the index person's prediction for her teammate is not related to the index person's own quit probability (Model 8).

We interact the dichotomized self-predictions of the index person and her teammate (Model 9) and plot the fitted probabilities (Figure 7.2a) from a regression-adjusted model in order to test for heterogeneous team effects.⁷⁹ Indeed, the team effects are non-monotonic in teammate's self-confidence. A team of (Low, High) type is 45.8% points more likely to quit smoking, compared to a (Low, Low) dyad, meaning that a person's quit probability increases dramatically when paired with a self-confident teammate. This differential effect could be interpreted as an encouragement effect from the perspective of an index person paired with a High type or as a discouragement effect from the perspective of an index person paired with a Low type. Given that Low types in the control group have a similar average quit probability as the (Low, Low) pairings, we consider this as suggestive but not conclusive evidence that the differential is driven by an encouragement effect for (Low, High) types. In contrast, High types are not significantly affected by a teammate's type. The theoretical model poses two possible explanations: the pattern may imply no encouragement or discouragement effects,

⁷⁹Figure B.1 in Appendix B provides a side-by-side comparison of the unadjusted model and a model controlling for all covariates. The patterns are qualitatively similar across models. While a teammate's self-prediction is exogenous to the index person, the index person's self-predictions are endogenous. As such, we prefer the adjusted model, which controls for potential confounders.

Table 7.5: Predicted and Observed Quitting at 3 Months
(Randomly Formed Teams in the Treatment Group)

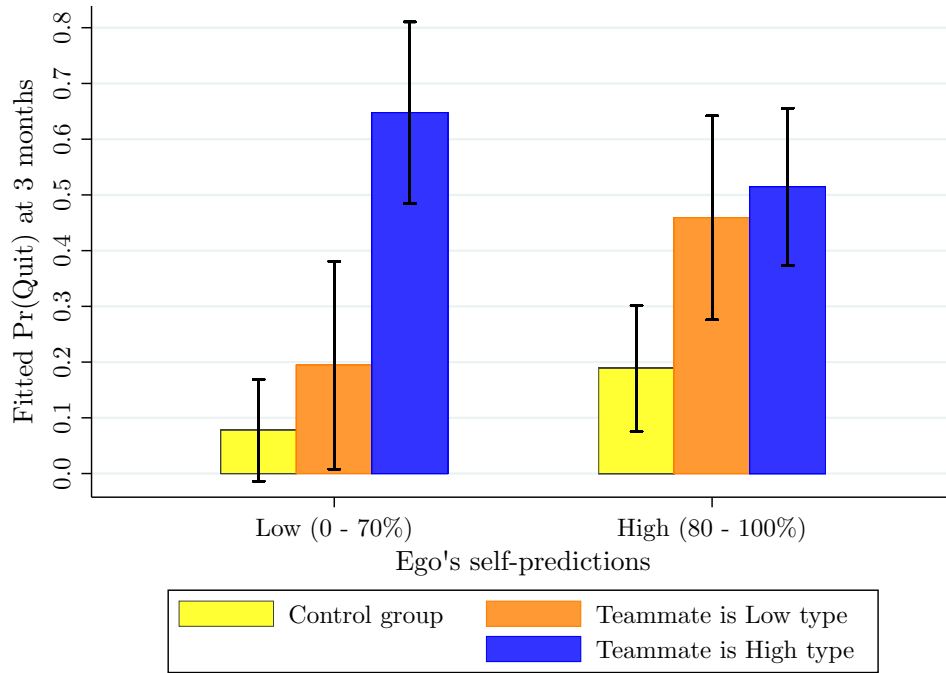
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Ego's self-predictions	0.158 (0.218)	0.174 (0.214)	0.165 (0.214)	-0.109 (0.231)	-0.083 (0.229)	0.833** (0.324)	-0.018 (0.254)	0.235 (0.255)	
Teammate's self-predictions		0.449** (0.182)	0.337** (0.170)		0.491*** (0.175)		0.316* (0.175)		
Ego's × teammate's self-predictions			-1.947 (1.821)						
Others' mean predictions for ego				0.942*** (0.287)	1.066*** (0.286)				
Overconfidence (= Ego's – Others' predictions)						-0.942*** (0.287)			
Teammate's predictions for ego							0.358** (0.181)		
Ego's predictions for teammate								0.329 (0.248)	
Team type, based on self-predictions									
Ego low, teammate low (ref)									
Ego low, teammate high									0.458*** (0.119)
Ego high, teammate low									0.263* (0.121)
Ego high, teammate high									0.318*** (0.110)
Number of participants	116	116	116	112	112	112	113	102	116
Number of teams	59	59	59	59	59	59	65	59	59
Pseudo- R^2	0.25	0.29	0.28	0.32	0.36	0.32	0.35	0.28	0.32
Log likelihood	-59.9	-56.8	-57.8	-53.1	-49.6	-53.1	-50.8	-51.0	-54.7

Note: The sample is restricted to *randomly formed*, treated teams. Coefficients are expressed as marginal effects from logit models of quitting at 3 months, controlling for all covariates listed in Table 5.1, subdistrict, cessation counselor, and quadratic terms for age, income, and cigarettes smoked per day. Robust standard errors, clustered at the team level, are in parentheses. Model 3 includes an interaction between ego's and teammate's self-predictions. Team type in Model 9 is based on each teammate's self-predictions, dichotomized as low (0-70%) and high (80-100%). Significance: * 0.10 ** 0.05 *** 0.01.

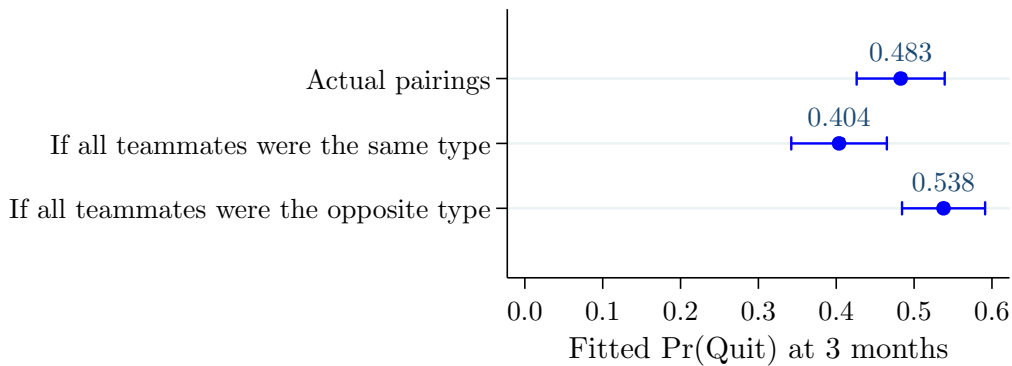
or High types may be analogous to “strong” types from the theoretical model, i.e., individuals who would have quit regardless of teammate assignment. That these smokers have had a 30-year smoking tenure dotted with multiple quit attempts, on average, suggests that the individuals more closely resemble weak types from the model.

Among the intervention’s actual team pairings, the fitted probability of quitting from Equation 4.9 is 48.3%. We also predict the quit probability under the scenario that all participants had been randomly paired with a teammate of the same type—(Low, Low) and (High, High) dyads—and under the scenario that all pairings had been of opposite type—(Low, High) and (High, Low). The predicted probabilities are shown in Figure 7.2b. Same-type pairings are predicted to yield a quit rate of 40.4% and opposite-type pairings are predicted to yield a quit rate of 53.8%, and these differences are statistically significant. Matching more confident individuals with less confident individuals leads to an encouragement effect for the less confident individuals without incurring any large discouragement penalty for the more confident individuals. We also tested these scenarios using others’ mean predictions for the index person and for the teammate (not shown). The results were similar but far noisier, and the differential effect is no longer significant. Thus, self-predictions are the clearest contributor to the heterogeneous team effects.

Figure 7.2: Ego's and Teammate's Self-Predictions and Actual Quitting at 3 months
(Randomly Formed Teams in the Treatment Group)



(a) Effect of own and teammate's self-predictions on fitted Pr(Quit) at 3 months



(b) Average fitted Pr(Quit), by scenario

Note: Sample restricted to randomly formed, treated teams ($n = 116$). Self-predictions for quitting are dichotomized at the median into low (0 – 70%) and high (80 – 100%). Fitted probabilities are based on a logit model of quitting at 3 months, controlling for all baseline covariates listed in Table 5.1, subdistrict, and smoking cessation counselor and quadratic terms for age, income, and cigarettes smoked per day. Error bars represent the 95% confidence interval, clustering standard errors at the team level. Same-type pairings are teams in which both teammates are low types or both are high types, whereas opposite-type pairings are teams in which one teammate is low type and one is high type.

Chapter 8

Discussion and Conclusion

8.1 Discussion

We find that trial participants displayed signs of two key behavioral biases: naïveté about present bias and projection bias about the benefits of quitting. Projection bias led smokers to under-value smoking cessation while at the same time naïveté led smokers to be wildly overoptimistic about their chances of quitting successfully. On average, smokers under-predicted the benefits of being smoke-free by nearly 50% and over-predicted their ability to quit more than two-fold. Smokers maintain these mistaken beliefs for at least six months, highlighting the persistence of these errors and the need for interventions that can correct them. These results add to a limited empirical literature on the presence of these biases for smoking.

We designed a novel team commitment intervention to counter present bias. We supplemented a basic commitment contract with team incentives to accomplish two objectives: 1) to attract naïve agents who would not enter into a basic commitment contract, according to the quasi-hyperbolic discounting model, and 2) to help partially naïve agents to overcome their tendency to under-invest in commitment contracts. We posited that a large monetary and social stake in quitting would motivate naïve and partially naïve smokers to avoid the impulse to smoke. We found that the intervention substantially increased the likelihood of biochemically verified smoking abstinence three months after the intervention ended (six months after enrollment). The average treatment effect at six months was 20% points (95% CI 9–31). The provision of cash incentives for quitting smoking has not consistently increased long-term smoking abstinence (Cahill and Perera, 2011). We show that cash incentives contingent on team production are effective in combination with commitment contracts. Relative to basic commitment contracts tested in the Philippines (Giné, Karlan and Zinman, 2010), team commitment contracts reduced the failure rate of users, highlighting the potential of stronger commitment through team incentives to promote quitting. However, about half of our contract users still failed to quit, suggesting that our intervention did not fully resolve the problems of under-commitment and lack of self-control faced by our study participants.

Few studies have assessed smoking cessation interventions in population-based settings in the developing world, and even fewer have assessed strategies targeted to rural populations,

despite the large share of rural deaths attributable to tobacco use. Our intervention translated into a decline in smoking rates of 2-5% points in the study area.⁸⁰ A change of such magnitude could potentially lead to a multiplier effect if quitting spreads through social networks as some researchers assert (Cutler and Glaeser, 2010; Christakis and Fowler, 2008). We also find low relapse rates among participants. The crowding effects cited in some studies involving monetary incentives (e.g., Bowles and Polania-Reyes, 2012) did not play a large role in our field experiment. Coordinated quit attempts of friends within the same community may reduce recidivism, potentially by changing the norms of tobacco use within a smoker's social network.

We only asked participants to contribute to a commitment savings account for 10 weeks, compared to 26 weeks in the CARES trial. Yet, even after one month, we detected large treatment effects that sustained long after the intervention ended. Thanks in part to a short intervention period, we find that our intervention is highly cost-effective. The incremental cost-effectiveness analysis indicates that our intervention performed favorably relative to the smoking treatments most commonly used in Thailand and relative to other economic evaluations of smoking cessation therapies (Ruger and Lazar, 2012). We have not calculated the cost per lives saved nor the cost per disability-adjusted life year (DALY) averted, but given the available estimates of DALYs averted from nicotine replacement therapy and other tobacco control interventions (Ransom et al., 2000), the team commitment intervention likely meets the World Health Organization's (WHO) standard for "very cost-effective" in Thailand, defined as being less than gross domestic product (\$8,600, PPP-adjusted, in 2011).⁸¹ The health gains from our intervention are large if existing estimates of the benefits from smoking cessation transfer to the Thai context. Smoking cessation among men aged 55 (the closest average age to our study population) extended life expectancy by nearly 5 years in the U.S. (Taylor Jr. et al., 2002). Life expectancy at birth in Thailand was 70 years in 2009, according to official WHO estimates, compared to 78 in the U.S.

Peer effects have been notoriously challenging to estimate (Manski, 1993). We use random variation in teammate assignment to construct a reliable instrumental variable that identifies the causal effect of teams. We find that teammates had strong effects on each other's outcomes. The bivariate probit estimation points to a causal effect of a teammate quitting of 39% points (95% CI 15–64), larger than the overall impact of the intervention at the same point in time (28% points). The magnitude of these team effects demonstrate the power of team incentives as an efficient and effective way to influence individuals' behavior. Of note, we find large team effects even though 90% of our teams were exogenously formed, challenging the claim that artificial team formation cannot be successful. In contrast, team-based interventions that aim to enhance social support have not consistently increased

⁸⁰ The decline is 2% if we conservatively assume that all control group members would have quit in the absence of the intervention. The decline is 5% if we assume that no one would have quit in the absence of the intervention.

⁸¹ This estimate comes from the World Bank's World DataBank (2012). Available at: <http://databank.worldbank.org/ddp/home.do>. Accessed on May 26, 2012.

smoking abstinence (May et al., 2006; Park, Tudiver and Campbell, 2012). We also find that the text message reminders cannot fully explain the magnitude of our average treatment effect. Thus, we posit that some other aspect of the team incentives, such as peer pressure, is responsible for the strong team effects. A larger, more complex evaluation is needed to test this hypothesis and to discern the relative contribution of the intervention's potential pathways to smoking abstinence.

Our analyses indicate that the team effects are heterogeneous with respect to baseline predictions for quitting, as our model predicted. Certain other findings did not adhere to the model predictions. For example, smoking abstinence did not increase with a person's self-confidence in quitting. The heterogeneous team effects imply that a preferred rule entails sorting individuals into heterogeneous teams based on baseline assessments of one's own quit probability.⁸² This rule concords with the optimal sorting uncovered by Ryvkin (2011), who finds that a social planner often maximizes effort by minimizing variation across groups. Optimal rules for assortative matching is an exciting new area of research (Bhattacharya, 2009; Graham, Imbens and Ridder, 2009), although the task warrants caution; empirically driven assignment rules can lead to unanticipated outcomes. Carrell, Sacerdote and West (Forthcoming) test a sorting rule developed from historical observational data (as opposed to the experimental data we use) and find a negative treatment effect. Future research should attempt to replicate our findings.

Overall, our study shows that a simple intervention enhanced the likelihood of smoking cessation in rural communities. Team commitment contracts may offer a viable, cost-effective alternative to current smoking cessation approaches in use in low-resource settings. The intervention also might be feasible to try in other settings, such as clinics and workplaces, and for other health behaviors, such as exercise and weight loss. Moreover, our findings raise exciting new possibilities for mobilizing peer pressure to effect positive health behavior change.

