Predicting Smoking Behaviour Among Pregnant Smokers Using the Reasons Model and Self-

Determination Theory

by

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Declaration Page

I hereby declare that I am the sole author of this thesis. This is a true copy of the

thesis, including any required final revisions, as excepted by my examiners.

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Abstract

The dangerous health effects of smoking during pregnancy and during the postpartum period are well-established, yet a significant proportion of pregnant women continue to smoke despite being aware of the health risks and wanting to quit. While many risks factors for continued smoking or relapse have been identified, these factors are largely demographic and difficult to change.

The purpose of the present study was to identify and measure the psychological factors that predict smoking cessation intentions and behaviours among pregnant women, during pregnancy and the postpartum period, who are either currently smoking or have recently quit. Pregnant smokers (N= 56) were asked to complete a series of questionnaires designed to access their reasoning at the three levels outlined by the Reasons Model and their feelings of autonomy and competence, and partner support in quitting smoking as indicated by Self-Determination Theory. Participants were also asked to complete a number of other questionnaires and a short, semi-structured interview to assess other factors potentially related to smoking behaviour. Participants were then re-contacted twice after their baby was born, at approximately two months and four months postpartum. At both times, participants were asked to again complete the questionnaire package and a short semi-structured interview.

It was hypothesized that Reasons Model and Self-Determination Theory would predict both current and future intentions to quit smoking, and smoking behaviour, respectively. It was also hypothesized that those with direct experience with quitting smoking or reducing their smoking behaviour during pregnancy and postpartum (multigravida) would be more accurate in predicting their intentions to quit smoking and smoking behaviour than would

those who were pregnant for the first time (primagravida). The results indicated some support

for the ability of the two models to predict intentions to quit and smoking behaviour, though

was limited by the small sample size. Further, level of direct experience emerged as a

significant factor in participants' ability to predict their intentions and behaviour regarding

smoking. The current study suggests that both the Reasons Model and Self-Determination

Theory are important tools for assessing and developing interventions for helping women to

make positive changes in their smoking behaviour during pregnancy and postpartum.

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I wish to acknowledge as well two dedicated research assistants, Sara Hitchman and Erin Calder. Their dedication to this project proved to be essential in its completion. I wish both all the best in their future careers.

Dedication

I dedicate this to my son and son-to-be, Jonah and Ethan. Jonah, your boundless energy and sense of fun and curiousity has helped keep me sane and reminded me of what is most important in life. Ethan, you were a driving force in motivating me to get this done! I dedicate this as well to my husband Adam, whose patience, love, and belief in me has been a steadying presence in helping me achieve this goal.

Finally, I dedicate this to my father, this would not have happened without you. You are the best at whatever you do, and in this case, as researcher, supervisor, and motivational coach! You made it all seem possible, and for that I am grateful.

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INTRODUCTION

Health Risks of Smoking during Pregnancy and Postpartum

The health issues and dangers of smoking while pregnant are commonly known, yet many women continue to smoke during pregnancy despite being aware of the health risks (Haslam & Draper, 2001). In 1999, 17 percent of pregnant women in the United States smoked during their pregnancy compared to general population rates of 31 percent (Substance Abuse and Mental Health Administration, 1999). Other studies have reported similar rates ranging from 12 percent to as high as 30 percent (American College of Obstetricians and Gynecologists, 2007; Valanis et al., 2001). Adolescents seem most at risk, with almost half (46%) smoking during pregnancy, at least double the rate of typical adult populations (Delpisheh, Attia, Drammond, & Brabin, 2006).

The health risks are significant. Women who smoke during pregnancy are at an increased risk for miscarriage, stillbirth, and low birth weight babies (McBride & Pirie, 1990; Kallen, 2001). Salihu, Aliyu, Pierre-Louis, and Alexander (2003) found a 40 percent increased risk of infant death in those whose mothers smoked during pregnancy, even after controlling for sociodemographic variables such as race, age, and education level.

Recent genetic research has begun to better measure the effect of tobacco exposure on fetuses with distressing results. Research with genetic coding of fetuses has found a link between in utero exposure to tobacco (at a rate of greater than 10 cigarettes a day) and chromosomal abnormalities that have been linked to cancer, developmental delays, and genetic disorders (de la Chica, Ribas, Giraldo, Egozcue, & Fuster, 2005).

A number of toxins have been found in cigarettes, but two in particular have been shown to have adverse effects on fetal development. Carbon monoxide has been shown to causes fetal hypoxia (Lambers & Clark, 1996), which is a reduction of oxygen available to the fetus. Nicotine has been shown to affect the development of cardiovascular and central nervous systems (Stillman, Rosenberg, & Sachs, 1986) and to constrict the flow of oxygen and nutrients to the fetus (Lambers et al., 1996). It is hypothesized that these toxins in particular are linked to the risks outlined above.

These health risks continue after childbirth. During the post-partum period, mothers who breastfeed can transmit nicotine through their breastmilk (Samet, Lewit, & Warner, 1994). Mascola, Van Vunakis, and Tager (1998) found levels of cotinine (a metabolite of nicotine and often used as a measure of exposure to tobacco smoke) in the urine of infants who were breastfed by smokers at rates ten times higher than infants of smokers who did not breastfeed, providing evidence that infants are exposed to nicotine not only through environmental tobacco smoke, but also through their mother's breastmilk.

In addition, infants exposed to environmental tobacco smoke are at an increased risk for respiratory problems, SIDS, and ear infections (Samet et al., 1994; Klonoff-Cohen, Edelstein, Serfkowitz, & et.al., 1995; Stoddard & Gray, 1997; Ey, Holberg, Aldous, & Wright, 1995). A relationship has also been found between smoking during pregnancy and postpartum, and an increased risk of infantile colic (Sondergaard, Henriksen, Obel, & Wisborg, 2001).

While many women are able to quit smoking prior to or during their pregnancy, researchers have identified a number of risk factors for continued smoking during pregnancy. These include younger age (particularly adolescents), lower levels of education, having more

friends who smoke, and coming from a lower socioeconomic background. Pregnant adolescents who smoke are more likely to be white, have lower income and education level, and have partners and friends who smoke (Cornelius, Leech, & Goldschmidt, 2004; Johnson et al., 2004; Lu, Tong, & Oldenburg, 2001).

Women who smoke during pregnancy are more likely to have higher rates of smoking prior to pregnancy, have been smoking for a longer period of time, and report higher levels of addiction to smoking (Lu et al., 2001). Levels of stress, depression, and anxiety have also been identified as risk factors for smoking during pregnancy (Cornelius et al., 2004; Paarlberg et al., 1999; Dejin-Karlsson et al., 1996). Paarlberg et al. (1999) found that women who smoked during pregnancy reported higher levels of stress, depression, and somatic complaints than women who were non-smokers, and reported higher levels of daily stress. In particular, higher levels of stress related to financial worries, family problems, and domestic violence were found to be related to continued smoking (Bullock, Mears, Woodcock, & Record, 2001).