8.2 Limitations

Our study has several limitations. First, external validity is a concern for a small trial fielded in 42 communities. Smoking prevalence in our communities matches national estimates for rural areas, and our communities are diverse, including Buddhist and Muslim areas; however, the communities were sampled out of convenience, not to represent a broader geographic area. More generally, one might worry that Thailand's high demand for quitting and comprehensive tobacco control regulations make it a special case, although smoking patterns in other developing countries are likely to follow suit as a result of tobacco control reforms already underway. Second, our intra-village randomization procedure could have

⁸² Alcoholics Anonymous pairs new members with a sponsor who has been abstinent long-term. Many self-help groups have similar programs. It is unclear the extent to which a signal of strong willpower from someone like the sponsor influences the behavior of other members.

led to interference between control and treatment group members.⁸³ Our main treatment effects would be biased upward if control group members became less likely to quit after observing the assistance given to the treatment group. During the qualitative interviews, control group members reported that they were not adversely affected by assignment to the control group. Also, the quit rate in the control group is higher than most other smoking cessation trials, indicating that any discouragement felt by control group members had minimal impact on their quit status. However, we have no way to reliably measure the extent to which the control group incurred negative spillovers. Third, the two-arm trial cannot disentangle the causal pathways by which the intervention worked. The next step will involve a larger evaluation that seeks to clarify the potential mechanisms underlying team commitment's success (e.g., financial commitment vs. peer pressure vs. regular reminders) and to investigate the nature of the team effects. Fourth, the predictions on which much of our analysis relied were not elicited in an incentive-compatible manner. In other words, subjects were not paid for giving accurate answers, leaving open the possibility that participants reported predictions that are somehow systematically biased. Many studies find that incentivized and unincentivized predictions are equally effective (Delavande, Giné and McKenzie, 2011), although we are unable to confirm that our subjects reported their true beliefs. Fifth, the effect sizes estimated for each intervention as part of our incremental cost-effectiveness analysis are drawn from different studies and different populations. If effects are heterogeneous by geography or culture, then some of our estimates may be misleading. We use results from meta-analyses to mitigate any bias and to compare our intervention to the average effect across many studies, yet we cannot rule out that our intervention and the clinical interventions would stack up differently if implemented in the same patient population. Finally, our small sample size precluded us from taking a more granular look at certain extensions of our theoretical model, including the types of pairings that inhibit and promote goal attainment.

8.3 Future Research

This study has served as the basis for a proposed large-scale impact evaluation of team commitment contracts. We propose to conduct a cluster randomized trial in a sample of 3,200 smokers from 100 firms (clusters). The study would track an additional 4,800 smokers from the same firms who choose not to participate in the intervention. We would randomly assign participating firms to treatment arms that vary on two cross-randomized factors: type of contract (no contract or one of three types) and size of cash bonus for quitting smoking (no bonus or one of two sizes). Table 8.1 shows the proposed design.

The proposed study's central purpose would be to elucidate the ways in which multiple kinds of social and monetary mechanisms interact to affect quit rates. As Table 8.1 shows, each study arm would be expected to mobilize a different set of mechanisms, namely

⁸³ This would be a violation of the stable unit treatment value assumption (SUTVA).

Table 8.1: Proposed Design of an 11-Arm Cross-Randomized Study

Commitment contract type	No bonus	Bonus	
		Smaller	Larger
No contract	1	2	3 (cash)
Individual contract with individual bonus (<i>individual contract</i>)	4 (commitment)	5 (cash + commitment)	6 (cash + commitment)
Individual contract with assigned teammate and team bonus (<i>team contract</i>)	7 (commitment + social support)	8 (cash + commitment + support + peer pressure)	9 (cash + commitment + support + peer pressure)
Contract with choice between individual and team bonus (<i>choice contract</i>)		10	11

Note: Each numbered cell denotes one study arm. Arm 1 is the control group. Proposed mechanisms for each arm are in parentheses. “Cash” denotes motivation from potential financial gain. “Commitment” denotes motivation from monetary commitment.

monetary commitment, motivation from potential financial gain, social support, and peer pressure. By comparing the average treatment effect across arms, we would be able to identify the contribution of each mechanism to quitting and the interaction effects that exist between mechanisms.

The study would invite all workers interested in quitting to take up the assigned treatment—i.e., to attend a group counseling session for smoking cessation and, if applicable, to make a deposit at enrollment. Among those assigned to a contract, some participants would receive a cash bonus for quitting (*individual bonus contract*); some would be randomly assigned a teammate and would receive a cash bonus if both members quit (*team bonus contract*); and others would choose between the two (*choice contract*).

This proposed study would provide unique evidence on the effectiveness of adding a cash bonus and social pressure to commitment contracts. The methodology would be transferrable to other health behaviors (e.g., exercise) and other settings (e.g., rural communities and medical clinics), and the scientific lessons would be broadly portable, including to high-income countries. Above all, the study would have the potential to influence tobacco policy across many contexts and to advance the literature on the use of commitment contracts and social and monetary incentives to improve health behavior.

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Appendix A

Questionnaires

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Faculty of Medicine Srinakharinwirot University
คณะแพทยศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ

Using Group Commitment for Smoking Cessation

SCREENING QUESTIONNAIRE

Tambon

Muban #

Participant #

Partner #

Name of Interviewer: _____

Interview Date (DD/MM): _____

Start time: _____

Version, November 27, 2010

Screening Questionnaire

For administrative use only:
Tambon #: _____ Muban #: _____ Participant #: _____

Instructions: Please be assured that all your responses will be kept entirely confidential. For multiple choice questions (such as Question S1 below), please circle or shade the correct answer. For fill-in-the-blank questions (such as Question S2), please write in the correct answer.

S1 **[Note: Don't read.]** What is the person's gender.

- 1 Male
- 2 Female

S2 What is your age?

Enter age in years: _____

S3 What is your race?

- 1 Thai
- 2 Other (specify): _____

S4 What is your religion?

- 1 Buddhism
- 2 Islam
- 3 Christianity
- 4 Confucianism/Taoism/other traditional Chinese religion
- 5 No religion
- 6 Other (specify): _____

S5 What is your marital status?

- 1 Married
- 2 Single (never married)
- 3 Not married but living together
- 4 Divorced
- 5 Widowed

S6 How many children do you have? (Please include all children you have ever had who survived to age 1.)

Enter number of children: _____

Screening Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

S7 What is the highest level of education that you have completed?

- 1 No schooling
- 2 Lower Elementary
- 3 Upper Elementary
- 4 Lower Secondary
- 5 Upper Secondary
- 6 Diploma/Certificate
- 7 Bachelor Degree
- 8 Master/PhD Degree
- 9 Other (specify): _____

S8 Where did you grow up?

- 1 Amphur Ongkharak
- 2 Nakhon Nayok province, but not Amphur Ongkharak
- 3 Thailand, but not Nakhon Nayok
- 4 Another country, specify: _____

S9 Which of the following best describes your employment status? Choose one.

- 1 Agriculture or self-employed
- 2 Full-time employed in the workforce
- 3 Part-time employed in the workforce
- 4 Unemployed
- 5 Retired or on a pension
- 6 Full-time student
- 7 Home duties
- 8 Other (specify): _____

S10 What is your usual occupation?

Enter usual occupation: _____

S11 In the last year, on average, how much was the total income per month of all persons in your household combined, before taxes?

Baht _____ (per month)

Note: This question is for research purposes only. Please be assured that your responses will be kept completely confidential.

Screening Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

S12 Please indicate if your household has the following?

(Does your household have:)	Tick <input type="checkbox"/> in appropriate box	
	Yes	No
a. Electricity?	<input type="checkbox"/>	<input type="checkbox"/>
b. A television?	<input type="checkbox"/>	<input type="checkbox"/>
c. A radio?	<input type="checkbox"/>	<input type="checkbox"/>
d. A refrigerator?	<input type="checkbox"/>	<input type="checkbox"/>
e. A bicycle?	<input type="checkbox"/>	<input type="checkbox"/>
f. A motorcycle?	<input type="checkbox"/>	<input type="checkbox"/>
g. A car or truck?	<input type="checkbox"/>	<input type="checkbox"/>
h. A formal bank account?	<input type="checkbox"/>	<input type="checkbox"/>

S13 How many people aged 20 years or older, not including yourself, live in your household?

Enter number of adults: _____

S14 How many people younger than 20 years old live in your household?

Enter number of children: _____

S15 Do you now smoke every day or some days? (Circle one.)

- 1 Every day
- 2 Some days **(Skip to S17)**

S16. On average, how many cigarettes do you smoke each day? Include both factory-made and hand-rolled cigarettes.

Enter Number: _____ **(Skip to S18)**

S17. On average, how many cigarettes do you smoke each week? Include both factory-made and hand-rolled cigarettes.

Enter Number: _____

Screening Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

S18 Do you smoke factory-made cigarettes, hand-rolled cigarettes, or both?

- 1 Factory-made only. If yes, typically what brand: _____
(Skip to S20)
- 2 Hand-rolled only **(Skip to S20)**
- 3 Both. If yes, typically what brand of factory-made: _____

S19 If you smoke both factory-made cigarettes and hand-rolled cigarettes, do you smoke mainly factory made or mainly hand-rolled cigarettes (tobacco leaf)?

- 1 Mainly factory-made
- 2 Mainly hand-rolled (tobacco leaf)
- 3 About the same

S20 How old were you when you first started to smoke?

Enter age in years: _____

S21 About how many months or years have you been smoking? **[Complete only 1 blank.]**

If less than 12 months, enter months: _____

If 12 months or more, enter years: _____

S22 On days that you smoke, how many minutes or hours after waking do you usually have your first cigarette? **[Complete only 1 blank.]**

If less than 60 minutes, enter minutes: _____

If more than 60 minutes, enter hours: _____

S23 When did you last smoke a cigarette? (Circle one)

- 1 Less than 1 hour ago
- 2 1 to 3 hours ago
- 3 4 to 6 hours ago
- 4 6 to 12 hours ago
- 5 12-24 hours ago
- 6 More than 24 hours ago. Enter number of days: _____

Screening Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

S24 Do you consider yourself addicted to cigarettes? (Circle one)

- 1 Not at all addicted
- 2 Somewhat addicted
- 3 Very addicted

S25 How many smokers aged 20 or older live in your household, not including yourself?

Enter number of adult smokers: _____

S26 Have you ever tried to quit smoking?

- 1 Yes
- 2 No **(Skip to Question S31)**

S27 How many times have you ever tried to quit smoking? Either write or circle the correct response.

- 1 ____ Times (enter number 0-9)
- 2 More than 10

S28 How long ago did your most recent serious quit attempt end? **[Complete only 1 blank.]**

- 1 ____ Days ago (enter number 0-31)
- 2 ____ Months ago (enter number 0-12)
- 3 ____ Years ago (enter number 0-60)

S29 Thinking about your last serious quit attempt—How long did you stay smoke-free? **[Complete only 1 blank.]**

- 1 ____ Days (enter number 0-31)
- 2 ____ Weeks (enter number 0-10)
- 3 ____ Months (enter number 0-12)
- 4 ____ Years (enter number 0-30)

Screening Questionnaire

For administrative use only:
 Tambon #: ___ Muban #: ___ Participant #: ___

S30 Why did your last quit attempt fail: (Circle the best answer)

- 1 Stress
- 2 Habit or physical addiction
- 3 Quitting smoking made you sick
- 4 Desire to be social
- 5 People around you were smoking
- 6 You missed smoking
- 7 Other. If yes, specify: _____

S31 Are you planning to quit smoking: (Circle one)

- 1 Within the next month
- 2 Within the next 6 months
- 3 Sometime in the future, beyond 6 months
- 4 Not planning to quit

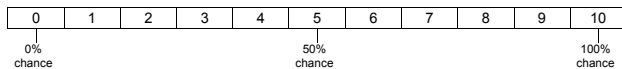
S32 Have you set a firm date for quitting? (Circle one)

- 1 Yes
- 2 No

S33 If you quit smoking for this project, do you plan to start smoking again after the project ends? (Circle one)

- 1 Yes
- 2 No
- 3 Don't know

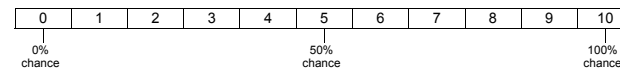
S34 **NOTE: USE VISUAL AIDS.** If you decide to give up smoking completely in the next month, what is the chance that you would succeed? Please point to a number from 0 to 10, where each number represents one chance out of 10. If you circle 0, it means you are certain that you will not quit. If you circle 10, it means that you are certain you will quit. If you circle 5, it means that you are as likely to quit as to not quit.



Screening Questionnaire

For administrative use only:
 Tambon #: ___ Muban #: ___ Participant #: ___

S35 **NOTE: USE VISUAL AIDS.** If you decide to give up smoking completely in the next three months, what is the chance that you would succeed? Please point to a number below from 0 to 10.



S36 More generally, how sure are you that you would succeed if you decided to give up smoking completely in the next three months?

- 1 Not at all sure
- 2 Somewhat sure
- 3 Very sure
- 4 Extremely sure

S37 How important is it to you that give up smoking completely in the next three months?

- 1 Not at all important
- 2 Somewhat important
- 3 Very important
- 4 Extremely important

S38 **NOTE: USE VISUAL AIDS.** In the past 6 months, have each of the following things led you to think about quitting not at all, somewhat, or very much?

(In the last 6 months, were you led to think about quitting by:)	Tick <input checked="" type="checkbox"/> in appropriate box		
	Not at all	Somewhat	Very much
a. Concern for your personal health?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Concern about the effect of your cigarette smoke on non-smokers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. That Thai society disapproves of smoking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. The price of cigarettes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. The potential financial savings?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Advertisements or information about the health risks of smoking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Warning labels on cigarette packages?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Wanting to set an example for children?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Screening Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

S39 **NOTE: USE VISUAL AIDS.** Have each of the following led you to join this project not at all, somewhat, or very much?

(Were you led to join this project by:)	Tick <input type="checkbox"/> in appropriate box		
	Not at all	Somewhat	Very much
a. Concern for the health of you or others?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. The financial savings from the deposits?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. The project money that will be put in the savings account for you?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. The cash bonus from quitting?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. The project will give you a partner to help you quit smoking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. A friend asked you to be his partner?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. A community health worker asked you to join?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Another person asked or told you to join?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

S40 I am going to read you a list of health effects and diseases that may or may not be caused by smoking cigarettes. Based on what you know or believe, does smoking cause the following:

(Does smoking cause:)	Tick <input type="checkbox"/> in appropriate box		
	Yes	No	Don't know
a. Stroke in smokers [blood clots in the brain].	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Impotence in male smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Lung cancer in smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Decay in the lungs of smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Stained teeth in smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Premature ageing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Lung cancer in nonsmokers from secondhand smoke.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Screening Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

S41 In general, how would you describe your health?

- 1 Poor
- 2 Fair
- 3 Good
- 4 Very good
- 5 Excellent

S42 Has a doctor ever diagnosed you with any of the following chronic health conditions?

(Has a doctor ever diagnosed you with:)	Tick <input type="checkbox"/> in appropriate box	
	Yes	No
a. Diabetes?	<input type="checkbox"/>	<input type="checkbox"/>
b. Hypertension?	<input type="checkbox"/>	<input type="checkbox"/>
c. Heart disease?	<input type="checkbox"/>	<input type="checkbox"/>
d. Chronic obstructive pulmonary disease?	<input type="checkbox"/>	<input type="checkbox"/>
e. Cancer?	<input type="checkbox"/>	<input type="checkbox"/>
f. Other? If yes, specify: _____	<input type="checkbox"/>	<input type="checkbox"/>

S43 During the past 3 months, about how often did you have any kind of alcoholic drink?

- 1 Every day
- 2 5-6 days per week
- 3 3-4 days per week
- 4 1-2 days per week
- 5 Less than once a week, but at least once a month
- 6 Less than once a month
- 7 Did not drink alcohol in the past 3 months (**Skip to S45**)

S44 On a typical day when you had alcohol over the past 3 months, how many alcoholic drinks did you usually have?

NOTE: Code for type of container: 1 = shot glass (pek), 2 = small bottle (gat), 3 = small bottle, 4 = big bottle, 5 = can, 6 = water glass.

(How many of each do you usually drink?)	# per day	Container type (Enter code #)
a. Thai rice whiskey?	_____	_____
b. Beer?	_____	_____

Screening Questionnaire For administrative use only:
Tambon #: _____ Muban #: _____ Participant #: _____

S48 After 3 months, we will like to interview you again. At that time, you will receive THB 200 or be eligible to receive a cash bonus of THB 1,200. We will contact you to schedule that meeting. If we are unable to find you at follow-up, is there a friend or family member who would know how to contact you? If yes, please provide the person's name and phone number. If no phone number, please provide his village and house #.