Relapse During the Postpartum Period

While some women are able to quit smoking during their pregnancy, the majority of these return to smoking within a short time period after delivering their baby (McBride et al., 1999). More startling is the finding that during and following pregnancy some women are able to abstain from cigarettes for extended periods of time (six months to a year) before relapsing (Ratner, Johnson, Bottorff, Dahinten, & Hall, 2000), a time period that would be considered a significant milestone for a typical adult smoking population. Relapse rates of 70 to 80 percent within one year of giving birth have been found among women who quit during their pregnancy (Severson, Andrews, Lichtenstein, Wall, & Akers, 1997). Gaffney and Henry (2007) found that 66 percent of their sample of pregnant women who had quit smoking during

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pregnancy intended to remain abstinent, yet 70 percent were smoking by the end of the second month postpartum. Risk factors identified for postpartum relapse are quite similar to those for smoking during pregnancy, and include age, mental health, low income, poorer education levels, less confidence in ability to stay quit, higher smoking rates prior to pregnancy, and starting to smoke occasionally towards the end of pregnancy (Mullen, Richardson, Quinn, & Ershoff, 1997; Ratner et al., 2000; Secker-Walker, Solomon, Flynn, Skelly, & Mead, 1998). Further, women who live with a partner who smoked were four times more likely to relapse after their pregnancy (Lelong, Kaminski, Saurel-Cubizolles, & Bouvier-Colle, 2001). These risk factors have been found to override intervention attempts, with no significant differences in quit rates between intervention and control groups (Ershoff et al., 1999).

Indeed, despite extensive knowledge of risk factors for continued smoking and relapse during pregnancy and the postpartum period, relapse prevention and smoking cessations programs of varying intensity and support have had limited success (Lowe, Windsor, Balanda, & Woodby, 1997; Ershoff, Quinn, & Mullen, 1995; Van't Hof, Wall, Dowler, & Stark, 2000). Intervention attempts such as written and video materials, motivational interviewing, and minimal to intensive levels of counseling support around pros and cons of quitting and barriers to quitting have not resulted in sustained increased quit behaviour among women during the postpartum period. Indeed, some have had short-term success but with no lasting impact postpartum (Lawrence et al., 2005; Stotts, DiClemente, & Dolan-Mullen, 2002), even with women who spontaneously quit during their pregnancy (Secker-Walker et al., 1998; Pbert et al., 2004).

Researchers have identified that the majority of pregnant women are aware of the health risks of smoking to their baby and report issues related to the health of their baby as the

primary reason for wanting to quit smoking (Haslam et al., 2001). At the same time, a significant majority of pregnant women will either continue to smoke during their pregnancy or will relapse within a short time period after giving birth despite explicit information and support from health professionals. Further, many of the risk factors currently identified for continued smoking during pregnancy and postpartum relapse (e.g. age, level of education, income) are factors which cannot be significantly altered. However, even among these high risk groups differences in smoking behaviour have been found, suggesting that a need exists for further understanding of the barriers to quitting smoking during pregnancy and to staying quit.

The extensive health risks of exposing a child to tobacco smoke both during pregnancy and after they are born suggests a real need for effective intervention strategies to help women reduce or quit their smoking behaviour during pregnancy and postpartum. However, the typically low impact of previous attempts at cessation intervention strategies suggests a need to first gain a better understanding of women who smoke during pregnancy and postpartum in order to determine who is most a risk for continued smoking and relapse, and how best to help them change that behaviour.

Role of Experience

One factor that seems to have been overlooked in previous literature with pregnant smokers is their level of personal experience either with quitting smoking or with pregnancy and childrearing, yet it is likely to be an important factor in a woman's attitudes and behaviour towards smoking during pregnancy. For example, Haslam and Draper (2001) noted that women who were aware of health risks associated with smoking during pregnancy (e.g. low birth weight) were also able to dismiss these health warnings after having given birth to

healthy babies.

Research examining how individuals form attitudes and how those attitudes subsequently impact their behaviour has shown that the method in which the attitude is formed has a direct impact on attitude-behaviour consistency (Regan & Fazio, 1977). That is, individuals who form their attitudes towards a behaviour through more passive means (being told about the negative health effects, observation of others engaging in the behaviour) are less likely to behave in a manner that is consistent with their reported attitude than those whose attitude has been formed by direct experience with the behaviour (Fazio & Zanna, 1978a). Direct experience creates an attitude that is more clearly, confidently, and stably maintained that an attitude formed through indirect means (Regan et al., 1977).

Direct experience has also been shown to affect an individual's sense of confidence in being able to engage in the behaviour and the number of reasons they have to engage in the behaviour, thus leading to stronger attitude-behaviour consistency (Fazio et al., 1978a; Fazio & Zanna, 1978b). Direct experience allows an individual to form a stronger attitude towards a behaviour by not only gathering information about the behaviour, but also determining their ability to engage in that behaviour (Fazio et al., 1978b).

Within the population of pregnant smokers, most report an intention to quit smoking during their pregnancy and to stay quit postpartum. However, previous research has shown that very few are actually able to maintain abstinence from smoking (Gaffney & Henry, 2007; Severson et al., 1997). One possible differentiating factor in maintaining abstinence may be the level of experience an individual has with both previous attempts to quit and with previous pregnancies. An individual who has attempted to quit smoking before will be more aware of things that may have helped her to stay quit as well as barriers (e.g. withdrawal experience,

situations that lead to temptation to smoke) that are most relevant to her. Similarly, a woman who has experience with pregnancy and parenting will be more aware of her ability to quit or attempt to stay quit during pregnancy and the experience of bringing home a newborn. Differences with level of direct experience need to be examined in the context of their relationship with intentions to quit smoking with future intentions and smoking behaviour. Following this line of research, it may be assumed that women who have previous direct experience with quitting smoking and with pregnancy and childrearing would show better attitude-behaviour consistency than those who have not previously attempted to quit.

The Reasons Model

More generally, the thoughts and reasoning about smoking behaviour are other factors that have not been a significant focus within the literature on pregnant smokers. The Reasons Model is a model of health behaviour change that emerged from a narrative psychology perspective and suggests that individuals base behavioral decisions on their constructive narratives (Meichenbaum & Fong, 1993). These narratives help them to create attributions for engaging in certain behaviours, and allow them to both explain past behaviour, and justify future behavioural intentions. According to the Reasons Model, in order to understand and predict an individual's decision about whether or not to engage in a health behaviour (i.e. smoking), one must first understand their reasons both for and against engaging in that behaviour (Rempel & Fong, 2005). The Reasons Model further understands these reasons within the context of a hierarchy of categories or levels within which each reason is classified. This is different from previous approaches to health behaviour in which the focus is more on the individual and not their reasoning, such as the stages of change model (Prochaska & Diclemente, 1983). Based on qualitative research in health behaviour areas such as smoking,

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exercise, and safer sex, Meichenbaum and Fong (1993) developed the model which hierarchically organizes reasons into three levels. Rempel and Fong (2005) also provided empirical evidence for the hypothesis that the Reasons Model is predictive of intentions to engage in a health behaviour (i.e. breastfeeding).

The Reasons Model is a model of health behaviour change that focuses on both reasons for and against engaging in a healthy behaviour. In terms of quitting smoking during pregnancy, previous literature has identified a number of reasons both for and against quitting smoking. Reasons cited for continued abstinence during pregnancy and the postpartum period have included health of the baby, confidence in ability to quit, encouragement from important others, nausea, and own health (Gaffney et al., 2007; Mullen, Pollak, & Kok, 1999). During the postpartum period, Gaffney and Henry (2007) identified health of child, self, and family members, and breastfeeding as reasons to remain abstinent. Mullen et al. (1999) found that self-efficacy was the strongest predictor of ability to remain quit up to three months postpartum, and that reasons that were stable and internal were most predictive of sustained abstinence from smoking. Bottorff, Johnson, Irwin and Ratner (2000) conducted in-depth qualitative interviews with mothers who had relapsed during the postpartum period and identified themes relating to relapse back to smoking. These included never really quitting (e.g. being a "social smoker"), smoking as stress management, nostalgia for former life, vulnerability to smoking due to other smokers around and to addiction, and unsuccessfully attempting to be an occasional smoker (e.g. just having a "puff" now and then). However, the Reasons Model goes beyond simply identifying these reasons and organizes them into three levels based on how relevant or important the reasons are to the individual, with the personal relevance of the reason increasing from Level I to Level III.

Level I consists of evidence-based reasons for and against a healthy behaviour. In this first level, reasoning is based on information derived from a variety of sources such as health care professionals, family members, friends, and personal experience. Decisions in Level I may be based on personal experience, but also rely on the experiences and reasoning of others. For example, a woman may believe it is important to quit smoking as her doctor told her smoking is unhealthy for her baby. During the postpartum period, keeping nicotine out of breastmilk may be another Level I reason to quit smoking. On the opposite side, a pregnant smoker may dispute the evidence that smoking increases the likelihood of miscarriage by providing anecdotal accounts of friends and relatives who smoked and never had a miscarriage. After the baby is born, a belief that an infant cannot be harmed if her mother smokes outside may be a Level I reason against quitting. Level I reasons derive from logical rationalizations that, while possibly incorrect, are based on concrete evidence about the health behaviour in general.

In contrast, Level II reasons are self-consequential reasons, and relate to the specific consequences on the individual when engaging in an unhealthy behaviour. Reasoning at this level may consist of thoughts such as a cost-benefit analysis: thoughts about both barriers and about aids to quitting smoking. Consider once again the example of the pregnant smoker who is deciding whether or not to quit. Level II reasons for quitting may include a belief that it is easier to quit during pregnancy because her body is more rejecting of cigarettes (e.g. nausea, aversion to smells). After the baby is born, a new mother may believe she will not have time to have a smoke and that will make it easier to quit. Level II reasoning against quitting during pregnancy and the postpartum may include a belief that she is addicted and is not capable of quitting, or that she needs to smoke to handle stress. At this level, individuals are focusing

more on the effect engaging in a healthy behaviour will have on them personally. Level II reasons, then, differ from Level I in being less related to evidence or perceived "facts" for engaging in a behaviour, and more related to what the experience will be like for that individual to attempt quitting.

Finally, at Level III, reasons are affective, schema-related reasons and focus on the meaning that a behaviour has to that person. These reasons are based on core values and emotional reactions surrounding the health behaviour, and often express the ways a behaviour reflects how an individual sees themselves. Women may be motivated to quit smoking as the health of their child is important to them and they consider themselves strong-willed and capable of quitting. Conversely, a pregnant woman may see herself as a follower who just smokes because others do, or may see smoking as a reminder of who she was before becoming a mother. Level III reasons reflect how an individual sees herself and how the healthy behaviour fits with who she is. Level III reasons are different from Level I and Level II reasons in that they can be based on rational thought or past experience, but are also more in keeping with how an individual's core values and beliefs guide their behaviour.

The Reasons Model has the potential to not only predict who is most at risk for relapse, but also to provide an understanding of each individual's risk factors for relapse. Smoking cessation interventions with pregnant women have been largely unsuccessful in maintaining positive changes in smoking behaviour. These interventions tend to focus almost entirely on the negative health effects of smoking and ways around barriers to quitting (Level I and Level II), and rarely address the personal consequences and emotions surrounding smoking in pregnant women. Research has shown that pregnant women are aware of the dangers of smoking during pregnancy, and want to quit smoking, yet continue to struggle to

quit (Haslam et al., 2001). According to the Reasons Model, an intervention that does not address all levels of reasoning for and against engaging in a healthy behaviour would not be expected to change intentions or behaviour. Further, as indicated earlier, current literature focuses on the types of women who smoke while pregnant (based on stage or readiness and demographic variables), while the Reasons Model suggests a focus on the types of reasoning involved in the decision to smoke while pregnant. The Reasons Model presents a more comprehensive understanding of the individual's ability to successfully engage in a healthy behaviour by eliciting reasons for and against a behaviour as opposed to a more global definition of the individual. Moreover since it focuses on cognitions (which are amenable to change) rather than on demographic variables (which are difficult to change) the Reasons Model can be used in developing targeted interventions.

Previous research with the Reasons Model has shown that individuals endorse reasons for and against a health behaviour, and that these reasons are successful predictors of intentions to carry out that health behaviour (Rempel, 2000). It is thought that the Reasons Model can be a useful tool in better understanding motivations that drive pregnant women to either spontaneously quit smoking and stay quit postpartum, as well as identifying risk factors unique to this population. That is, identifying the reasons that prevent someone from quitting despite their knowledge of the negative health effects and their intentions to quit. An understanding of the motivations for and against quitting allows better prediction of who is most at risk for relapse, and thus provides a basis for creating more successful interventions.

Of note, many of the reasons cited in the literature by pregnant women as reasons to quit are specific to being pregnant (e.g. risk of miscarriage, baby has no choice when inside me, easier to quit during pregnancy due to nausea). It follows that women whose motivation to

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quit smoking is based largely on these reasons would then likely have little motivation to continue engaging in the healthy behaviour of quitting after their baby is born. This loss of motivation may be related to the high risk of relapse for women during the postpartum period (McBride et al., 1999), in stark contrast to the high success rates of the general smoking population after nine months of quitting. The Reasons Model can provide a useful assessment of reasons for and against smoking as a means of predicting who is most at risk for relapse. For example, identifying women whose main reasons for quitting smoking are related to pregnancy may indicate these women are most at risk for relapse after the baby is born.

Relationships Among the Levels of the Reasons Model

Level I reasons are evidence-based and relate to how the behavioural decision is perceived and implemented by people in general. Level II reasons focus more on the direct effects a behaviour has on the individual and past experience with the behaviour, while Level III reasons are based on how the behaviour is or is not connected with an individual's self-concept.

However, these levels are not completely mutually exclusive categories, and particularly for Levels II and III, can overlap with one another. In this situation, the content of the reasoning may be similar, but the implications of the behaviour are different for each level. The distinction between the levels lies, not in the content, but in how significant the reason is for that individual. For example, consider the pregnant woman who does not believe she can quit. A Level III perspective might be that she sees herself as having an addictive personality, and that being addicted to cigarettes is just part of her identity. A Level II perspective might be that she believes she is addicted to cigarettes and that the physical side effects of withdrawal make it too difficult to quit.

Each level of reasoning differs in its level of self-relevance and importance to the individual, with increasing significance to the individual at each level. Further, while reasons at Levels I and II are at least somewhat empirically based, Level III reasons are not. Therefore, health decisions based on reasons at Level I may be fairly easy to change, but change becomes increasingly difficult for reasons at Levels II and III. The Reasons Model therefore, provides useful information in predicting relapse and guiding interventions tailored to the each individual. Those with stronger endorsements of Level II and III reasons to engage in a healthy behaviour would be more likely to do so than those with stronger endorsements of Level I reasons. Following the example above, an individual who believes she is addicted to cigarettes, but does not believe she has an addictive personality would be hypothesized to be more responsive to an intervention to quit smoking than would someone who also believes she has an addictive personality. Since overlap exists in the content of the reasons at the different levels, it is predicted that the reasons at the different levels will be somewhat correlated. As has been found with previous research (Rempel et al., 2005), it is hypothesized that these correlations are due to causal relationships between the reasons levels. According to the Reasons Model, personal beliefs and values (Level III) regarding smoking serve to strengthen an individual's view of evidence (Level I) and believed personal consequences of engaging in the behaviour (Level II). In their study with breastfeeding, consistent with the Reasons Model, Rempel and Fong (2005) found that Level III reasons for and against breastfeeding were predictive of Level I and Level II reasons, and that the reverse path of Level I and Level II reasons predicting Level III reasons was not significant.