- a) Enter the person's name: _____
- b) Enter phone #: _____
 Or: _____
 Enter muban: _____ Enter tambon: _____ Enter house number: _____

Thank you! That completes the questionnaire.

End time: _____

Screening Questionnaire For administrative use only:
Tambon #: _____ Muban #: _____ Participant #: _____

- c. Manufactured whiskey _____
- d. Rice whiskey with herbs? _____
- e. Other? Specify units: _____

S45 During the past 3 months, have you used any drugs for recreation? **[If yes, ask:]** Which drugs? **[Note: Do not read the list to the participant. Circle all that apply.]**

- 1 No
- 2 Amphetamines
- 3 Kratom
- 4 Gancha
- 5 Other. Specify: _____

S46 Of your 5 closest friends, not including people who live in your household, how many are smokers?

- 1 1
- 2 2
- 3 3
- 4 4
- 5 5
- 6 None

S47 Of the 5 people that you spend the most time with on a regular basis, not including people who live in your household, how many are smokers?

- 1 1
- 2 2
- 3 3
- 4 4
- 5 5
- 6 None



Faculty of Medicine Srinakharinwirot University
คณะแพทยศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ

Using Individual and Group Commitment for Smoking Cessation

BASELINE QUESTIONNAIRE

--	--

Interviewer code
CODE0

--	--	--	--

Village code
CODE1

--	--

Individual code
CODE2

--

--	--	--	--

Subject's name
CODE_NAME

--	--	--	--	--	--	--	--	--	--	--	--

Telephone number
CODE_TEL

Version, May 10, 2010

DATE OF INTERVIEW : □□□□YYYY □□MM □□DD

START TIME : □□HOUR □□MINUTE

English Version

SURVEY SECTION

1 Do you smoke every day or less than every day? Include both factory-made and hand-rolled cigarettes.

- 1 Every day **Go to Q.2**
 2 Less than everyday **Go to Q.3**

2 On average, how many cigarettes do you smoke each day? Include both factory-made and hand-rolled cigarettes.

_____| **Number of cigarettes** **Go to Q.4**

Interviewer Note: If respondents give range (e.g. 15-20 cigarettes), choose midpoint and round up, if necessary (e.g. 17.5 becomes 18).

3 On average, how many cigarettes do you smoke each week?

_____| **Number of cigarettes**

4 I am going to read you a list of health effects and diseases that may or may not be caused by smoking cigarettes. Based on what you know or believe, does smoking cause the following:

	Tick <input checked="" type="checkbox"/> in appropriate box		
	Yes	No	Don't know
a. Stroke in smokers [blood clots in the brains].	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Impotence in male smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Lung cancer in smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Decay in the lungs of smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Stained teeth in smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Premature ageing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Lung cancer in nonsmokers from secondhand smoke.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PRICE, EXPENDITURES, AND SAVINGS

5 These next questions are about cigarette prices and where you get your cigarettes.

Where did you **last** buy cigarettes or tobacco for yourself?
(Don't read checklist, but you can give examples. Select only one response)

- 1 From a street vendor
- 2 Local stores
- 3 Convenience stores – include kiosks
- 4 Gas stations
- 5 Hypermarket or supermarket
- 6 From recreational venue – e.g., coffee shop, restaurant, bar
- 7 From an independent vendor in a recreational venue
- 8 Duty-free shop or region
- 9 Outside the country
- 10 Military stores
- 11 On the internet
- 12 From vending machines
- 13 From a vendor selling from a truck or car
- 14 Newsstand
- 15 Other: _____
- 88 Refused
- 99 Don't know

Interviewer Note: If respondent says "store," ask: would that be a local store or a large supermarket? If unsure do not guess. Instead, record response in category 15 – Other.

6 What brand did you buy?
 Enter brand name: _____

**88 Refused
 99 Don't know**

Interviewer Note: If roll-your-own tobacco, Go to Q.9a

7 The last time you bought cigarettes for yourself, did you buy them by the carton, the pack, or as single cigarettes?

- | | |
|---------------------------------------|------------------------------------|
| <input type="checkbox"/> 1 Carton | Go to Q.8a |
| <input type="checkbox"/> 2 Pack | Go to Q.8b |
| <input type="checkbox"/> 3 Loose | Go to Q.8c |
| <input type="checkbox"/> 8 Refused | (Don't read out) Go to Q.10 |
| <input type="checkbox"/> 9 Don't know | (Don't read out) Go to Q.10 |

Note: "Loose" cigarettes = single or individual cigarettes.

8a How much did you pay for that carton?

Baht _____ [Enter price] **Go to Q.10**

**888 Refused
 999 Don't know**

8b How much did you pay for that pack?

Baht _____ [Enter price] **Go to Q.10**

**888 Refused
 999 Don't know**

8c a) How many single cigarettes did you purchase?

_____ [Enter number of cigarettes]

**88 Refused
 99 Don't know**

b) How much did you pay for that one (each) cigarette?

Baht _____ [Enter price] **Go to Q.10**

Note: Respondents might not know the cost per cigarette, and we don't want them to do arithmetic. If respondent can only provide price for multiple cigarettes, please do the arithmetic to get single stick price and enter that.

9a **If respondent uses hand-rolled cigarettes, then ask:**

How much did you pay for your last pack of hand-rolling tobacco?

Baht _____ [Enter price]

**888 Refused
 999 Don't know**

- 9b How many days did it take you to smoke this packet of hand-rolling tobacco?
Enter number of days: _____
88 Refused
99 Don't know
- 10 How much money do you spend each week on cigarettes, including both factory-made and hand-rolled cigarettes?
Baht _____ [Enter expenditures]
888 Refused
999 Don't know
- 11 In the last **6** months, have you spent money on cigarettes that you knew would be better spent on household essentials like food?
 1 Yes
 2 No
- 12 Next, I am going to ask a couple hypothetical questions.
Would you prefer to receive THB 200 guaranteed today, or THB 300 guaranteed in 1 month?
 1 THB 200 today
 2 THB 300 in 1 month
- 13 Would you prefer to receive THB 200 guaranteed in 6 months, or THB 300 guaranteed in 7 months?
 1 THB 200 in 6 months
 2 THB 300 in 7 months
- 14 Next, I am going to ask you about your savings over the next 3 months.
How much money would you like to save over the next 3 months?
Baht _____ [Enter savings]
888 Refused
999 Don't know

- 15 If you save this amount of money, how would you spend it (**choose one**)?
 1 Purchase equipment and tools
 2 Buy merchandise
 3 Purchase a moto taxi
 4 Purchase land
 5 Purchase vehicle(s)
 6 Purchase housing
 7 Education
 8 Emergency/Contingency
 9 Purchase household equipment
 10 Social and family events
 11 Starting a business
 12 Improve business
 13 Improve housing
 14 Other, specify: _____
- 16 Who is the primary keeper of money in your household?
 1 Me
 2 My spouse
 3 Son or daughter
 4 Parent or parent-in-law
 5 Other family member, specify relationship: _____
 8 Refused (**Don't read out**)
 9 Don't know (**Don't read out**)
- 17 Who is the primary person responsible for budgeting in your household?
 1 Me
 2 My spouse
 3 Son or daughter
 4 Other family member, specify relationship: _____
 8 Refused (**Don't read out**)
 9 Don't know (**Don't read out**)

OTHER SMOKED PRODUCTS

18 In the past month, have you used any tobacco product other than cigarettes?
This could include tobacco that you smoke or tobacco that you don't smoke?

- 1 Yes
- 2 No **Go to Q.20**
- 8 Refused **(Don't read out)**
- 9 Can't say **(Don't read out)**

19 What did you use? **(Don't read out. Select all that apply).**

Do you use [product] daily or less than daily?

	Tick <input checked="" type="checkbox"/> in appropriate box	
	¹ Daily	² Less than daily
a. Cigars	<input type="checkbox"/>	<input type="checkbox"/>
b. Cigarillos	<input type="checkbox"/>	<input type="checkbox"/>
c. Bidis	<input type="checkbox"/>	<input type="checkbox"/>
d. Pipe	<input type="checkbox"/>	<input type="checkbox"/>
e. Chewing tobacco	<input type="checkbox"/>	<input type="checkbox"/>
f. Snuff	<input type="checkbox"/>	<input type="checkbox"/>
g. Shisa/hokka	<input type="checkbox"/>	<input type="checkbox"/>
h. Other product (Specify) _____	<input type="checkbox"/>	<input type="checkbox"/>

Interviewer Note: Ask frequency of use for each product used.

NICOTINE REPLACEMENT THERAPY (NRT) / CESSATION

20 Have you heard about medications to help people stop smoking, including nicotine gum, stop-smoking pills such as Zyban, or herbal medications?

- 1 Yes
- 2 No **Go to Q.23**

21 Have you ever used any of these medications?

- 1 Yes
- 2 No **Go to Q.23**
- 9 Can't remember **(Don't read out) Go to Q.23**

22 Which medication or medications have you used?
(Don't read out, select all that apply)

	Tick <input checked="" type="checkbox"/> in appropriate box	
	¹ Ever used	² Used in last year
a. Nicotine gum	<input type="checkbox"/>	<input type="checkbox"/>
b. Nicotine patch	<input type="checkbox"/>	<input type="checkbox"/>
c. Nicotine lozenges	<input type="checkbox"/>	<input type="checkbox"/>
f. Nicotine nasal spray	<input type="checkbox"/>	<input type="checkbox"/>
g. Quomem or Zyban	<input type="checkbox"/>	<input type="checkbox"/>
h. Other (Specify) _____	<input type="checkbox"/>	<input type="checkbox"/>

Interviewer notes:
For all used, check to see if they have used them in the last year, and, if so check second column as well as first.

QUITTING

23 a. In the last 6 months, have you visited a doctor or other health professional?

- 1 Yes
- 2 No **Go to Q.25**

24 During any visit to the doctor or other health professional in the last **6** months, did you receive: **(Read)**

	Tick <input type="checkbox"/> in appropriate box	
	Yes	No
a. Advice to quit smoking.	<input type="checkbox"/>	<input type="checkbox"/>
b. Pamphlets or brochures on how to quit.	<input type="checkbox"/>	<input type="checkbox"/>
c. Additional help or a referral to another service to help you quit.	<input type="checkbox"/>	<input type="checkbox"/>

25 In the last **6** months, have you received advice or information about quitting smoking from any of the following?

a. Telephone or Quit Line services?

- 1 Yes
- 2 No

b. Local stop-smoking services such as hospitals or clinics?

- 1 Yes
- 2 No

BELIEFS ABOUT QUITTING

26 If you decided to give up smoking completely in the **next month**, how sure are you that you would succeed?

- 1 Not at all sure
- 2 Somewhat sure
- 3 Very sure
- 4 Extremely sure
- 9 Don't know **(Don't read out)**

27 Are you planning to quit smoking:

- 1 Within the next month.
- 2 Within the next 6 months. **Go to Q.29**
- 3 Sometime in the future, beyond 6 months. **Go to Q.29**
- 4 Not planning to quit. **Go to Q.29**
- 8 Refused **(Don't read out)** **Go to Q.29**
- 9 Can't say **(Don't read out)** **Go to Q.29**

28 Have you set a firm date?

- 1 Yes
- 2 No

29 **If Q.27=4:** Even though you are not currently planning to quit, in the past **6** months, have each of the following things led you to think about quitting, not at all, somewhat, or very much.

If Q.27=1,2, or 3: In the past **6** months, have each of the following things led you to think about quitting, not at all, somewhat, or very much:

(In the last 6 months, were you led to think about quitting by:)	Tick <input type="checkbox"/> in appropriate box			
	¹ Not at all	² Somewhat	³ Very much	⁹ Can't Say
a. Concern for your personal health?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Concern about the effect of your cigarette smoke on non-smokers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. That Thai society disapproves of smoking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. The price of cigarettes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. The potential financial savings?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Advertisements or information about the health risks of smoking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Warning labels on cigarette packages?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Wanting to set an example for children?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

30 How much do you think you would benefit from health and other gains if you were to quit smoking permanently in the next 6 months?

- 1 Not at all
- 2 Somewhat
- 3 Very much
- 9 Can't say

31 For each person still in attendance at this meeting, please tell me how likely he is to quit smoking. If he (she) decide to give up smoking completely in the next month, what is the chance or likelihood that he (she) would succeed? Please circle a number below from 0 to 10, where each number represents one chance out of 10. If you circle 0, it means you are certain that he (she) will not quit. If you circle 10, it means that you are certain he (she) will quit. If you circle 5, it means that he (she) are as likely to quit as to not quit.

NAME	No chance	Small chance			50/50 chance			Big chance			Totally Certain
	0	1	2	3	4	5	6	7	8	9	10
1.	0	1	2	3	4	5	6	7	8	9	10
2.	0	1	2	3	4	5	6	7	8	9	10
3.	0	1	2	3	4	5	6	7	8	9	10
4.	0	1	2	3	4	5	6	7	8	9	10
5.	0	1	2	3	4	5	6	7	8	9	10
6.	0	1	2	3	4	5	6	7	8	9	10
7.	0	1	2	3	4	5	6	7	8	9	10
8.	0	1	2	3	4	5	6	7	8	9	10
9.	0	1	2	3	4	5	6	7	8	9	10
10.	0	1	2	3	4	5	6	7	8	9	10
11.	0	1	2	3	4	5	6	7	8	9	10
12.	0	1	2	3	4	5	6	7	8	9	10
13.	0	1	2	3	4	5	6	7	8	9	10
14.	0	1	2	3	4	5	6	7	8	9	10
15.	0	1	2	3	4	5	6	7	8	9	10
16.	0	1	2	3	4	5	6	7	8	9	10
17.	0	1	2	3	4	5	6	7	8	9	10
18.	0	1	2	3	4	5	6	7	8	9	10
19.	0	1	2	3	4	5	6	7	8	9	10
20.	0	1	2	3	4	5	6	7	8	9	10

SMOKING ENVIRONMENT

32 Do you try to avoid areas or situations that make you want to smoke?

- 1 Yes
- 2 No

33 Which of the following best describes smoking inside your home?

- 1 Smoking is not allowed in any indoor areas
- 2 Smoking is allowed only in some indoor areas
- 3 No rules or restrictions
- 9 Not Sure **(Don't read out)**

34 Which of the following best describes the rules about smoking in indoor places where people go to socialize, such as restaurants, coffee shops, and karaoke lounges?

- 1 Smoking is not allowed in any indoor areas
- 2 Smoking is allowed only in some indoor areas
- 3 No rules or restrictions
- 9 Not Sure **(Don't read out)**

35 In the last 6 months, have you visited such indoor places?

- 1 Yes
- 2 No **Go to Q.37**

36 Would that be at least weekly or less often?

- 1 At least weekly
- 2 Less often

37 Are you currently in paid work?

- 1 Yes
- 2 No **Go to Q.41**
- 8 Refused **Go to Q.41**
- 9 Can't say **Go to Q.41**

38 Do you usually work inside a building?

- 1 Yes
- 2 No **Go to Q.41**
- 8 Refused **Go to Q.41**
- 9 Can't say **Go to Q.41**

39 Which of the following best describes the smoking policy where you work.

- 1 Smoking is not allowed in any areas
- 2 Smoking is allowed only in some areas
- 3 No rules or restrictions
- 9 Not Sure (**Don't read out**)

40 In the last 6 months, have you smoked in indoor areas at work?

- 1 Yes
- 2 No

AGREE-DISAGREE QUESTIONS

Please tell me whether you strongly disagree, disagree, neither disagree nor agree, agree, or strongly agree with each of the following statements. Allow *Can't Say* option for recording answers but **do not read them out**.

Note: Where they agree or disagree, it is acceptable to prompt for strong vs. not, but code weaker answer if no clear response.