According to the Reasons Model, it is necessary to elicit both reasons for and reasons against engaging in a healthy behaviour on the premise that individuals consider the pros and

cons of a behaviour before making a decision. The important distinctions lie in the strength of their endorsements of these pro and con reasons. Rempel and Fong (2000) found weak correlations between pro and con reasons for breastfeeding (ranging from –0.19 to 0.16), and that both pro and con reasons were significant predictors of intentions to breastfeed. This study provided empirical support to justify identifying both pro and con reasons for engaging in a health behaviour, and for considering them as separate predictors of intentions to engage in a health behaviour.

Reasons Model and Level of Experience

The Reasons Model suggests that many reasons are largely influenced by an individual's experience with the health behaviour. Previous research with the Reasons Model has shown that Level I reasons are more predictive of behaviour prior to actual experience, and Level II reasons are more predictive of intentions after the individual has had experience with the behaviour (Rempel et al., 2005). Recall that Level II reasons for engaging in a behaviour are largely derived from personal experience and from personal aids and barriers to quitting. Thus, it is expected that Level II reasons in particular will be affected by level of experience in two ways. First, Level II reasons will likely be different between primagravida mothers (those giving birth for the first time) and multigravida mothers (those who have already given birth). Secondly, since they are experiencing quitting during pregnancy for the first time, ratings of Level II reasons are expected to change for primagravida mothers in particular as their reasons are measured across the pregnancy and postpartum time periods. Level I reasons, which are largely based on factual information or the reported experiences of others, are predicted to become less relevant to reported intentions regarding smoking behaviour as level of experience with the behaviour increases. However, based on previous

research with the Reasons Model (Rempel et al., 2005), Level III reasons are hypothesized to be least affected by experience, and are expected to remain fairly constant across time periods for all participants.

While the Reasons Model has the potential to make a unique contribution to health behaviour change research, empirical support for the model has not been extensive at this point. Further, tests of health behaviour change with pregnant smokers have largely focused on the Stages of Change Model (Prochaska et al., 1983). In order to further examine the role of Reasons Model it is also important to consider a second, more empirically established model of health behaviour change that also focuses on how an individual thinks about and experiences a health behaviour they are attempting to maintain or begin.

Self-Determination Theory

Self-Determination Theory (SDT) is a motivational theory which looks at the sources of motivation towards engaging in a healthy behaviour (Ryan & Deci, 2000). SDT makes distinctions among different kinds of motivation and specifies how they are linked to behaviour.

An autonomously motivated behaviour is one in which the individual feels that they want to engage in the behaviour and that they are doing it for themselves. In contrast, a controlled motivation behaviour is one that is done for the sake of others or because of pressure from others to engage in the behaviour. Individuals can have both autonomous and controlled motivation to engage in a behaviour. For example, a pregnant woman may choose to quit smoking both because she believes it is what is best for her health (autonomous motivation), but may also do so as she receives a great deal of external pressure from her physician or partner to quit (controlled motivation). However, according to SDT, quit attempts

are more likely to be successful in the long-term if they are driven by autonomous motivation (Ryan et al., 2000). Considering the example given above, a woman's choice to reduce her smoking behaviour as she wants to take responsibility for her own health is likely to drive her behaviour over the long-term, while motivation to quit smoking because of pressure from others will only last as long as the pressure continues to be applied. Indeed, many pregnant women receive messages to quit during their pregnancy for the health of their baby, but this message is typically only given as long as they are pregnant. Research looking at the types of motivation that best predicted sustained abstinence at eight weeks and six months postpartum found that quitters were more likely to endorse intrinsic versus extrinsic motivation than were those who relapsed (Curry, McBride, Grothaus, Lando, & Pirie, 2001).

Related to this hypothesis, interventions are most likely to be successful when important others (e.g. romantic partner) help to create an autonomy-supportive environment. In the context of smoking, an important or significant other can best help someone to quit smoking by helping them to find their own motivations for quitting and allowing them to make their own decisions surrounding quit behaviours. Along the same lines, the concept of relatedness within SDT indicates that an individual who feels connected to their partner and feels that their partner is generally supportive of them is more likely to be able to strive towards making positive changes than is someone whose partner is not perceived as being generally supportive (e.g. is seen as demanding, controlling, distant).

Perceived competence is the third need that SDT views as essential to the adoption of healthy behaviours. Simply stated, an individual will be more likely to engage in a behaviour if she feels capable of doing so. Consistent with SDT, previous research with pregnant smokers has found that those who felt more confident in their ability to quit and had a sense of

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self-efficacy were more likely to be able to maintain abstinence than those who did not feel confident or self-efficacious (Mullen et al., 1997; Mullen et al., 1999; Gaffney et al., 2007; Ershoff et al., 1999).

SDT has been used as a model of health behaviour change. For example, it has been applied to a wide variety of healthy behaviour interventions such as treatment adherence (Zeldman, Ryan, & Fiscella, 2004), exercising (Wilson, Longley, Muon, Rodgers, & Murray, 2006), weight loss (Williams, McGregor, Zeldman, Freedman, & Deci, 2004), and smoking (Williams et al., 2002; Williams et al., 2006). Typically, SDT has looked at intervention efforts that attempt to determine whether an autonomously-supportive intervention is more successful at increasing self-reports of autonomous motivation and healthy behaviour change. Research in which SDT has been applied to smoking cessation has found that anti-smoking presentations using an autonomy-supportive style did result in increased reports of autonomous motivation to quit among adolescent audiences, and that this was also related to a short-term decrease in the frequency and intensity of smoking (Williams, Cox, Hedberg, & Deci, 2000). An intervention study of family physician approaches to smoking cessation found that patients who received an autonomy supportive approach to cessation counseling were more likely to report feeling autonomously motivated to quit smoking than were those who received a controlling approach. Further, both autonomous motivation to quit smoking and perceived competence were found to be independent predictors of continuous abstinence (Williams, Gagné, Ryan, & Deci, 2002).

In summary, according to SDT, health behaviour change is most likely to occur (and to last) when someone feels competent in their ability to carry out the behaviour, is autonomously motivated to engage in the behaviour and has important others in their life who

help create an autonomy-supportive environment. Individuals are also more likely to report greater competence to engage in a behaviour if they were also autonomously motivated (Williams & Deci, 1996). Considering the example of a woman who would like to quit during her pregnancy, she is more likely to be able to do so if she feels competent in her ability to quit, is autonomously motivated to quit (e.g. would like to do so as *she* feels it is an important thing to do), and has a partner who supports her decision to quit as opposed to forcing her to quit (e.g. hiding her cigarettes, making her feel guilty about smoking during pregnancy). Though not emphasized in the health behaviour literature, it is also possible that feeling a sense of security or relatedness with an important other (e.g. romantic partner) may help individuals to internalize motivations to engage in healthy behaviours (Ryan et al., 2000).

Self-Determination Theory and Level of Experience

As with the Reasons Model, it is important to consider whether those with previous experience both with attempts to quit or reduce their smoking behaviour and with childrearing respond differently to measures of motivation, partner support, and perceived competence than those with no prior experience. Consistent with attitude-behaviour consistency research (Fazio et al., 1978b) it is likely that individuals with previous experience will be more accurate in determining their level of competence to quit or stay quit, and thus those with previous experience may show better consistency between their reported perceived competence and their actual behaviour than those who have never attempted to quit smoking or been pregnant before. Further, individuals with direct experience with a health behaviour may be less influenced by pressure from others, which may affect the influence of controlled motivation on their behaviour. For example, a pregnant smoker who is being told to quit by her physician may be less likely to listen to that advice if she has previously given birth to

healthy children despite smoking during pregnancy. In contrast, someone who is pregnant for the first time may be more likely to heed the suggestions from others, as they have no direct experience to contradict this source of information.

Comparing and Contrasting the Reasons Model and Self-Determination Theory

The Reasons Model focuses on the role reasons for and against will play in guiding intentions to engage in a healthy behaviour while SDT focuses instead on the behaviour and on level of motivation, perceived competence, and support from others. However, there are a number of similarities between the two models in terms of their approach to predicting health behaviour change. Both Reasons Model and SDT look at the perceptions and beliefs an individual has about a health behaviour and their ability to adopt that behaviour. For this reason, both theoretical models have the potential to help better understanding and predict smoking behaviour among pregnant women. The similarities between these models suggests a need to explore whether the two models capture different aspects of behaviour change or whether there is some overlap between the two. As such, in the present study, both models have been examined individually to test hypotheses regarding their ability to predict intentions to quit and smoking behaviour. However, the two theoretical models do differ in terms of their organization of an individual's cognitions surrounding a healthy behaviour. As well, SDT tends to focus more explicitly on the environment in which an individual is attempting to make a healthy behaviour change (e.g. examining the type of support from others), while Reasons Model tends to incorporate these factors into the levels of either pro or con reasons. Reasons Model also differs from SDT in assessing the barriers to engaging in a health behaviour as a separate construct as opposed to SDT, which focuses more on the type and extent of the aids an individual has aids to engage in a behaviour. For this reason,

relationships between the models were explored to determine whether they complement one

another in determining relapse risk and appropriate interventions.

OVERVIEW

The purpose of the present study was to identify and measure the psychological factors that predict smoking cessation intentions and behaviours among pregnant women, during pregnancy and the postpartum period, who are either currently smoking or have recently quit. Pregnant smokers (N= 56) were asked to complete a series of questionnaires designed to access their reasoning at the three levels outlined by the Reasons Model and their feelings of autonomy and competence, and partner support in quitting smoking as indicated by Self-Determination Theory. Participants were also asked to complete a number of other questionnaires to assess other factors potentially related to smoking behaviour. The questionnaire package included measures from both the Reasons Model and Self-Determination Theory, as well as behavioural reports of behaviours, attitudes, and mood. Participants were asked to complete a short semi-structured interview after completing the questionnaire package in order to provide information about their experiences not covered by the questionnaires. Participants were then re-contacted twice after their baby was born, at approximately two months and four months postpartum. At both times, participants were asked to again complete the questionnaire package and a short semi-structured interview. Their responses were then used to assess the efficacy of the Reasons Model and Self-Determination Theory in predicting smoking behaviour and intentions.

Hypotheses

The present study was designed to examine the Reasons Model and Self-Determination Theory in the context of smoking in women in pregnancy and during the postpartum period. Both models of health behaviour change aim to predict an individual's ability to engage in a health behaviour by focusing on their cognitions surrounding the behaviour. The Reasons model measures levels of reasoning for and against engaging in a behaviour and uses these reasons to make predictions about intentions to engage in a health behavior, while Self-Determination Theory makes predictions about the actual health behavior based on reported levels of autonomous and controlled motivation, perceived competence, and the presence of an autonomously-supportive environment. Accordingly, different outcome measures were associated with the tests of the two models. Hypotheses are set out according to the model they are associated with. An examination of the relationship between Reasons Model and Self-Determination Theory was undertaken in order to determine whether the two models of health behaviour can be integrated in a manner that allows one to complement the explanatory power of the other.

1. Consistent with previous research with pregnant smokers, Poor mother-infant bonding, high perceived level of stress, high levels of depression and anxiety, and a partner who smokes were predicted to all have a negative effect on both intentions to quit and quit behaviour.

2. Participants who report receiving advice not to quit smoking will be more likely to continue smoking than those who receive advice to quit.

3. Reasons Model: It was predicted that all three levels of reasons would predict current and future intentions to quit smoking. Reasons were used to predict intentions measured at the same interview and intentions measured at subsequent interview(s).

4. Reasons Model: As has been found with past work (Rempel, 1999), Level III reasons (core values and beliefs) were hypothesized to be predictive of Level II (barriers and aids relevant to personal experience) and Level I (evidence-based) reasons.

5. Reasons Model: The effect of experience was predicted to impact participants' reported reasons for and against engaging in quitting behaviour. While Level III reasons were predicted to be largely independent of experience effects, experience was predicted to change ratings of Level I and Level II reasons. Level I and Level II reasons were also expected to remain stable for participants with a history of previous pregnancies (multigravida) and quit attempts. However, for those with no previous pregnancies (primagravida) and few or no quit attempts, Level I reasons were predicted to have more impact at T1 (prenatal interview) and Level II reasons are predicted to have more impact at times two (T2) and three (T3) (postpartum interviews). In summary, personal experience with quit attempts, pregnancy and childrearing was expected to decrease the impact of factual reasons (Level I) at T1 and increase the impact of barriers or motivators to quitting (Level II) at T2.

6. Reasons Model: Based on previous analyses (Rempel et al., 2005), reasons for and against quitting were predicted to be relatively independent of one another at all levels and will have independent predictive effects on intentions and behaviour.

7. Self-Determination Theory: Autonomous motivation to quit or stay quit was hypothesized to be more predictive of reductions in smoking behaviour than was controlled motivation to quit.

8. Self-Determination Theory: Levels of autonomous support from romantic partners to quit smoking and general autonomous support from a partner were predicted to have a greater association with a reduction in smoking behaviour than controlled levels of support both to quit smoking and in general.

9. Self-Determination Theory: Participants who report low levels of competence in their ability to quit smoking were expected to be less likely to maintain or achieve quit status during the postpartum period. Further, participants' reported level of competence was expected to be altered by experience such that primagravida participants would have lower levels of perceived competence to quit smoking after the baby is born, while levels of competence were not expected to change for multigravida participants.

METHOD

Materials

All previously unpublished or altered materials used for this study can be found in the Appendices A through I. Table 1 presents reliability estimates for the scales.

Reasons Model Questionnaires:

Smoking Reasons Questionnaires (SRQ): The SRQ questionnaires were developed based on reasons for and against smoking during the post-partum period. These reasons were elicited prior to the study by means of qualitative interviews conducted in a pilot study of 35 pregnant women who were either currently smoking or had quit due to their pregnancy. Questionnaire items were also generated based on reasons reported in the literature for smoking or quitting during pregnancy and postpartum. Reasons from all three levels of the Reasons Model were included; general evidence-based Level I; more specific self-consequential Level II; and affective, schema-based Level III. Items were worded for clarity and to meet the literacy level of approximately a Grade 8 level. Three independent raters were provided with a description of the three levels of reasons and asked to place each item into one of the three levels. Items that were not unanimously placed into one the three levels were either discarded or re-worded. Those items that were relevant during pregnancy only were not included in the questionnaires during the postpartum sessions.