41 If you had to do it over again, you would not have started smoking.

1	2	3	4	5	9
Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree	Can't say

42 You spend too much money on cigarettes.

1	2	3	4	5	9
Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree	Can't say

43 People who are important to you believe that you should not smoke.

1	2	3	4	5	9
Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree	Can't say

44 Thai society disapproves of smoking.

1	2	3	4	5	9
Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree	Can't say

45 Smoking is a sign of sophistication.

1	2	3	4	5	9
Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree	Can't say

46 Before you make a decision, you like to talk to close friends and get their ideas.

1	2	3	4	5	9
Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree	Can't say

47 You would give up an activity you really enjoy if your family did not approve.

1	2	3	4	5	9
Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree	Can't say

48 You enjoy being different from others.

1	2	3	4	5	9
Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree	Can't say

CONCLUDING QUESTION

49 In the last year, on average, how much was the total income **per month** of all persons in your household combined, before taxes?

Baht _____ (per month)

Interviewer Note: "This question is for statistical purposes. Please be assured that your responses will be kept completely confidential."

Interviewer: "Those are all my questions. Thank you very much for your help."

END TIME : □□HOUR □□MINUTE

Interviewers' overall judgment about the interview:

- ① Reliable
- ② Somewhat reliable
- ③ With some errors
- ④ With a lot of errors

Interviewer comments (e.g., language difficulties):



Faculty of Medicine Srinakharinwirot University
คณะแพทยศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ

Using Group Commitment for Smoking Cessation

Three-Month Follow-Up Questionnaire

QUITTER

Tambon

Village #

Participant #

Partner #

Name of Interviewer: _____

Interview Date (DD/MM): _____

Start time: _____

Version, February 25, 2011

Quitter Questionnaire

For administrative use only:
Tambon #: ____ Muban #: ____ Participant #: ____

Please be assured that all your responses will be kept entirely confidential. Truthful answers will help the project to assist other smokers with quitting.

RECENT QUIT ATTEMPTS

TQ1 How long ago did you quit? (**Don't read choices. Select only one answer.**)

- 1 ____ Days (enter number 0-31)
 2 ____ Weeks (enter number 0-10)
 3 ____ Months (enter number 0-12)
 88 Refused (**Don't read**)
 99 Don't know (**Don't read**)

TQ2 How long after the enrollment meeting did you quit? (**Don't read choices. Select only one answer.**)

- 1 ____ Days (enter number 0-31)
 2 ____ Weeks (enter number 0-10)
 3 ____ Months (enter number 0-12)
 88 Refused (**Don't read**)
 99 Don't know (**Don't read**)

TQ3 During your last quit attempt, did you use any of the following strategies to help quit?

(Did you use:)	Tick <input checked="" type="checkbox"/> in appropriate box		
	Yes	No	Refuse [Don't read]
a. Exercise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Drinking water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Gum, sweets, lozenges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Meditation or prayer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

TQ4 Can you describe any other strategies you used to limit the amount you smoked during your last quit attempt?

Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

TQ5 In the last 3 months, did you use drugs or nicotine replacement to help quit smoking?

- 1 Yes
- 2 No **(Skip to TQ7)**
- 8 Refused **(Don't read) (Skip to TQ7)**
- 9 Don't know **(Don't read) (Skip to TQ7)**

TQ6 21 M In the last 3 months, which of the following did you use to help quit smoking? [Tick all that apply.]

(Have you used:)	Tick <input checked="" type="checkbox"/> in appropriate box		
	In last 3 months?	In last quit attempt?	Refused (Don't read)
a. Nicotine gum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Nicotine patch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Champix (blue pill)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Quomem or Zyban (purple pill)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Nortriptyline	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Herbal medicines (Specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Other (Specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

TQ7 32 M During your last quit attempt did you try to avoid areas or situations that make you want to smoke?

- 1 Yes
- 2 No
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

TQ8 During your last quit attempt did you decide not to carry cigarettes with you in order to avoid being tempted to smoke?

- 1 Yes
- 2 No
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

TQ9 During your most recent quit attempt, did you experience any withdrawal symptoms? For each symptom, please state how many days the symptoms lasted and how much discomfort the symptoms caused: (1) a little discomfort, (2) some discomfort, (3) a lot of discomfort

(Did you have:)	Tick <input checked="" type="checkbox"/> if yes		
	In last 3 months?	How many days?	Level of Discomfort [Enter 1-3]
a. Anxiety, tension, restlessness	<input type="checkbox"/>	_____	_____
b. Sore throat, coughing	<input type="checkbox"/>	_____	_____
c. Drowsiness or trouble sleeping	<input type="checkbox"/>	_____	_____
d. Increased appetite, weight gain	<input type="checkbox"/>	_____	_____
e. Irritability or depression	<input type="checkbox"/>	_____	_____
f. Headaches	<input type="checkbox"/>	_____	_____
g. Stomach pain or nausea	<input type="checkbox"/>	_____	_____
h. Other (Specify) _____	<input type="checkbox"/>	_____	_____

TQ10 On your most recent quit attempt, did you stop smoking suddenly or did you gradually cut down on the number of cigarettes you smoked?

- 1 Stopped suddenly **(Go to TQ12)**
- 2 Gradually cut down
- 8 Refused **(Don't read) (Go to TQ12)**
- 9 Don't know **(Don't read) (Go to TQ12)**

TQ11 If cut down: Did you delay smoking for longer and longer or just cut down the total amount?

- 1 Delay smoking longer and longer
- 2 Reduce total amount
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

TQ12 Have you had any cigarettes, even a puff, since you quit smoking?

- 1 Yes
- 2 No
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

TQ13 How hard is it for you to go without smoking for a whole day?

- 1 Not at all hard
- 2 Somewhat hard
- 3 Very hard
- 4 Extremely hard
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

TQ14 How often do you get strong urges to smoke?

- 1 Never
- 2 Less than daily
- 3 Daily
- 4 Several times a day
- 5 Hourly or more often
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

TQ15 S41 In general, how would you describe your health?

- 1 Poor
- 2 Fair
- 3 Good
- 4 Very good
- 5 Excellent

Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

TQ16 Since you quit smoking, do you think your health is the same as before, better than before, or worse than before?

- 1 Worse
- 2 Same
- 3 Better
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

TQ17 25 M How much do you think you would benefit from health and other gains if you were to continue not to smoke?

- 1 Not at all
- 2 Somewhat
- 3 Very much
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

TQ18 22 M In the last 3 months, have you visited a doctor, other health professional, clinic, or hospital?

- 1 Yes **(Go to TQ19)**
- 2 No **(Go to TQ19)**
- 8 Refused **(Don't read) (Go to TQ19)**
- 9 Don't know **(Don't read) (Go to TQ19)**

TQ19 23 M During any visit to the doctor or other health professional in the last 3 months, did you receive: **(Read)**

(During a medical visit, did a doctor or other health professional provide:)	Tick <input type="checkbox"/> in appropriate box	
	Yes	No
a. Advice to quit smoking?	<input type="checkbox"/>	<input type="checkbox"/>
b. Pamphlets or brochures on how to quit?	<input type="checkbox"/>	<input type="checkbox"/>
c. Drugs or nicotine substitutes to quit smoking	<input type="checkbox"/>	<input type="checkbox"/>
d. Additional help or a referral to another service to help you quit?	<input type="checkbox"/>	<input type="checkbox"/>

Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

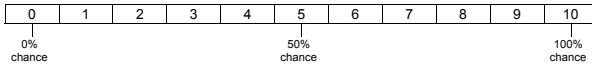
TQ20 S38 M **NOTE: USE VISUAL AIDS.** In the past 3 months, have each of the following things led you to think about quitting not at all, somewhat, or very much?

(In the last 3 months, were you led to think about quitting by:)	Tick <input checked="" type="checkbox"/> in appropriate box		
	Not at all	Somewhat	Very much
a. Concern for your personal health?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Concern about the effect of your cigarette smoke on non-smokers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. That Thai society disapproves of smoking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. The price of cigarettes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. The potential financial savings?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Advertisements or information about the health risks of smoking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Warning labels on cigarette packages?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Wanting to set an example for children?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

TQ21 24 M How sure are you that you will continue to stay smoke-free over the next 3 months?

- 1 Not at all sure
- 2 Somewhat sure
- 3 Very sure
- 4 Extremely sure
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

TQ22 S34 M **NOTE: USE VISUAL AIDS.** What is the chance that you will continue to stay smoke-free over the next 3 months? Please point to a number from 0 to 10, where each number represents one chance out of 10. If you circle 0, it means you are certain that you will not quit. If you circle 10, it means that you are certain you will quit. If you circle 5, it means that you are as likely to quit as to not quit.



Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

TQ23 S40 I am going to read you a list of health effects and diseases that may or may not be caused by smoking cigarettes. Based on what you know or believe, does smoking cause the following:

(Does smoking cause:)	Tick <input checked="" type="checkbox"/> in appropriate box		
	Yes	No	Don't know
a. Stroke in smokers [blood clots in the brain].	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Impotence in male smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Lung cancer in smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Decay in the lungs of smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Stained teeth in smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Premature ageing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Lung cancer in nonsmokers from secondhand smoke.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

TQ24 33 Which of the following best describes smoking inside your home?

- 1 Smoking is not allowed in any indoor areas
- 2 Smoking is allowed only in some indoor areas
- 3 No rules or restrictions
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

TQ25 34 Which of the following best describes the rules about smoking where you work?

- 1 Smoking is not allowed
- 2 Smoking is allowed only in some indoor areas
- 3 No rules or restrictions
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

TQ30 When did you last use yaa nat?
 Enter number of days ago: _____

88 Refused
99 Don't know

TQ31 During the time that you used yaa nat over the last 3 months, about how often did you use it?

- 1 Every day
- 2 5-6 days per week
- 3 3-4 days per week
- 4 1-2 days per week
- 5 Less than once a week, but at least once a month
- 6 Less than once a month

TQ32 S46 Of your 5 closest friends, not including people who live in your household, how many are smokers?

- 1 1
- 2 2
- 3 3
- 4 4
- 5 5
- 6 None

TQ33 S47 Of the 5 people that you spend the most time with on a regular basis, not including people who live in your household, how many are smokers?

- 1 1
- 2 2
- 3 3
- 4 4
- 5 5
- 6 None

Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

TQ26 S43 During the past 3 months, about how often did you have any kind of alcoholic drink?

- 1 Every day
- 2 5-6 days per week
- 3 3-4 days per week
- 4 1-2 days per week
- 5 Less than once a week, but at least once a month
- 6 Less than once a month
- 7 Did not drink alcohol in the past 3 months **(Go to TQ28)**

TQ27 S44 On a typical day when you had alcohol over the past 3 months, how many alcoholic drinks did you usually have?

NOTE: Code for type of container: 1 = shot glass (pek), 2 = small bottle (gat), 3 = small bottle, 4 = big bottle, 5 = can, 6 = water glass.

(How many of each do you usually drink?)	# per day	Container type (Enter code #)
a. Thai rice whiskey?	_____	_____
b. Beer?	_____	_____
c. Manufactured whiskey	_____	_____
d. Rice whiskey with herbs?	_____	_____
e. Other? Specify type: _____	_____	_____

TQ28 S45 During the past 3 months, have you used any drugs for recreation? **[If yes, ask:]** Which drugs? **[Note: Do not read the list to the participant. Circle all that apply.]**

- 1 No
- 2 Amphetamines
- 3 Kratom
- 2 Gancha
- 2 Other. Specify: _____

TQ29 During the past 3 months, did you use yaa nat?

- 1 Yes
- 2 No **(Go to TQ32)**
- 8 Refused **(Don't read) (Go to TQ32)**
- 9 Don't know **(Don't read) (Go to TQ32)**

Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

TQ34 30 How often do you spend time with friends?

- 1 Every day
- 2 5-6 days per week
- 3 3-4 days per week
- 4 1-2 days per week
- 5 Less than once a week
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

TQ35 31 Are you involved in any volunteer organizations in the community?

- 1 Yes. Specify the number: _____
- 2 No

TQ36 17 Do you or your spouse currently have a savings account with any of the following:
(Read)

(Do you or your spouse have a savings account with:)	Tick <input checked="" type="checkbox"/> in appropriate box	
	Yes	No
a. A formal bank (e.g., Thai Phantit)?	<input type="checkbox"/>	<input type="checkbox"/>
b. An agricultural cooperative (e.g., TKS)?	<input type="checkbox"/>	<input type="checkbox"/>
c. The government (e.g., Om Sin)?	<input type="checkbox"/>	<input type="checkbox"/>
d. Other? If yes, specify: _____	<input type="checkbox"/>	<input type="checkbox"/>

TQ37 18 In total, how much money do you and your spouse have in savings, including the savings accounts just listed, savings kept at home, loans you have given to neighbors, family, or friends, investments in life insurance, and any other savings?

Enter savings: _____ Baht

8888 Refused
9999 Don't know

Interviewer: "This question is for research purposes only. Please be assured that your response will be kept completely confidential."



Faculty of Medicine Srinakharinwirot University
คณะแพทยศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ

Using Group Commitment for Smoking Cessation

Three-Month Follow-Up Questionnaire

CONTINUING SMOKER

Tambon

Village #

Participant #

Partner #

Name of Interviewer: _____

Interview Date (DD/MM): _____

Start time: _____

Version, February 25, 2011

Continuing Smoker Questionnaire

For administrative use only:

Tambon #: _____ Muban #: _____ Participant #: _____

Please be assured that all your responses will be kept entirely confidential. Truthful answers will help the project to assist other smokers with quitting.

SMOKING CHARACTERISTICS

TS1 S15 Do you now smoke every day or some days? (Circle one.)

- 1 Every day
 2 Some days **(Go to TS3)**

TS2 S16. On average, how many cigarettes do you smoke each day? Include both factory-made and hand-rolled cigarettes.

Enter number of cigarettes: _____ **(Go to TS4)**

TS3 S17. On average, how many cigarettes do you smoke each week? Include both factory-made and hand-rolled cigarettes.

Enter number of cigarettes: _____

TS4 S18 Do you smoke factory-made cigarettes, hand-rolled cigarettes, or both?

- 1 Factory-made only. If yes, typically what brand: _____ **(Go to TS6)**
 2 Hand-rolled only **(Go to TS6)**
 3 Both. If yes, typically what brand of factory-made: _____

TS5 S19 If you smoke both factory-made cigarettes and hand-rolled cigarettes, do you smoke mainly factory made or mainly hand-rolled cigarettes (tobacco leaf)?

- 1 Mainly factory-made
 2 Mainly hand-rolled (tobacco leaf)
 3 About the same

TS6 S23 When did you last smoke a cigarette? (Circle one)

- 1 Less than 1 hour ago
 2 1 to 3 hours ago
 3 4 to 6 hours ago
 4 6 to 12 hours ago
 5 12-24 hours ago
 6 More than 24 hours ago. Enter number of days: _____

Continuing Smoker Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

- TS7 S22 a. On days that you smoke, how many minutes/hours after waking do you usually have your first cigarette? **[Complete only one blank.]**
- If less than 60 minutes, enter minutes: _____
- If more than 60 minutes, enter hours: _____
- S24 b. Do you consider yourself addicted to cigarettes? (Circle one)
- 1 Not at all addicted
- 2 Somewhat addicted
- 3 Very addicted

QUIT ATTEMPTS

- TS8 How many times did you try to quit smoking since the enrolment meeting? Either write or circle the correct response.
- 1 0 **(Go to TS19)**
- 2 ____ Times **(Enter number 0-9)**
- TS9 Thinking about your longest quit attempt during the last 3 months, how many days did you stay smoke-free?
- Enter number of days: _____
- TS10 During your last quit attempt, did you use any of the following strategies to help quit?
- | (Did you use:) | Tick <input type="checkbox"/> in appropriate box | | |
|--------------------------|--|--------------------------|-------------------------------|
| | Yes | No | Refuse
[Don't read] |
| a. Exercise | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Drinking water | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Gum, sweets, lozenges | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d. Meditation or prayer | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Continuing Smoker Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

- TS11 Can you describe any other strategies you used to limit the amount you smoked during your last quit attempt?
- _____
- _____
- _____
- TS12 In the last 3 months, did you use drugs or nicotine replacement to help quit smoking?
- 1 Yes **(Go to TS14)**
- 2 No **(Go to TS14)**
- 8 Refused **(Don't read) (Go to TS14)**
- 9 Don't know **(Don't read) (Go to TS14)**
- TS13 21 M In the last 3 months, which of the following did you use to help quit smoking? [Tick all that apply.]
- | (Have you used:) | Tick <input type="checkbox"/> in appropriate box | | |
|------------------------------------|--|--------------------------|--------------------------------|
| | In last 3 months? | In last quit attempt? | Refused
(Don't read) |
| a. Nicotine gum | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Nicotine patch | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Champix (blue pill) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d. Quomem or Zyban (purple pill) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e. Nortriptyline | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| f. Herbal medicines(Specify) _____ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| g. Other (Specify) _____ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
- TS14 32 M During your last quit attempt did you try to avoid areas or situations that make you want to smoke?
- 1 Yes
- 2 No
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

Continuing Smoker Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

TS15 During your last quit attempt did you decide not to carry cigarettes with you in order to avoid being tempted to smoke?