Table 1

Reliability estimates of self-report questionnaires

Questionnaire	Cronbach's Alpha
SRQQ (Reasons for quitting – Reasons Model)	.92
SRQS (Reasons against quitting – Reasons Model)	.82
TSRQ (Autonomous motivation to quit smoking – SDT)	.84
PSRQ (Autonomous motivation not to smoke – SDT)	.88
PCS (Perceived competence scale – SDT)	.92
HCCQ (Support from partner to quit smoking – SDT)	.87
BNS (Basic needs satisfaction from partner - SDT)	.86
PSS (Perceived Stress Scale)	.85
EPDS (Edinburgh Postnatal Depression Scale)	.84
SNS (Social norms scale)	.72
MPAS (Maternal Postnatal Attachment Scale)	.68

Note: All data were collected from the session during pregnancy (N= 56) except the MPAS scale which was collected at T2, the first post-pregnancy session (N=36)

Note: data from T2 and T3 produced similar reliability estimates

The prenatal SRQ-Quitting Questionnaire contains 29 reasons for quitting or staying quit after the baby is born, and the postpartum SRQ-Quitting Questionnaire contains 21 items, with each item coded as either a Level I, II, or III reason for quitting. The prenatal SRQ-Smoking Questionnaire contains 28 reasons for not quitting while the postpartum SRQ-Smoking contains 23 items, with each item coded as either a Level I, II, or III reason against quitting. Participants were asked to rate the importance of each reason on a scale of 1 (not at all true) to 7 (very true). Average responses for each of the levels (for both reasons for and against quitting) were computed by adding together all of the items within a particular level and dividing by the number of items. The SRQ-Quitting Questionnaire was used to create three the independent variables of Level I reasons for quitting, Level II reasons for quitting, and Level III reasons for quitting by summing and averaging responses.

Self-Determination Theory Questionnaires:

The questionnaires used to measure variables for SDT that were not altered for the current study have well-established reliability and validity (Deci & Ryan, 2008).

Treatment Self-Regulation Questionnaire - Smoking (TSRQ-Smoking): The TSRQ-Smoking Questionnaire (Williams, Gagne, Ryan, & Deci, 2002) contains 15 items which ask participants why they would like to stop smoking, and assesses either their autonomous or controlled motivation to do so using a 7-point scale ('not at all true' to 'very true'). Averaged scores of controlled and autonomous motivation were used in the analyses for the current study as indicated by Deci and Ryan (2008).

Perceived Self-Regulation Questionnaire – Quitting (PSRQ-Quitting): The PSRQ-Quitting was adapted from the TSRQ-Smoking Questionnaire to specifically address autonomous and controlled motivation to quit smoking in relation to motherhood. Items were added to this questionnaire to specifically reflect quitting in relation to being a mother. The questionnaire contains 18 items using a 7-point scale. Averaged scores of controlled and autonomous motivation were used in the analyses for the current study.

Perceived Competence Scale - Not Smoking (PCS-Not Smoking): Also developed based on SDT, this 4-item questionnaire assessed participants' feelings of competence for quitting smoking using a 7-point scale from 'not at all true' to 'very true' (Williams, Gagne, Ryan, & Deci, 2002). An averaged score of perceived competence was used in the analyses.

Health Care Climate Questionnaire - Not Smoking (HCCQ-Not Smoking) The HCCQ-Not Smoking questionnaire (Williams, Gagne, Ryan, & Deci, 1999) is a 6-item questionnaire designed to assess the degree to which the participant felt that their partner support to quit smoking is autonomous versus controlling. Participants without current partners did not complete this questionnaire. The HCCQ-Not Smoking uses a 7-point scale ranging from 'not at all true' to 'very true'. Averaged scores of controlled and autonomous support were used in the analyses for the current study.

Basic Need Satisfaction in Relationships (BNSR): This 9-item questionnaire was used to assess the nature of participants' relationships with their romantic partner. If a participant was not currently involved in a romantic relationship, the questionnaire was omitted. The BNSR (La Guardia, Ryan, Couchman, & Deci, 2000) uses a 7-point scale. An averaged score of basic needs satisfaction was used for analyses.

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Questionnaires to Assess Stress, Depression, Social Support and Maternal Bonding:

Prenatal Questionnaire and Postpartum Questionnaire: These questionnaires were designed to elicit demographic information including smoking behaviour and intentions, history of previous pregnancies, and barriers and aids to quitting smoking. The dependent variable of smoking behaviour was drawn from this questionnaire using the item which asked participants to estimate their weekly average of cigarettes smoked. All other data discussed in the results section was described using percentages of participants who endorsed the items (e.g. percentage of participants reporting that stress was a barrier to quitting smoking).

Perceived Stress Scale (PSS): This scale was included to assess the role of stress in smoking behaviour using a 5-point scale. The PSS (Cohen, Kamarck, & Mermelstein, 1983) is a 14-item measure of stress that has been used in a great number of health-related studies. The PSS has been widely used in health research and has been established as a valid and reliable measure. A variable of perceived stress was created by averaging a participant's response on the items.

The Edinburgh Postnatal Depression Scale (EPDS): The EPDS (Cox, Holden, & Sagovsky, 1987) has been well-established as a valid screening tool for post-partum depression in many different populations, and has also been successfully used to assess depression prenatally. Participants were asked to complete this 10-item scale at all three sessions using a 4-point scale from 0 (symptom of depression not endorsed) to 3 (symptom of depression strongly endorsed). A score above 10 is considered an indicator of a significant level of depression. An averaged score is obtained as an overall indicator of postpartum depression.

Social Norms Scale (SNS): This scale was created by Rempel (2004) and measures the degree to which important others (e.g. partner, family, friends, physician) encourage participants to quit, and how important they are to the participant. Encouragement to quit from each important other and participants' importance ratings of these opinions were measured on 5-point scales from 1 (low level of support) to 5 (high level of support).

Maternal Postnatal Attachment Scale (MPAS): This is a 19-item scale (Condon & Corkindale, 1998) that was designed to assess the mother-infant relationship based on factors of quality of attachment, absence of hostility, and pleasure in interaction. This scale uses a 5-point scale from 1 (low attachment) to 5 (high attachment). The MPAS was only administered to participants during the postpartum sessions. A summed score of mother – infant attachment was calculated using the method outlined in Condon and Corkindale (1998).

Semi-Structured Interviews

Participants were asked to complete a brief semi-structured interview as a means of collecting more detailed information or additional information not accessed through the questionnaires. The interviews can be found in Appendices H and I. The interviews were conducted one-on-one either in person or over the phone, and responses were written down. The information collected from these interviews was informally analyzed to determine any themes in responses as well as to provide a context for some of the questionnaire responses. No formal qualitative analyses were performed on the responses to this interview. The dependent variable of intent to quit was drawn from the interview question 'What are your plans for smoking?' Responses were coded into one of three categories (quit; cut back; continue to smoke at same rate) by two independent raters.

Recruitment of Participants

Participants were all women who were currently pregnant, and reported being either current smokers or having recently quit due to their pregnancy. Participants in this study were recruited from four program sites that were aimed at high needs, low income pregnant women. Three of these sites were established as prenatal nutrition programs which women attended on a weekly basis. Women were able to start this program at any time during their pregnancy, and stopped attending only after the birth of their baby. A fourth site was a residence and school program for pregnant teenagers. Participants were recruited monthly at each site by a research assistant affiliated with the study. At all sites, potential participants were asked to complete a contact information form, indicating whether or not they were interested in learning more about the study. Those who indicated an interest in the study were then contacted by telephone to be recruited and to schedule their first session.

Recruitment was to continue until 100 women had completed the study. However, recruitment of participants was a much more difficult problem than originally anticipated. Efforts to recruit participants continued for one year past the original end date of the study, and were expanded to a number of additional sites through posters, pamphlets, and an internet website. Unfortunately, no participants were recruited through these expanded methods. After three years of recruitment, a total of 105 individuals had indicated an interest in the study. Of that, only 56 were successfully re-contacted and eligible to complete the study. Further difficulties emerged as participants were often recruited in either their first or second trimester, and then they moved or changed address prior to being re-contacted during their third trimester to participate in the study. This mobility also occurred between the first and second session. To compensate for this difficulty, participants recruited later in the study were

asked to provide contact information for a friend or family member who would be willing to provide the research assistant with updated contact information. Despite these efforts, 20 participants were lost to follow-up prior to the second session, and another 10 participants were lost between the second and third session.