- 1 Yes
- 2 No
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

TS16 On your most recent quit attempt, did you stop smoking suddenly or did you gradually cut down on the number of cigarettes you smoked?

- 1 Stopped suddenly **(Go to TS18)**
- 2 Gradually cut down
- 8 Refused **(Don't read) (Go to TS18)**
- 9 Don't know **(Don't read) (Go to TS18)**

TS17 If cut down: Did you delay smoking for longer and longer or just cut down the total amount?

- 1 Delay smoking longer and longer
- 2 Reduce total amount
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

TS18 S30 Why did your last quit attempt fail: (Circle the best answer)

- 1 Stress
- 2 Habit or physical addiction
- 3 Quitting smoking made you sick
- 4 Desire to be social
- 5 People around you were smoking
- 6 You missed smoking
- 7 Other. If yes, specify: _____

TS19 S31 Are you planning to quit smoking: (Circle one)

- 1 Within the next month
- 2 Within the next 6 months
- 3 Sometime in the future, beyond 6 months
- 4 Not planning to quit

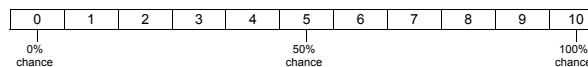
Continuing Smoker Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

TS20 S32 Have you set a firm date for quitting? (Circle one)

- 1 Yes
- 2 No

TS21 S34 M **NOTE: USE VISUAL AIDS.** If you decide to give up smoking completely in the next three months, what is the chance that you would succeed? Please point to a number from 0 to 10, where each number represents one chance out of 10. If you circle 0, it means you are certain that you will not quit. If you circle 10, it means that you are certain you will quit. If you circle 5, it means that you are as likely to quit as to not quit.



OTHER TOPICS

TS22 S38 M **NOTE: USE VISUAL AIDS.** In the past 3 months, have each of the following things led you to think about quitting not at all, somewhat, or very much?

(In the last 6 months, were you led to think about quitting by:)	Tick <input checked="" type="checkbox"/> in appropriate box		
	Not at all	Somewhat	Very much
a. Concern for your personal health?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Concern about the effect of your cigarette smoke on non-smokers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. That Thai society disapproves of smoking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. The price of cigarettes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. The potential financial savings?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Advertisements or information about the health risks of smoking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Warning labels on cigarette packages?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Wanting to set an example for children?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Continuing Smoker Questionnaire For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

TS23 S40 I am going to read you a list of health effects and diseases that may or may not be caused by smoking cigarettes. Based on what you know or believe, does smoking cause the following:

(Does smoking cause:)	Tick <input checked="" type="checkbox"/> in appropriate box		
	Yes	No	Don't know
a. Stroke in smokers [blood clots in the brain].	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Impotence in male smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Lung cancer in smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Decay in the lungs of smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Stained teeth in smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Premature ageing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Lung cancer in nonsmokers from secondhand smoke.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

TS24 33 Which of the following best describes smoking inside your home?

- 1 Smoking is not allowed in any indoor areas
- 2 Smoking is allowed only in some indoor areas
- 3 No rules or restrictions
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

TS25 34 Which of the following best describes the rules about smoking where you work?

- 1 Smoking is not allowed
- 2 Smoking is allowed only in some indoor areas
- 3 No rules or restrictions
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

Continuing Smoker Questionnaire For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

TS26 35 In the last 3 months, have you smoked at work?

- 1 Yes
- 2 No
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

TS27 S41 In general, how would you describe your health?

- 1 Poor
- 2 Fair
- 3 Good
- 4 Very good
- 5 Excellent

TS28 25 How much do you think you would benefit from health and other gains if you were to quit smoking permanently in the next 3 months?

- 1 Not at all
- 2 Somewhat
- 3 Very much
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

TS29 22 M In the last 3 months, have you visited a doctor, other health professional, clinic, or hospital?

- 1 Yes **(Go to TS31)**
- 2 No **(Go to TS31)**
- 8 Refused **(Don't read) (Go to TS31)**
- 9 Don't know **(Don't read) (Go to TS31)**

Continuing Smoker Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

TS30 23 M During any visit to the doctor or other health professional in the last 3 months, did you receive: **(Read)**

(During a medical visit, did a doctor or other health professional provide:)	Tick <input type="checkbox"/> in appropriate box	
	Yes	No
a. Advice to quit smoking?	<input type="checkbox"/>	<input type="checkbox"/>
b. Pamphlets or brochures on how to quit?	<input type="checkbox"/>	<input type="checkbox"/>
c. Drugs or nicotine substitutes to quit smoking	<input type="checkbox"/>	<input type="checkbox"/>
d. Additional help or a referral to another service to help you quit?	<input type="checkbox"/>	<input type="checkbox"/>

TS31 S43 During the past 3 months, about how often did you have any kind of alcoholic drink?

- 1 Every day
- 2 5-6 days per week
- 3 3-4 days per week
- 4 1-2 days per week
- 5 Less than once a week, but at least once a month
- 6 Less than once a month
- 7 Did not drink alcohol in the past 3 months **(Go to TS33)**

TS32 S44 On a typical day when you had alcohol over the past 3 months, how many alcoholic drinks did you usually have?

NOTE: Code for type of container: 1 = shot glass (pek), 2 = small bottle (gat), 3 = small bottle, 4 = big bottle, 5 = can, 6 = water glass.

(How many of each do you usually drink?)	# per day	Container type (Enter code #)
a. Thai rice whiskey?	_____	_____
b. Beer?	_____	_____
c. Manufactured whiskey	_____	_____
d. Rice whiskey with herbs?	_____	_____
e. Other? Specify units: _____	_____	_____

Continuing Smoker Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

TS33 S45 During the past 3 months, have you used any drugs for recreation? **[If yes, ask:]** Which drugs? **[Do NOT read the list. Circle all that apply.]**

- 1 No
- 2 Amphetamines
- 3 Kratom
- 2 Gancha
- 2 Other. Specify: _____

TS34 S46 Of your 5 closest friends, not including people who live in your household, how many are smokers?

- 1 1
- 2 2
- 3 3
- 4 4
- 5 5
- 6 None

TS35 S47 Of the 5 people that you spend the most time with on a regular basis, not including people who live in your household, how many are smokers?

- 1 1
- 2 2
- 3 3
- 4 4
- 5 5
- 6 None

TS36 30 How often do you spend time with friends?

- 1 Every day
- 2 5-6 days per week
- 3 3-4 days per week
- 4 1-2 days per week
- 5 Less than once a week
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

Continuing Smoker Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

TS37 31 Are you involved in any volunteer organizations in the community?
 1 Yes. Specify the number: _____
 2 No

TS38 17 Do you or your spouse currently have a savings account with any of the following:
 (Read)

(Do you or your spouse have a savings account with:)	Tick <input checked="" type="checkbox"/> in appropriate box	
	Yes	No
a. A formal bank (e.g., Thai Phantit)?	<input type="checkbox"/>	<input type="checkbox"/>
b. An agricultural cooperative (e.g., TKS)?	<input type="checkbox"/>	<input type="checkbox"/>
c. The government (e.g., Om Sin)?	<input type="checkbox"/>	<input type="checkbox"/>
d. Other? If yes, specify: _____	<input type="checkbox"/>	<input type="checkbox"/>

TS39 18 In total, how much money do you and your spouse have in savings, including the savings accounts just listed, savings kept at home, loans you have given to neighbors, family, or friends, investments in life insurance, and any other savings?

Enter savings: _____ Baht

8888 Refused
9999 Don't know

Interviewer: "This question is for research purposes only. Please be assured that your response will be kept completely confidential."

End time: _____



Faculty of Medicine Srinakharinwirot University
คณะแพทยศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ

Using Group Commitment for Smoking Cessation

Three-Month Follow-Up Questionnaire

TREATMENT GROUP

Tambon

Village #

Participant #

Partner #

Name of Interviewer: _____

Interview Date (DD/MM): _____

Start time: _____

Version, February 25, 2011

Treatment Group Questionnaire

For administrative use only:

Tambon #: _____ Muban #: _____ Participant #: _____

Please be assured that all your responses will be kept entirely confidential. Truthful answers will help the project to assist other smokers with quitting.

TT1 S39 **NOTE: USE VISUAL AIDS.** Did each of the following help you to quit not at all, somewhat, or very much?
M

(Were you helped with quitting by:)	Tick <input checked="" type="checkbox"/> in appropriate box		
	Not at all	Somewhat	Very much
a. Concern for the health of you or others?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Financial savings from the deposits?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Project money added to your deposits?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Cash bonus from quitting?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Pressure from your partner to quit?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Guilt that your partner may lose the bonus?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Help and encouragement from your project partner?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Help and encouragement from other friends or family?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DEPOSITS

TT2 a. In total, how much money did you deposit with the project, including the amount you gave at the enrollment meeting? Do not include project money added to the deposits.

Enter deposited amount: _____

8 Refused
9 Don't know

b. In total, how much money do you think you have in your deposit account? Please include the amount you deposited at the enrollment meeting, any deposits since the enrollment meeting, and any project money added to your deposits.

Enter total amount: _____

8 Refused
9 Don't know

Treatment Group Questionnaire For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

c. Since the enrollment meeting, about how many times did the deposit collector ask you if you wanted to make a deposit? Please give your best guess. **[Don't read the choices.]**

Enter number of visits: _____

8 Refused
9 Don't know

TT3 In your opinion, what is the main purpose of the deposits? Select only one.

- 1 Save money
- 2 Increase motivation to quit
- 3 Make money for the project
- 4 Other. Specify _____
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

TT4 **NOTE: USE VISUAL AIDS.** Did each of the following limit the amount you deposited not at all, somewhat, or very much?

(Was the amount you deposited limited by:)	Tick <input checked="" type="checkbox"/> in appropriate box		
	Not at all	Somewhat	Very much
a. Lack of trust in the deposit collector?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Lack of trust in the project?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Lack of money available for deposits?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Deposit collector did not visit you as often as you wanted?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Lack of confidence in your ability to quit?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Lack of understanding about the purpose of the deposits?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Better alternatives for saving money?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Treatment Group Questionnaire For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

TT5 Since the enrollment meeting, how often did you worry about losing your deposits because you were not sure if you would be able to quit?

- 1 Never
- 2 Less than one time per month
- 3 Less than one time per week
- 4 More than one time per week
- 5 Daily
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

TT6 The project offered to pay you 150 baht at enrollment and another 150 baht if you deposited 100 baht within a certain number of months of enrollment. How many months after enrollment did you have to deposit the 100 baht? **[Do NOT read the choices.]**

- 1 1 month
- 2 3 months
- 3 Other. Specify _____
- 8 Refused
- 9 Don't know

PARTNER AND BONUS

TT7 What is your partner's name? **[Nickname is ok.]**

Enter partner name: _____

8 Refused (Go to TT11)
9 Don't know (Go to TT11)

TT8 a. Before this project, what relationship did you have with your partner? **[Select one.]**

- 1 A stranger
- 2 An acquaintance
- 3 A distant friend
- 4 A close friend
- 5 A relative. Specify: _____
- 6 Other. Specify: _____
- 8 Refused
- 9 Don't know

Treatment Group Questionnaire

For administrative use only:
 Tambon #: ___ Muban #: ___ Participant #: ___

b. About how far is your house from your partner's house? **[Complete only one blank below.]**

Enter distance: _____ meters

Enter distance: _____ kilometers

8 Refused
 9 Don't know

TT9

a. Has your partner quit smoking completely?

1 Yes

2 No

3 Don't know (Go to TT11)



b. **[If participant has not quit, go to TT10. Otherwise:]** Did your partner quit before you?

1 Yes

2 No

3 Don't know



Go to TT11

d. Did your motivation to quit increase when your partner quit successfully? **[Answer, then go to TT11.]**

1 Not at all

2 Somewhat

3 Very much

8 Refused (Don't read)

9 Don't know (Don't read)

c. **[If participant has quit, go to TT10. Otherwise:]** Did your partner fail to quit before you?

1 Yes

2 No

3 Don't know



Go to TT11

e. Did your motivation to quit decrease when your partner failed to quit? **[Answer, then go to TT11.]**

1 Not at all

2 Somewhat

3 Very much

8 Refused (Don't read)

9 Don't know (Don't read)

TT10

One person in your pair quit and one did not. Did this hurt your relationship with your partner?

1 Not at all

2 Somewhat. Explain: _____

3 Very much. Explain: _____

8 Refused (Don't read)

9 Don't know (Don't read)

Treatment Group Questionnaire

For administrative use only:
 Tambon #: ___ Muban #: ___ Participant #: ___

TT11

How often did you talk to your partner before and during the project? How often did you talk about smoking or the project?

(How many times did you talk to your partner:)	Tick <input type="checkbox"/> in appropriate box				
	Not at all	Monthly or less	At least twice a month	At least weekly	More than weekly
a. Before the project?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Since the enrollment meeting?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. About smoking or the project since the enrollment meeting?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

TT12

[If TT11, Part c = "Not at all", skip to TT13.]
[Note: Use visual aids.] Thinking about your relationship with your partner:

	Tick <input type="checkbox"/> in appropriate box			
	Never	Once	2 or 3 times	4+ times
a. Did your partner ask or try to convince you to quit?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Did your partner give you advice about how to quit?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Did your partner help to calm you down when you were feeling stressed or irritated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Did your partner express pleasure at your efforts to quit or express confidence in your ability to quit?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Did you ask or try to convince your partner to quit?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Did you give your partner advice about how to quit?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Have you and your partner ever smoked together, including before the project started?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Have you and your partner smoked together since the enrollment meeting?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Treatment Group Questionnaire For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

TT13 a. How much is cash bonus to each person if you and your partner both quit successfully? **[Do NOT read the choices.]**

1 1,200 baht
 2 Other. Specify _____
 8 Refused
 9 Don't know

b. Imagine the following made-up scenario. A participant in this project deposited 50 baht at the enrollment meeting and a total of 50 baht after the enrollment meeting. He quits smoking after one month. His assigned partner continues to smoke. How much total money would the project give this participant at the 3-month follow-up (today)? Please include any bonus and other project money. **[Do not read the choices.]**

Enter total amount: _____

8 Refused
9 Don't know

SMS

TT14 Do you own a cell phone?

1 Yes
 2 No
 8 Refused **(Don't read)**

TT15 Did you receive any SMS messages about smoking cessation over the last 3 months?

1 Yes
 2 No **(Go to end)**
 8 Refused **(Don't read)** **(Go to end)**
 9 Don't know **(Don't read)** **(Go to end)**

TT16 How many of the SMS messages did you read?

1 None **(Go to end)**
 2 1 or 2
 3 3 to 5
 4 6 or more
 8 Refused **(Don't read)**
 9 Don't know **(Don't read)**

Treatment Group Questionnaire For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

TT17 What was the subject of most of the messages?