Participants were excluded if they either lost their child or did not plan to keep their child. This resulted in the exclusion of two participants as they did not plan to keep their child.

Study Procedure

The study involved three sessions (T1, T2, and T3) in which participants were asked to complete a series of questionnaires followed by a brief interview. Table 2 presents an outline of the questionnaires given at each session. The T1 session took place during the third trimester of their pregnancy, while the T2 and T3 sessions occurred at approximately two months and four months postpartum, respectively. Interviews were conducted either over the phone or in the current residence of the participant. Participants who were interviewed over the phone provided verbal consent and received the questionnaire package through the mail. Participants who were interviewed in their homes were asked to complete the questionnaires at that time. Each session took approximately 40 minutes to complete.

At the initial interview, participants' mailing address was obtained as well as contact information for a friend or family member should the participant move or change phone number. Participants were then mailed a letter six weeks after their due date to remind them that a research assistant would be calling to schedule the second session. Participants were given the option to call at this point to terminate their involvement in the study, though none

did. Participants were then re-contacted by telephone at eight weeks post-partum for the second session, and again at four months post-partum for the third session. All participants received a $20 gift certificate for each session they completed, and upon conclusion of participation, were given feedback information. Please see Appendices A-G for copies of all materials developed for this study including recruitment scripts, phone scripts, consent forms, the information letter, and the feedback letter.

Table 2

Questionnaire schedule

Questionnaire	T1 Third trimester of pregnancy	T2 Two months postpartum	T3 Four months postpartum
Smoking Reasons Questionnaires	X	X	X
Social Norms Scale	X		
Perceived Stress Scale	X	X	X
Trmt. Self-Regulation Questionnaire -Smoking	X	X	X
Perceived Competence Scale - Smoking	X	X	X
Health Care Climate Questionnaire -Smoking	X	X	X
Basic Needs Satisfaction in Relationships	X		X
Maternal Postnatal Attachment Scale		X	X
Edinburgh Postnatal Depression Scale	X	X	X
Prenatal Interview	X		
Postpartum Interview		X	X

RESULTS

Characteristics of Participants

Demographics: Participants were all females who were 16 years of age or older and at least 26 weeks pregnant. Please see Table 3 for a summary of participant characteristics. Despite their youth (M = 21.6 years), there was an almost even split between those who were primagravida (pregnant for the first time, 48%) and those who were multigravida (second pregnancy or more, 52%). Participants were either current smokers or had recently quit (i.e. as a result of their pregnancy). The majority of participants had been smoking for a number of years (M = 7.8), and all reported attempting to quit at least once prior to their pregnancy.

At T1 (pregnancy), only 14.3 % (8 of 56 participants) stated they had quit smoking completely. This percentage stayed relatively constant across the three time periods (12.5% were quit at T2 and 10.7 % at T3). When asked about their intentions to quit smoking after the baby was born, 42.9 % reported intending to quit, 42.9 % reported being unsure, and 14.3 % reported not intending to quit. When asked about their intentions for smoking behaviour after the baby was born, almost half of participants (48.2 %) reported planning to smoke outside as opposed to in the house. At T2 and T3, more than half of participants indicated an intention to quit or stay quit (64.8 % and 51.8 %, respectively), and the majority of smokers intended to smoke outside (75.0 % and 65.3 % respectively).

Participants were asked about the rate at which they smoked. At T1, all but one participant reported having actively attempted to cut back on the number of cigarettes they smoked from pre-pregnancy to pregnancy. At each session, participants were asked to

Table 3

Participant characteristics

Variable	N	M	SD	Range
Age	56	21.63	6.18	16 to 43 years
Number of weeks pregnant	56	31.04	5.39	26 to 40 weeks
Number of pregnancies	56	1.94	1.32	1 to 7 pregnancies
Age started smoking	56	13.80	2.54	7 to 20 years
Number of years as a smoker	56	7.84	6.51	1 to 34 years
Weekly average of cigarettes smoked prior to pregnancy among current smokers	56	107.11	57.67	5 to 200
Weekly average of cigarettes smoked at T1 among current smokers	48	56.52	36.26	2 to 175
Number of non-smokers at TI	8	-	-	-
Weekly average of cigarettes smoked at T2 among current smokers	31	60.58	39.63	1 to 150
Number of non-smokers at T2	5	-	-	-
Weekly average of cigarettes smoked at T3 among current smokers	19	63.00	28.31	20 to 126
Number of non-smokers at T3	6	-	-	-

report on their average daily, weekly, and monthly cigarette intake. Weekly average emerged as the most reliable indicator of smoking behaviour as participants often reported having difficulty specifying a daily average due to day to day fluctuations, and it appeared that many tended to simply multiply their weekly average to determine a monthly average. As can be seen in Table 3, there was a large decrease in the weekly average number of cigarettes smoked between pre-pregnancy and the time periods during and after pregnancy. The majority of women who continued to smoke during their pregnancy and postpartum drastically reduced their smoking rate. However, it was also noted that by the last time period (T3, four months postpartum), the minimum number of cigarettes smoked was 20 a week, up from a minimum of just 1 to 2 a week during pregnancy. This trend is suggestive of a return to pre-pregnancy smoking rates that is often seen with this population. Two variables (weekly average number of cigarettes smoked and intentions to quit) were selected as measures of the dependent variables of smoking behaviour and intention for the data collected during pregnancy.

As can be seen from Table 4, a high percentage of participants reported being in a current romantic relationship at T1, though fewer than half were living with their partner. As expected, the majority of participants in romantic relationships had partners who were current smokers. However, the percent of participants who reported being in a relationship decreased over sessions, and a closer examination of relationship status revealed considerable instability. Of those who completed at least two sessions of the study, 36 % reported a change in their relationship status at least once, and some reported a change each time they were interviewed. Over the course of their involvement with this study (across the third trimester and up to four months postpartum), over a third of participants reported stopping and starting the same relationship over the course of the study or ending one relationship and starting a new one.

This instability in relationships may in part be due to the large number of younger participants, as well as the fact that many were only in short-term dating relationships and still living with their parents when they became pregnant. Thus, attempts to determine the impact of partner support on smoking behaviour and intentions to quit were severely limited by the lack of stable relationships within this sample.

Table 4

Partner variables

	N	Have a current partner	Have a current partner and live with that partner	Have a current partner and that partner smokes
% of participants at T1	39	70%	42%	82%
% of participants at T2	27	48%	29%	81%
% of participants at T3	20	36%	21%	75%

Note: Percentages for last two columns are based on the number of participants who reported having a partner.

Barriers and Aids to Quitting or Reducing Smoking Behaviour: Participants were asked to indicate things that either hindered or helped their efforts to cut back or quit. At T1, the most commonly cited barriers to quitting were stress (57.1%), anger (42.9%), being around other smokers (37.5%), needing a break (35.7%), and at the end of a meal (35.7%). These barriers also emerged in comments made during the semi-structured interview. Participants reported experiencing a great deal of stress, and found that smoking cigarettes allowed them to get away from the stress and to calm down. Participants who lived with

smokers also commented that it was difficult and, for some, pointless to reduce their smoking behaviour when exposed to secondhand smoke.