1 Having good health
 2 Making deposits and saving money
 3 Talking to your partner and getting a cash bonus
 8 Refused **(Don't read)**
 9 Don't know **(Don't read)**

TT18 **[Note: Use visual aids.]** Did the SMS messages have any of the following effects on you?

(Did the SMS message:)	Tick <input checked="" type="checkbox"/> in appropriate box			
	Not at all often	Somewhat often	Very often	Don't know
a. Make you think about quitting smoking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Increase your motivation to quit smoking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Lead you to deposit more money?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Lead you to talk to your partner?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Annoy or bother you?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Other. Specify: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank you! That completes the questionnaire. We hope to interview you again in 3 months, at which time you would get 200 baht for your inconvenience.

End time: _____

Treatment Group Questionnaire

For administrative use only:
Tambon #: ____ Muban #: ____ Participant #: ____

INTERVIEWER OBSERVATIONS

P1. Interviewers' overall judgment about the interview:

- ① Reliable
- ② Somewhat reliable
- ③ With some errors
- ④ With a lot of errors

P2. Did the interviewee seem interested with the interview in general?

- ① Yes
- ② No

P3. Did the interviewee appear to try hard to answer accurately?

- ① Yes
- ② No

P4. Was it harder for the interviewee to understand questions, compared to other interviewees?

- ① Yes
- ② No

P5. Interviewer comments:



Faculty of Medicine Srinakharinwirot University
คณะแพทยศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ

Using Group Commitment for Smoking Cessation

6-Month Follow-Up Questionnaire

QUITTER

Tambon

Village #

Participant #

T/C

Name of Interviewer: _____

Interview Date (DD/MM): _____

Start time: _____

Version, May 5, 2011

6-month Quitter Questionnaire

For administrative use only:
Tambon #: _____ Muban #: _____ Participant #: _____

Please be assured that all your responses will be kept entirely confidential. Truthful answers will help the project to assist other smokers with quitting.

RECENT QUIT ATTEMPTS

SQ1 TQ1 How long ago did you quit? (**Don't read choices. Select only one answer.**)

- 1 _____ Days (enter number 0-31)
 2 _____ Weeks (enter number 0-10)
 3 _____ Months (enter number 0-12)
 88 Refused (**Don't read**)
 99 Don't know (**Don't read**)

SQ2 Did your current quit attempt start before or after the follow-up meeting 3 months ago?

- 1 Before 3-month meeting
 2 After 3-month meeting (**Go to SQ5**)

SQ3 TQ12 M Have you had any cigarettes, even a puff, since the follow-up meeting 3 months ago?

- 1 No, not at all (**Go to SQ15**)
 2 Yes, 6 or fewer days in a row
 3 Yes, 7 or more days in a row

SQ4 TS18 M Why did you start smoking again? (Circle only **ONE** best answer)

- 1 Stress
 2 Habit or physical addiction
 3 Quitting smoking made you sick
 4 Desire to be social
 5 People around you were smoking
 6 You missed smoking
 7 Other. If yes, specify: _____

6-month Quitter Questionnaire

For administrative use only:
Tambon #: ___ Muban #: ___ Participant #: ___

SQ5 TQ3 M [If SQ3 = 2, go to SQ15. If SQ3 = 3, continue with SQ5.] During your last quit attempt, did you use any of the following strategies to help quit?

Table with 3 columns: (Did you use:), Yes, No, Refuse [Don't read]. Rows include: a. Exercise, b. Drinking water, c. Gum, sweets, lozenges, d. Meditation or prayer.

SQ6 TQ4 M Can you describe any other strategies you used to limit the amount you smoked during your last quit attempt?

- 1) _____
2) _____
3) _____
4) _____
5) _____

SQ7 TQ5 M In the last 3 months, did you use drugs or nicotine replacement, such as nicotine gum, to help quit smoking?

- 1 Yes
2 No (Skip to SQ9)
8 Refused (Don't read) (Skip to SQ9)
9 Don't know (Don't read) (Skip to SQ9)

6-month Quitter Questionnaire

For administrative use only:
Tambon #: ___ Muban #: ___ Participant #: ___

SQ8 TQ6 In the last 3 months, which of the following did you use to help quit smoking? [Tick all that apply.]

Table with 3 columns: (Have you used:), In last 3 months?, In last quit attempt?, Refused (Don't read). Rows include: a. Nicotine gum, b. Nicotine patch, c. Champix (blue pill), d. Quomem or Zyban (purple pill), e. Nortriptyline, f. Herbal medicines (Specify) _____, g. Other (Specify) _____.

SQ9 TQ7 During the last quit attempt did you try to avoid areas or situations that make you want to smoke?

- 1 Yes
2 No
8 Refused (Don't read)
9 Don't know (Don't read)

SQ10 TQ8 During your last quit attempt did you decide not to carry cigarettes with you in order to avoid being tempted to smoke?

- 1 Yes
2 No
8 Refused (Don't read)
9 Don't know (Don't read)

6-month Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

SQ11 TQ9 During your most recent quit attempt, did you experience any withdrawal symptoms? For each symptom, please state how many days the symptoms lasted and how much discomfort the symptoms caused: (1) a little discomfort, (2) some discomfort, (3) a lot of discomfort

(Did you have:)	Tick <input checked="" type="checkbox"/> if yes		
	In last 3 months?	How many days?	Level of Discomfort [Enter 1-3]
a. Anxiety, tension, restlessness	<input type="checkbox"/>	_____	_____
b. Sore throat, coughing	<input type="checkbox"/>	_____	_____
c. Drowsiness or trouble sleeping	<input type="checkbox"/>	_____	_____
d. Increased appetite, weight gain	<input type="checkbox"/>	_____	_____
e. Irritability or depression	<input type="checkbox"/>	_____	_____
f. Headaches	<input type="checkbox"/>	_____	_____
g. Stomach pain or nausea	<input type="checkbox"/>	_____	_____
h. Other (Specify) _____	<input type="checkbox"/>	_____	_____

SQ12 TQ10 M On your most recent quit attempt, did you stop smoking suddenly or did you gradually cut down on the number of cigarettes you smoked?

- 1 Stopped suddenly (Go to SQ14)
- 2 Gradually cut down
- 8 Refused (Don't read) (Go to SQ14)
- 9 Don't know (Don't read) (Go to SQ14)

SQ13 TQ11 If cut down: Did you delay smoking for longer and longer or just cut down the total amount?

- 1 Delay smoking longer and longer
- 2 Reduce total amount
- 8 Refused (Don't read)
- 9 Don't know (Don't read)

6-month Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

SQ14 TQ20 In the past 3 months, have each of the following things led you to think about quitting not at all, somewhat, or very much?

(In the last 3 months, were you led to think about quitting by:)	Tick <input checked="" type="checkbox"/> in appropriate box		
	Not at all	Somewhat	Very much
a. Concern for your personal health?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Concern about the effect of your cigarette smoke on non-smokers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. That Thai society disapproves of smoking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. The price of cigarettes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. The potential financial savings?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Advertisements or information about the health risks of smoking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Warning labels on cigarette packages?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Wanting to set an example for children?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SQ15 [Skip this question number]

SQ16 TQ13 How hard is it for you to go without smoking for a whole day?

- 1 Not at all hard
- 2 Somewhat hard
- 3 Very hard
- 4 Extremely hard
- 8 Refused (Don't read)
- 9 Don't know (Don't read)

6-month Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

SQ17 TQ14 How often do you get strong urges to smoke?

- 1 Never
- 2 Less than daily
- 3 Daily
- 4 Several times a day
- 4 Hourly or more often
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

SQ18 TQ15 In general, how would you describe your health?

- 1 Poor
- 2 Fair
- 3 Good
- 4 Very good
- 5 Excellent

SQ19 TQ16 M Since you quit smoking, do you think your health is the same as before, better than before, or worse than before?

- 1 Worse. Explain: _____
- 2 Same
- 3 Better. Explain: _____
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

SQ20 TQ17 How much do you think you would benefit from health and other gains if you were to continue not to smoke?

- 1 Not at all
- 2 Somewhat
- 3 Very much
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

6-month Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

SQ21 TQ18 M In the last 3 months, have you visited a doctor, other health professional, clinic, or hospital?

- 1 Yes
- 2 No **(Go to SQ23)**
- 8 Refused **(Don't read)** **(Go to SQ23)**
- 9 Don't know **(Don't read)** **(Go to SQ23)**

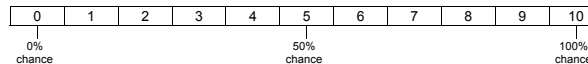
SQ22 TQ19 During any visit to the doctor or other health professional in the last 3 months, did you receive: **(Read)**

(During a medical visit, did a doctor or other health professional provide:)	Tick <input checked="" type="checkbox"/> in appropriate box	
	Yes	No
a. Advice to quit smoking?	<input type="checkbox"/>	<input type="checkbox"/>
b. Pamphlets or brochures on how to quit?	<input type="checkbox"/>	<input type="checkbox"/>
c. Drugs or nicotine substitutes to quit smoking	<input type="checkbox"/>	<input type="checkbox"/>
d. Additional help or a referral to another service to help you quit?	<input type="checkbox"/>	<input type="checkbox"/>

SQ23 TQ21 How sure are you that you will continue to stay smoke-free over the next 3 months?

- 1 Not at all sure
- 2 Somewhat sure
- 3 Very sure
- 4 Extremely sure
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

SQ24 TQ22 What is the chance that you will continue to stay smoke-free over the next 3 months? Please point to a number from 0 to 10, where each number represents one chance out of 10. If you circle 0, it means you are certain that you will not quit. If you circle 10, it means that you are certain you will quit. If you circle 5, it means that you are as likely to quit as to not quit.



6-month Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

SQ25 TQ23 I am going to read you a list of health effects and diseases that may or may not be caused by smoking cigarettes. Based on what you know or believe, does smoking cause the following:

(Does smoking cause:)	Tick <input checked="" type="checkbox"/> in appropriate box		
	Yes	No	Don't know
a. Stroke in smokers [blood clots in the brain].	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Impotence in male smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Lung cancer in smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Decay in the lungs of smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Stained teeth in smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Premature ageing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Lung cancer in nonsmokers from secondhand smoke.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SQ26 TQ24 Which of the following best describes smoking inside your home?

- 1 Smoking is not allowed in any indoor areas
- 2 Smoking is allowed only in some indoor areas
- 3 No rules or restrictions
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

SQ27 TQ25 Which of the following best describes the rules about smoking where you work?

- 1 Smoking is not allowed
- 2 Smoking is allowed only in some indoor areas
- 3 No rules or restrictions
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

6-month Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

SQ28 TQ26 During the past 3 months, about how often did you have any kind of alcoholic drink?

- 1 Every day
- 2 5-6 days per week
- 3 3-4 days per week
- 4 1-2 days per week
- 5 Less than once a week, but at least once a month
- 6 Less than once a month
- 7 Did not drink alcohol in the past 3 months **(Go to SQ30)**

SQ29 TQ27 On a typical day when you had alcohol over the past 3 months, how many alcoholic drinks did you usually have?

NOTE: Code for type of container: 1 = shot glass (pek), 2 = small bottle (gat), 3 = small bottle, 4 = big bottle, 5 = can, 6 = water glass.

(How many of each do you usually drink?)	# per day	Container type (Enter code #)
a. Thai rice whiskey?	_____	_____
b. Beer?	_____	_____
c. Manufactured whiskey	_____	_____
d. Rice whiskey with herbs?	_____	_____
e. Other? Specify type: _____	_____	_____

SQ30 TQ28 During the past 3 months, have you used any drugs for recreation? **[If yes, ask:] Which drugs? [Note: Do not read the list to the participant. Circle all that apply.]**

- 1 No
- 2 Amphetamines
- 3 Kratom
- 2 Gancha
- 2 Other. Specify: _____

SQ31 TQ29 M During the past 3 months, did you use yaa nat?

- 1 Yes
- 2 No **(Go to SQ34)**
- 8 Refused **(Don't read)** **(Go to SQ34)**
- 9 Don't know **(Don't read)** **(Go to SQ34)**

6-month Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

SQ32 TQ30 When did you last use yaa nat?

Enter number of days ago: _____

88 Refused
99 Don't know

SQ33 TQ31 During the time that you used yaa nat over the last 3 months, about how often did you use it?

- 1 Every day
- 2 5-6 days per week
- 3 3-4 days per week
- 4 1-2 days per week
- 5 Less than once a week, but at least once a month
- 6 Less than once a month

SQ34 TQ32 Of your 5 closest friends, not including people who live in your household, how many are smokers?

- 1 1
- 2 2
- 3 3
- 4 4
- 5 5
- 6 None

SQ35 TQ33 Of the 5 people that you spend the most time with on a regular basis, not including people who live in your household, how many are smokers?

- 1 1
- 2 2
- 3 3
- 4 4
- 5 5
- 6 None

6-month Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

SQ36 TQ34 How often do you spend time with friends?

- 1 Every day
- 2 5-6 days per week
- 3 3-4 days per week
- 4 1-2 days per week
- 5 Less than once a week
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

SQ37 TQ35 M Are you involved in any volunteer organizations in the community?

- 1 Yes Specify the number: _____
Specify the names: _____
- 2 No

SQ38 Imagine you were enrolling in the project today. Would you want to have a partner to help you to quit smoking?

- 1 Yes
- 2 No
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

SQ39 Imagine you were enrolling in the project today. Do you think having a partner would help you to quit successfully?

- 1 Not at all
- 2 Somewhat
- 3 Very much
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

6-month Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

SQ40 Imagine you were in enrolling in the project today. If you had to choose a partner, who would you choose?

- 1 Spouse
- 2 Relative. Specify relationship: _____
- 3 Friend
- 4 Acquaintance
- 5 Stranger
- 6 No preference
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

SQ41 Imagine you were enrolling in a smoking cessation project that had no partner bonus. If you had to choose a partner, would you choose a smoker or a non-smoker?

- 1 Smoker
- 2 Non-smoker
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

SQ42 At enrollment, participants in the deposit group had to deposit 50 baht with the project. Then, those people were eligible to get a partner bonus of 1,200 baht. Do you think you would have been more likely, just as likely, or less likely to join the project if the following were true?

(Would you be more likely, just as likely, or less likely to join the project if:)	Tick <input checked="" type="checkbox"/> in appropriate box		
	More likely	Just as likely	Less likely
a. Required deposit at enrollment was 100 baht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Required deposit at enrollment was 200 baht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Partner bonus was 900 baht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Partner bonus was 600 baht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6-month Quitter Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

SQ43 Do you think you would have been more likely, just as likely, or less likely to quit successfully if you were assigned to the deposit group and the following were true?

(Would you be more likely, just as likely, or less likely to quit if you were in the deposit group and:)	Tick <input checked="" type="checkbox"/> in appropriate box		
	More likely	Just as likely	Less likely
a. Required deposit at enrollment was 100 baht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Required deposit at enrollment was 200 baht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Partner bonus was 900 baht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Partner bonus was 600 baht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SQ44 TT1 M **[If the person is in the no-deposit group, go to SS46. If the person is in the deposit group, ask:]**
 Did each of the following help you to quit not at all, somewhat, or very much?

(Were you helped with quitting by:)	Tick <input checked="" type="checkbox"/> in appropriate box		
	Not at all	Somewhat	Very much
a. Concern for the health of you or others?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Financial savings from the deposits?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Project money added to your deposits?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Partner bonus from quitting?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Pressure from your partner to quit?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Guilt that your partner may lose the bonus?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Help and encouragement from your project partner?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Help and encouragement from other friends or family?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SQ45 Do you think the partner bonus made the partnership more helpful to your quit attempt?

- 1 Yes
- 2 No
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

6-month Quitter Questionnaire

For administrative use only:
Tambon #: ____ Muban #: ____ Participant #: ____

SQ46 Imagine a smoking cessation project like this one, except that instead of a smoker getting a bonus for quitting, a smoker pays a small penalty for not quitting. Would you have been willing to join such a project 6 months ago?

- 1 Yes
- 2 No
- 8 Refused (Don't read)
- 9 Don't know (Don't read)

End time: _____

6-month Quitter Questionnaire

For administrative use only:
Tambon #: ____ Muban #: ____ Participant #: ____

INTERVIEWER OBSERVATIONS

P1. Interviewers' overall judgment about the interview:

- ① Reliable
- ② Somewhat reliable
- ③ With some errors
- ④ With a lot of errors

P2. Did the interviewee seem interested with the interview in general?

- ① Yes
- ② No

P3. Did the interviewee appear to try hard to answer accurately?

- ① Yes
- ② No

P4. Was it harder for the interviewee to understand questions, compared to other interviewees?

- ① Yes
- ② No

P5. Interviewer comments:



Faculty of Medicine Srinakharinwirot University
คณะแพทยศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ

Using Group Commitment for Smoking Cessation

6-Month Follow-Up Questionnaire

CONTINUING SMOKER

Tambon

Village #

Participant #

T/C

Name of Interviewer: _____

Interview Date (DD/MM): _____

Start time: _____

Version, May 5, 2011

6-month Smoker Questionnaire

For administrative use only:
Tambon #: _____ Muban #: _____ Participant #: _____

Please be assured that all your responses will be kept entirely confidential. Truthful answers will help the project to assist other smokers with quitting.

SMOKING CHARACTERISTICS

- SS1 TS1 Do you now smoke every day or some days? (Circle one.)
M
 1 Every day
 2 Some days **(Go to SS3)**
- SS2 TS2 On average, how many cigarettes do you smoke each day? Include both factory-made and hand-rolled cigarettes.
M
 Enter number of cigarettes: _____ **(Go to SS4)**
- SS3 TS3 On average, how many cigarettes do you smoke each week? Include both factory-made and hand-rolled cigarettes.
M
 Enter number of cigarettes: _____
- SS4 TS4 Do you smoke factory-made cigarettes, hand-rolled cigarettes, or both?
M
 1 Factory-made only. If yes, typically what brand: _____ **(Go to SS6)**
 2 Hand-rolled only **(Go to SS6)**
 3 Both. If yes, typically what brand of factory-made: _____
- SS5 TS5 If you smoke both factory-made cigarettes and hand-rolled cigarettes, do you smoke mainly factory made or mainly hand-rolled cigarettes (tobacco leaf)?
M
 1 Mainly factory-made
 2 Mainly hand-rolled (tobacco leaf)
 3 About the same
- SS6 TS6 When did you last smoke a cigarette? (Circle one)
M
 1 Less than 1 hour ago
 2 1 to 3 hours ago
 3 4 to 6 hours ago
 4 6 to 12 hours ago
 5 12-24 hours ago
 6 More than 24 hours ago. Enter number of days: _____

6-month Smoker Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

SS7 TS7a On days that you smoke, how many minutes/hours after waking do you usually have your first cigarette? **[Complete only one blank.]**

If less than 60 minutes, enter minutes: _____

If more than 60 minutes, enter hours: _____

SS8 TS7b Do you consider yourself addicted to cigarettes? (Circle one)

- 1 Not at all addicted
- 2 Somewhat addicted
- 3 Very addicted

QUIT ATTEMPTS

SS9 At the project meeting 3 months ago, had you quit smoking?

- 1 Yes
- 2 No **(Go to SS12)**
- 8 Refused **(Don't read) (Go to SS12)**
- 9 Don't know **(Don't read) (Go to SS12)**

SS10 TS18 M Why did you start smoking again: (Circle only **ONE** best answer)

- 1 Stress
- 2 Habit or physical addiction
- 3 Quitting smoking made you sick
- 4 Desire to be social
- 5 People around you were smoking
- 6 You missed smoking
- 7 Other. If yes, specify: _____

SS11 **[See group assignment (T/C) on cover page. If the person is in the no-deposit group (C), go to SS13. If the person is in the deposit group (T), continue with SS11.]** Was the end of the project intervention (end of deposits and bonus) a factor in you starting to smoke again?

- 1 Yes
- 2 No
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

6-month Smoker Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

SS12 **[See group assignment (T/C) on cover page. If the person is in the no-deposit group (C), go to SS13. If the person is in the deposit group (T), continue with SS12.]** If the project intervention (deposits and partner bonus) had lasted 6 months, instead of 3 months, how likely would you be to have quit smoking by now?

- 1 More likely
- 2 Just as likely
- 3 Less likely
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

SS13 TS8 M How many times did you try to quit smoking since the last project meeting 3 months ago? Either write or circle the correct response.

- 1 0 **(Go to SS24)**
- 2 ____ Times **(Enter number 0-9)**

SS14 TS9 M Thinking about your longest quit attempt during the last 3 months, about how many days did you stay smoke-free?

Enter number of days: _____

SS15 TS10 During your last quit attempt, did you use any of the following strategies to help quit?

(Did you use:)	Tick <input checked="" type="checkbox"/> in appropriate box		
	Yes	No	Refuse [Don't read]
a. Exercise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Drinking water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Gum, sweets, lozenges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Meditation or prayer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6-month Smoker Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

SS16 TS11 M Can you describe any other strategies you used to limit the amount you smoked during your last quit attempt?

1) _____

2) _____

3) _____

4) _____

5) _____

SS17 TS12 M In the last 3 months, did you use drugs or nicotine replacement, such as nicotine gum, to help quit smoking?

1 Yes
 2 No (Go to SS19)
 8 Refused (Don't read) (Go to SS19)
 9 Don't know (Don't read) (Go to SS19)

SS18 TS13 In the last 3 months, which of the following did you use to help quit smoking? [Check all that apply.]

(Have you used:)	Tick <input checked="" type="checkbox"/> in appropriate box		
	In last 3 months?	In last quit attempt?	Refused (Don't read)
a. Nicotine gum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Nicotine patch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Champix (blue pill)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Quomem or Zyban (purple pill)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Nortriptyline	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Herbal medicines(Specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Other (Specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6-month Smoker Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

SS19 TS14 During your last quit attempt did you try to avoid areas or situations that make you want to smoke?

1 Yes
 2 No
 8 Refused (Don't read)
 9 Don't know (Don't read)

SS20 TS15 During your last quit attempt did you decide not to carry cigarettes with you in order to avoid being tempted to smoke?

1 Yes
 2 No
 8 Refused (Don't read)
 9 Don't know (Don't read)

SS21 TS16 M On your most recent quit attempt, did you stop smoking suddenly or did you gradually cut down on the number of cigarettes you smoked?

1 Stopped suddenly (Go to SS23)
 2 Gradually cut down
 8 Refused (Don't read) (Go to SS23)
 9 Don't know (Don't read) (Go to SS23)

SS22 TS17 If cut down: Did you delay smoking for longer and longer or just cut down the total amount?

1 Delay smoking longer and longer
 2 Reduce total amount
 8 Refused (Don't read)
 9 Don't know (Don't read)

6-month Smoker Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

SS23 TS18 M Why did your last quit attempt fail: (Circle only **ONE** best answer)

- 1 Stress
- 2 Habit or physical addiction
- 3 Quitting smoking made you sick
- 4 Desire to be social
- 5 People around you were smoking
- 6 You missed smoking
- 7 Other. If yes, specify: _____

SS24 TS19 Are you planning to quit smoking: (Circle one)

- 1 Within the next month
- 2 Within the next 6 months
- 3 Sometime in the future, beyond 6 months
- 4 Not planning to quit

SS25 TS20 Have you set a firm date for quitting? (Circle one)

- 1 Yes
- 2 No

SS26 TS21 If you decide to give up smoking completely in the next three months, what is the chance that you would succeed? Please point to a number from 0 to 10, where each number represents one chance out of 10. If you circle 0, it means you are certain that you will not quit. If you circle 10, it means that you are certain you will quit. If you circle 5, it means that you are as likely to quit as to not quit.

0	1	2	3	4	5	6	7	8	9	10
0% chance					50% chance					100% chance

OTHER TOPICS

6-month Smoker Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

SS27 TS22 In the past 3 months, have each of the following things led you to think about quitting not at all, somewhat, or very much?

(In the last 6 months, were you led to think about quitting by:)	Tick <input checked="" type="checkbox"/> in appropriate box		
	Not at all	Somewhat	Very much
a. Concern for your personal health?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Concern about the effect of your cigarette smoke on non-smokers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. That Thai society disapproves of smoking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. The price of cigarettes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. The potential financial savings?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Advertisements or information about the health risks of smoking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Warning labels on cigarette packages?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Wanting to set an example for children?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SS28 TS23 I am going to read you a list of health effects and diseases that may or may not be caused by smoking cigarettes. Based on what you know or believe, does smoking cause the following:

(Does smoking cause:)	Tick <input checked="" type="checkbox"/> in appropriate box		
	Yes	No	Don't know
a. Stroke in smokers [blood clots in the brain].	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Impotence in male smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Lung cancer in smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Decay in the lungs of smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Stained teeth in smokers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Premature ageing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Lung cancer in nonsmokers from secondhand smoke.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6-month Smoker Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

SS29 TS24 Which of the following best describes smoking inside your home?

- 1 Smoking is not allowed in any indoor areas
- 2 Smoking is allowed only in some indoor areas
- 3 No rules or restrictions
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

SS30 TS25 Which of the following best describes the rules about smoking where you work?

- 1 Smoking is not allowed
- 2 Smoking is allowed only in some indoor areas
- 3 No rules or restrictions
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

SS31 TS26 In the last 3 months, have you smoked at work?

- 1 Yes
- 2 No
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

SS32 TS27 In general, how would you describe your health?

- 1 Poor
- 2 Fair
- 3 Good
- 4 Very good
- 5 Excellent

SS33 TS28 How much do you think you would benefit from health and other gains if you were to quit smoking permanently in the next 3 months?

- 1 Not at all
- 2 Somewhat
- 3 Very much
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

6-month Smoker Questionnaire

For administrative use only:
 Tambon #: ____ Muban #: ____ Participant #: ____

SS34 TS29 In the last **3** months, have you visited a doctor, other health professional, clinic, or hospital?
 M

- 1 Yes **(Go to SS36)**
- 2 No **(Go to SS36)**
- 8 Refused **(Don't read)** **(Go to SS36)**
- 9 Don't know **(Don't read)** **(Go to SS36)**

SS35 TS30 During any visit to the doctor or other health professional in the last **3** months, did you receive: **(Read)**

(During a medical visit, did a doctor or other health professional provide:)	Tick <input type="checkbox"/> in appropriate box	
	Yes	No
a. Advice to quit smoking?	<input type="checkbox"/>	<input type="checkbox"/>
b. Pamphlets or brochures on how to quit?	<input type="checkbox"/>	<input type="checkbox"/>
c. Drugs or nicotine substitutes to quit smoking	<input type="checkbox"/>	<input type="checkbox"/>
d. Additional help or a referral to another service to help you quit?	<input type="checkbox"/>	<input type="checkbox"/>

SS36 TS31 During the past 3 months, about how often did you have any kind of alcoholic drink?

- 1 Every day
- 2 5-6 days per week
- 3 3-4 days per week
- 4 1-2 days per week
- 5 Less than once a week, but at least once a month
- 6 Less than once a month
- 7 Did not drink alcohol in the past 3 months **(Go to SS38)**

SS37 TS32 On a typical day when you had alcohol over the past 3 months, how many alcoholic drinks did you usually have?

NOTE: Code for type of container: 1 = shot glass (pek), 2 = small bottle (gat), 3 = small bottle, 4 = big bottle, 5 = can, 6 = water glass.

(How many of each do you usually drink?)	# per day	Container type (Enter code #)
a. Thai rice whiskey?	_____	_____
b. Beer?	_____	_____

6-month Smoker Questionnaire For administrative use only:
 Tambon #: _____ Muban #: _____ Participant #: _____

- c. Manufactured whiskey _____
- d. Rice whiskey with herbs? _____
- e. Other? Specify units: _____

SS38 TS33 During the past 3 months, have you used any drugs for recreation? **[If yes, ask:] Which drugs? [Do NOT read the list. Circle all that apply.]**

- 1 No
- 2 Amphetamines
- 3 Kratom
- 2 Gancha
- 2 Other. Specify: _____

SS39 TS34 Of your 5 closest friends, not including people who live in your household, how many are smokers?

- 1 1
- 2 2
- 3 3
- 4 4
- 5 5
- 6 None

SS40 TS35 Of the 5 people that you spend the most time with on a regular basis, not including people who live in your household, how many are smokers?

- 1 1
- 2 2
- 3 3
- 4 4
- 5 5
- 6 None

6-month Smoker Questionnaire For administrative use only:
 Tambon #: _____ Muban #: _____ Participant #: _____

SS41 TS36 How often do you spend time with friends?

- 1 Every day
- 2 5-6 days per week
- 3 3-4 days per week
- 4 1-2 days per week
- 5 Less than once a week
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

SS42 TS37 M Are you involved in any volunteer organizations in the community?

- 1 Yes Specify the number: _____
Specify the names: _____
- 2 No

SS43 Imagine you were enrolling in the project today. Would you want to have a partner to help you to quit smoking?

- 1 Yes
- 2 No
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

SS44 Imagine you were enrolling in the project today. Do you think having a partner would help you to quit successfully?

- 1 Not at all
- 2 Somewhat
- 3 Very much
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

SS45 Imagine you were in enrolling in the project today. If you had to choose a partner, who would you choose?

- 1 Spouse
- 2 Relative. Specify relationship: _____
- 3 Friend
- 4 Acquaintance
- 5 Stranger
- 6 No preference

6-month Smoker Questionnaire For administrative use only:
Tambon #: ____ Muban #: ____ Participant #: ____

- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

SS46 Imagine you were enrolling in a smoking cessation project that had no partner bonus. If you had to choose a partner, would you choose a smoker or a non-smoker?

- 1 Smoker
- 2 Non-smoker
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

SS47 At enrollment, participants in the deposit group had to deposit 50 baht with the project. Then, those people were eligible to get a partner bonus of 1,200 baht. Do you think you would have been more likely, just as likely, or less likely to join the project if the following were true?

(Would you be more likely, just as likely, or less likely to join the project if:)	Tick <input type="checkbox"/> in appropriate box		
	More likely	Just as likely	Less likely
a. Required deposit at enrollment was 100 baht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Required deposit at enrollment was 200 baht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Partner bonus was 1,800 baht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Partner bonus was 2,400 baht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SS48 Do you think you would have been more likely, just as likely, or less likely to quit successfully if you were assigned to the deposit group and the following were true?

(Would you be more likely, just as likely, or less likely to quit if you were in the deposit group and:)	Tick <input type="checkbox"/> in appropriate box		
	More likely	Just as likely	Less likely
a. Required deposit at enrollment was 100 baht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Required deposit at enrollment was 200 baht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Partner bonus was 1,800 baht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Partner bonus was 2,400 baht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6-month Smoker Questionnaire For administrative use only:
Tambon #: ____ Muban #: ____ Participant #: ____

SS49 TT1 M **[If the person is in the no-deposit group, go to SS46. If the person is in the deposit group, ask:]**
Did each of the following help you to quit not at all, somewhat, or very much?

(Were you helped with quitting by:)	Tick <input type="checkbox"/> in appropriate box		
	Not at all	Somewhat	Very much
a. Concern for the health of you or others?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Financial savings from the deposits?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Project money added to your deposits?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Partner bonus from quitting?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Pressure from your partner to quit?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Guilt that your partner may lose the bonus?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Help and encouragement from your project partner?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Help and encouragement from other friends or family?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SS50 Do you think the partner bonus made the partnership more helpful to your quit attempt?

- 1 Yes
- 2 No
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

SS51 Imagine a smoking cessation project like this one, except that instead of a smoker getting a bonus for quitting, a smoker pays a small penalty for not quitting. Would you have been willing to join such a project 6 months ago?

- 1 Yes
- 2 No
- 8 Refused **(Don't read)**
- 9 Don't know **(Don't read)**

End time: _____

6-month Smoker Questionnaire

For administrative use only:
Tambon #: ____ Muban #: ____ Participant #: ____

INTERVIEWER OBSERVATIONS

P1. Interviewers' overall judgment about the interview:

- ① Reliable
- ② Somewhat reliable
- ③ With some errors
- ④ With a lot of errors

P2. Did the interviewee seem interested with the interview in general?

- ① Yes
- ② No

P3. Did the interviewee appear to try hard to answer accurately?

- ① Yes
- ② No

P4. Was it harder for the interviewee to understand questions, compared to other interviewees?

- ① Yes
- ② No

P5. Interviewer comments:



Faculty of Medicine Srinakharinwirot University
คณะแพทยศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ

Using Group Commitment for Smoking Cessation

12-Month Follow-Up Phone Survey

Tambon

Village #

Participant #

Interview Date (DD/MM): _____

12-month Questionnaire

Please be assured that all your responses will be kept entirely confidential. Truthful answers will help the project to assist other smokers with quitting.

RECENT QUIT ATTEMPTS

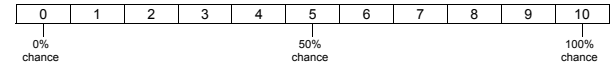
W1 Do you currently smoke cigarettes, either hand-rolled tobacco or manufactured cigarettes?

- 1 Yes **(Skip to W4)**
 2 No
 8 Refused **(Don't read) (Skip to W4)**
 9 Don't know **(Don't read) (Skip to W4)**

W2 TQ1 How long ago did you quit? **(Don't read choices. Select only one answer.)**

- 1 _____ Days (enter number 0-31)
 2 _____ Weeks (enter number 0-10)
 3 _____ Months (enter number 0-12)
 88 Refused **(Don't read)**
 99 Don't know **(Don't read)**

W3 TQ22 What is the chance that you will continue to stay smoke-free over the next 3 months? Please point to a number from 0 to 10, where each number represents one chance out of 10. If you circle 0, it means you are certain that you will not quit. If you circle 10, it means that you are certain you will quit. If you circle 5, it means that you are as likely to quit as to not quit.



Skip to End

W4 TS2 M On average, how many cigarettes do you smoke each day? Include both factory-made and hand-rolled cigarettes.

Enter number of cigarettes: _____

W5 TS8 M How many times did you try to quit smoking in the last 3 months?

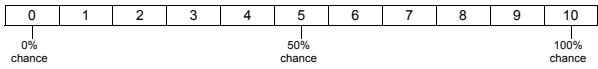
Enter number of attempts: _____

12-month Questionnaire

W6 TS9 Thinking about your longest quit attempt during the last 3 months, about how many days
M did you stay smoke-free?

Enter number of days: _____

W7 TS21 If you decide to give up smoking completely in the next three months, what is the chance that you would succeed? Please point to a number from 0 to 10, where each number represents one chance out of 10. If you circle 0, it means you are certain that you will not quit. If you circle 10, it means that you are certain you will quit. If you circle 5, it means that you are as likely to quit as to not quit.



Thanks for your help.

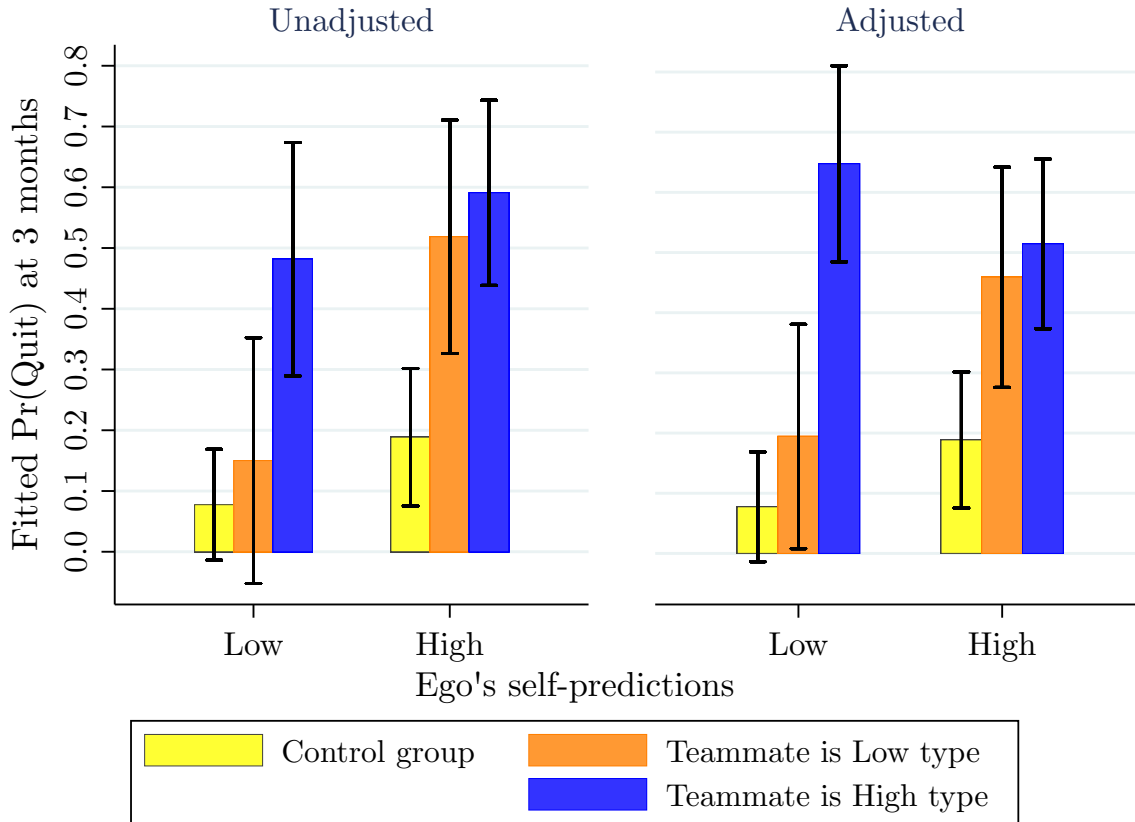
Interviewer comments:

Appendix B

Additional Figures and Tables

Appendix B. Additional Figures and Tables

Figure B.1: Own and teammate's self-predictions and actual quitting at 3 months
(Randomly formed teams in the treatment group)



Note: Sample restricted to formed assigned, treated teams ($n = 116$). Fitted probabilities are based on a logit model of quitting at 3 months. The adjusted model controls for all covariates listed in Table 5.1, subdistrict, and smoking cessation counselor and quadratic terms for age, income, and cigarettes smoked per day. Error bars represent the 95% confidence interval, clustering standard errors at the team level.

Table B.1: Sample Characteristics from Household Census

	Complete Cases					All Cases					Multiply Imputed Cases				
	Mean	SD	Min	Max	Count	Mean	SD	Min	Max	Count	Mean	SD	Min	Max	Count
Participant	0.157	0.364	0	1	1359	0.105	0.306	0	1	2055	--	--	--	--	--
Male	0.915	0.278	0	1	1359	0.926	0.262	0	1	2052	0.947	0.225	0	1	34800
Age	46.2	15.1	14	93	1359	45.7	15.2	14	93	1985	44.8	15.3	8	111	34800
Years smoking	22.2	14.1	1	71	1359	21.8	14.0	0.3	71	1666	20.4	13.7	0	121	34800
Cigs. Per day	13.7	7.8	0.1	100	1359	13.7	7.91	0.1	100	1817	13.8	8.1	0	100	34800
Type of tobacco															
Manufactured	0.299	0.458	0	1	1359	0.305	0.460	0	1	2002	0.144	0.351	0	1	34800
Handrolled	0.570	0.495	0	1	1359	0.559	0.497	0	1	2002	0.321	0.467	0	1	34800
Both	0.131	0.338	0	1	1359	0.136	0.343	0	1	2002	0.536	0.499	0	1	34800
Want to quit (1 mo)	0.278	0.448	0	1	1359	0.237	0.426	0	1	1804	0.143	0.350	0	1	34800
Want to quit (6 mos)	0.294	0.456	0	1	1359	0.249	0.433	0	1	1804	--	--	--	--	--
Subdistrict															
Subdistrict 1	0.152	0.359	0	1	1359	0.163	0.369	0	1	2055	--	--	--	--	--
Subdistrict 2	0.243	0.429	0	1	1359	0.267	0.443	0	1	2055	--	--	--	--	--
Subdistrict 3	0.233	0.423	0	1	1359	0.229	0.420	0	1	2055	--	--	--	--	--
Subdistrict 4	0.113	0.316	0	1	1359	0.102	0.303	0	1	2055	--	--	--	--	--
Subdistrict 5	0.132	0.338	0	1	1359	0.126	0.332	0	1	2055	--	--	--	--	--
Subdistrict 6	0.128	0.334	0	1	1359	0.113	0.317	0	1	2055	--	--	--	--	--
<i>N</i>					1359					2055					34800

Note: Household data on smokers collected by CHWs. 86.6% of CHWs returned data forms. Multiply imputed cases are based on sequential imputation using chained equations. We use 50 iterations for the imputations, along with 100 iterations for the burn-in period.

Appendix B. Additional Figures and Tables

Table B.2: Sample Attrition

	% any response			% verified response		
	Total	Control	Treatment	Total	Control	Treatment
1 month	89.6	87.0 [0.38]	90.9			
3 months	99.5	100.0 [0.47]	99.2	69.2	58.0 [0.01]	75.0
6 months	99.5	100.0 [1.00]	99.2	71.6	63.8 [0.07]	75.8
14 months	99.5	100.0 [1.00]	99.2			
Observations	201	69	132	201	69	132

Note: p -values from χ^2 tests of response status by treatment status are in brackets. Verified responses indicate that the person's smoking status was biochemically verified using a urine test for nicotine and cotinine.

Table B.3: Average Treatment Effects at 1, 3, 6, and 14 Months
(Full output)

	Self-reported	Biochemically verified		Self-reported
	Abstinance at 1 month	Abstinance at 3 months	Abstinance at 6 months	Abstinance at 14 months
	(1)	(2)	(3)	(4)
Treatment	0.135** (0.062)	0.281*** (0.058)	0.201*** (0.056)	0.132* (0.068)
Male	0.092 (0.091)	0.009 (0.110)	-0.033 (0.096)	0.025 (0.115)
Age	0.008 (0.006)	0.007 (0.005)	0.012** (0.005)	0.013** (0.005)
Monthly household income	-0.010 (0.014)	-0.014 (0.014)	-0.005 (0.011)	0.004 (0.019)
Education				
0-3 years (ref)				
4-6 years	-0.263*** (0.072)	-0.137 (0.085)	-0.086 (0.099)	0.032 (0.093)
7+ years	-0.079 (0.080)	-0.020 (0.098)	0.016 (0.096)	0.032 (0.095)
Currently married	0.052 (0.95)	0.097 (0.070)	0.037 (0.073)	0.072 (0.081)
Buddhist vs. Muslim	0.230*** (0.077)	0.097 (0.115)	0.070 (0.117)	0.124 (0.120)
Works in agriculture	-0.085 (0.081)	-0.114 (0.073)	-0.067 (0.075)	-0.057 (0.076)

Continued on next page

Table B.3 – *Continued from previous page*

	Self-reported	Biochemically verified		Self-reported
	Abstinence at 1 month	Abstinence at 3 months	Abstinence at 6 months	Abstinence at 14 months
	(1)	(2)	(3)	(4)
Self-rated health	< 0.001 0.062	-0.019 (0.068)	-0.034 (0.065)	-0.096 (0.066)
Average cigarettes per day	-0.019*** (0.005)	-0.016*** (0.004)	-0.015*** (0.004)	-0.007* (0.004)
Type of tobacco used				
Manufactured cigarettes only (ref)				
Handrolled cigarettes only	-0.100 (0.098)	-0.016 (0.073)	0.025 (0.077)	-0.026 (0.086)
Both	-0.009 (0.110)	0.058 (0.093)	0.127 (0.089)	0.129 (0.098)
Number of past quit attempts	0.014 (0.012)	0.007 (0.011)	-0.005 (0.013)	0.012 (0.012)
Number of years since initiation	-0.008* (0.005)	-0.007 (0.005)	-0.011* (0.006)	-0.007 (0.005)
Prediction of Pr(Quit) in 3 mos.	0.016 (0.016)	0.020 (0.015)	0.025 (0.016)	0.022 (0.017)
Planning to quit within 6 mos.	-0.064 (0.108)	-0.033 (0.091)	0.006 (0.095)	-0.013 (0.099)
Believe quitting is very important	0.190** (0.094)	0.158* (0.084)	0.111 (0.082)	0.105 (0.076)
Number of other adult smokers in HH	0.090*** (0.026)	0.062** (0.030)	0.050* (0.026)	0.045 (0.030)
All of 5 best friends are smokers	0.022 (0.069)	-0.015 (0.061)	0.010 (0.065)	-0.006 (0.073)

Continued on next page

Table B.3 – *Continued from previous page*

	Self-reported	Biochemically verified		Self-reported
	Abstinence at	Abstinence at	Abstinence at	Abstinence at
	1 month	3 months	6 months	14 months
	(1)	(2)	(3)	(4)
Preselected teammate	-0.167 (0.105)	-0.220*** (0.080)	-0.270*** (0.067)	-0.143 (0.118)
Number of participants	177	197	196	196
Number of teams	113	120	120	120
Mean of dependent variable	0.237	0.147	0.191	0.250
Pseudo- R^2	0.31	0.29	0.32	0.21
Log likelihood	-79.7	-85.8	-87.4	-99.4

Note: Average marginal effects are calculated from logit models, controlling for all variables listed, as well as subdistrict and cessation counselor. The models include quadratic terms for age, income, and cigarettes smoked per day. Robust standard errors, clustered at the team level, are given in parentheses. Smoking abstinence is defined as the 7-day point prevalence. Significance: * 0.10 ** 0.05 *** 0.01.

Appendix B. Additional Figures and Tables

Table B.4: Baseline Characteristics, by Others' Mean Predictions for Teammate

	Randomly formed, treated teams			t -test of (2) vs. (3) (p -value)
	All	Control group	Treatment group	
	(1)	(2)	(3)	(4)
Male	0.888	0.881	0.895	0.796
Age	52.07 (13.71)	51.92 (14.47)	52.23 (13.00)	0.893
Monthly household income	4.108 (6.040)	3.734 (5.006)	4.495 (6.975)	0.476
Education				
0-3 years	0.474	0.508	0.439	0.519
4-6 years	0.233	0.254	0.211	0.547
7+ years	0.293	0.237	0.351	0.203
Currently married	0.802	0.847	0.754	0.230
Works in agriculture	0.655	0.576	0.737	0.061
Self-rated health	0.284	0.271	0.298	0.644
Average cigs. smoked per day	11.86 (9.08)	10.95 (8.02)	12.80 (10.04)	0.282
Type of tobacco used				
Manufactured cigs. only	0.328	0.373	0.281	0.266
Handrolled cigs. only	0.483	0.492	0.474	0.781
Both	0.190	0.136	0.246	0.096
Number of past quit attempts	2.565 (2.689)	2.339 (2.258)	2.798 (3.076)	2.371
Number of years smoking	32.59 (13.28)	32.64 (14.87)	32.53 (14.47)	0.998
Prediction of Pr(Quit) in 3 months	0.787 (0.231)	0.805 (0.213)	0.768 (0.249)	0.447
Planning to quit w/in 6 mos.	0.828	0.814	0.842	0.657
Belief that quitting is v. important	0.767	0.729	0.807	0.781
Number of other adult smokers in HH	0.698 (0.962)	0.729 (0.827)	0.667 (1.091)	0.752
5 best friends are all smokers	0.483	0.458	0.509	0.585
Number of observations	117	117	117	

Note: Mean and standard deviation (in parentheses) of each variable are reported. Only a subset of variables were collected in the census for non-participants.