Barriers to quitting at T2 were similar, with stress (41.1%), anger (28.6%), and exposure to others smoking (30.4%) continuing to be most commonly reported. Interview comments continued to focus on stress as a main reason for wanting to smoke. One participant reported "smoking was her break" and "only time away from my children", a reason that was endorsed by another participant who stated that she "would have less time to herself if she quit". These comments suggest that smoking provides them with a legitimate reason to take time for themselves that they would not do otherwise. Other participants identified stress related to infant crying as a reason for needing to smoke, stating "I need a cigarette when she is crying so I can calm down, "She's always crying and I can't block it out … I need a cigarette to cope", "I need to smoke when I have a mommy meltdown". Another participant simply stated she would "feel lost without a smoke".

At T1, the strongest reported aid to quitting smoking was thinking about their baby's health (51.8 %) as well as distraction (46.4 %), and removing cigarettes from view (21.4 %). Most participants indicated during the semi-structured interviews that they were aware of the dangers of smoking on their unborn child, and of the added responsibility as the baby is inside them and that the fetus cannot be protected from the harmful effects of smoking. Participants were somewhat divided when asked whether it would be harder or easier to quit after the baby was born. Some anticipated that they would be too busy to smoke while others thought it would be harder. One participant noted that it is easier to quit while pregnant as being pregnant "gives me a reason to quit".

When interviewed at T2, many participants commented that it was easier to quit after

the baby was born as they had no time to smoke, and thus distraction (33.9%) was the most commonly reported aid to quitting. However, some participants continued to smoke despite being busier, one stating that "I don't have any time … I don't know why I still smoke". Of note, the number who reported thinking about their baby's health as an aid to quitting fell from 51.0% at T1 to 26.8% at T2. Some of the women interviewed during the postpartum sessions were clearly concerned about the effects of secondhand smoke, and went to great efforts to prevent their children from being exposed (e.g. "I only smoke after the children are in bed", "I always wash my hands after smoking", "I have a shower after smoking before picking up my baby"), yet had been unable to quit completely. A participant with the intention to quit smoking commented that "not smoking at all means you are a better parent and you would have to take the baby outside with you even when it's cold … smoking just leads you to make poor parenting decisions". One participant who had quit smoking reported that her "turning point" had been when her older daughter commented that her blanket smelled of smoke.

Participants were also aware of the impact of modeling, and wanted to avoid smoking in front of their children to set a better example. Most felt that simply smoking outside was not as healthy as not smoking at all, reporting that their clothes and hair would continue to smell of smoke, but did see it as a significant decrease in risk to their child. One participant noted that she smoked outside as smoking in the same room as her baby "it would be the same as giving my baby a cigarette". Another participant commented that "quitting smoking after pregnancy will be more difficult as right now I don't want to hurt my baby, but I won't have that reason after pregnancy". This suggests that while their child's health was a powerful motivator to quit smoking during pregnancy, it was not as powerful during the postpartum

period because their perception that the risk of smoking to their child was much lower after birth. However, in contrast to this belief, there are a number of significant risks to an infant associated with smoking within the first two years of a child's life (e.g. SIDS, respiratory illness, nicotine transferred through breastmilk) that cannot clearly be seen as "less risky" than smoking during pregnancy (Samet et al., 1994). Participants identified some of these risks, yet had determined that the ability to physically remove oneself from their child decreases the risk to their infant, ideas that suggest the need for more explicit education regarding the ongoing health risks of environmental tobacco smoke.

During the pilot project in which the reasons were elicited for the Reasons Model Questionnaires, women commented that advice from their physician that had led them to continue smoking as opposed to quitting, as they received messages that quitting was actually *more harmful to their child than just cutting back.* This is an astonishing finding given the lack of evidence to suggest that this is the case. At the same time, participants in this pilot study often rated their physician's opinion as more important than their partner's or family's opinions. Because of this, participants for the study were asked to describe the kind of support and advice they received from their physicians.

Participant interviews revealed that at least a third of women were hearing messages from their health care providers such as "smoking is safe after the first trimester", "you have until the end of the first trimester to quit", "quitting completely is too stressful on the fetus", "cutting back is just as good as quitting", "don't quit completely as the baby is addicted to nicotine", and "you can quit at the beginning of your pregnancy but not at the middle or the end as the baby will go through withdrawal". While many participants reported that health care providers told them the risks of smoking during pregnancy, the majority of participants

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reported either being told to quit with no advice about how to quit or not being told anything at all.

Participants were asked to report what type of advice, if any, they had received from their physician regarding smoking during pregnancy using a checklist format as well as an interview question. It was disturbing to note that at T1 only 25.0% indicated that they were provided with information about the negative health effects of smoking, and only 14.3% were given strategies for quitting. However, of greater concern is the fact that 29.6% reported that no advice was given about their smoking behaviour, and 25.9% reported being told by their physician to *cut back but not quit*. While a literature search did not reveal any empirical evidence to suggest quitting is dangerous during pregnancy, women reported being told that the stress on the fetus due to nicotine withdrawal or more generally of attempting to quit smoking was worse than the negative effects of smoking, and that the baby was addicted to nicotine and would therefore go through withdrawal if they quit completely.

Comparison of Participants by Rate of Attrition: As there was a high rate of attrition between T1 and T2, comparisons were conducted to determine whether participants who completed at least two sessions of the study were different from those who dropped out after the first session. As can be seen in Table 5, no significant differences were found, suggesting that participants who completed the study are a representative sample of this population. Please see Figure 1 for a more detailed description of the rate of attrition. It should be noted that many of the analyses presented in the current study were hindered by the low sample size and high rate of attrition. A number of significant findings were evident despite the small sample size, however, the results should be interpreted cautiously and as an initial exploration of the hypotheses.

Table 5

Comparison of participant characteristics at T1 by level of participation

	Completed One Session Only	Completed Two or Three Sessions	Sig. test	p
	M(SD)	M(SD)		
	N=20	N=36		
Reasons for quitting	4.40 (.92)	4.44 (1.17)	t(54)=-0.14	0.89
Reasons against quitting	2.69 (1.02)	2.89 (.76)	t(54)= -0.87	0.39
Perceived competence to quit	3.47 (1.98)	3.99 (1.88)	t(50)= -0.92	0.36
Autonomous motivation to quit	4.42 (1.78)	4.59 (1.59)	t(53)=-0.37	0.71
Controlled motivation to quit	2.59 (.85)	3.16 (1.75)	t(53)= -1.38	0.17
Partner support to quit	4.76 (1.64)	4.37 (1.59)	t(38)= 0.73	0.47
Depression	10.41(6.34)	9.25 (3.04)	t(43)= 0.83	0.41
Stress	30.85 (7.42)	29.00 (6.13)	t(54)= 1.00	0.32
Weekly average of cigarettes smoked	47.85 (40.64)	48.78 (38.66)	t(54)= -0.09	0.95
% planning to quit smoking	10 (50%)	14 (38.9%)	$\chi2(1)$= 0.65	0.42
Age	20.35 (4.83)	22.36 (6.77)	t(54)= -1.71	0.25
Primagravida	12 (60%)	15 (41.7%)	$\chi2 (1)$= 1.73	0.19

	Smoke
Pre Natal N=56	56 (100%)

```
                              Smoke
                            56 (100%)
                    ┌───────────┴───────────┐
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	Quit	Smoke
Pregnancy N=56	8 (14%)	48 (86%)

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           Quit                              Smoke
          8 (14%)                           48 (86%)
      ┌─────┴─────┐                    ┌───────┴───────┐
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	Quit	Smoke	Quit	Smoke
Postnatal 1 N=36	4 (80%)	1 (20%)	3 (10%)	28 (90%)

	Quit	Smoke	Quit	Smoke	Quit	Smoke	Quit	Smoke
Postnatal 2 N=26	2 (50%)	2 (50%)	0 (0%)	1 (100%)	2 (100%)	0 (0%)	2 (11%)	17 (89%)
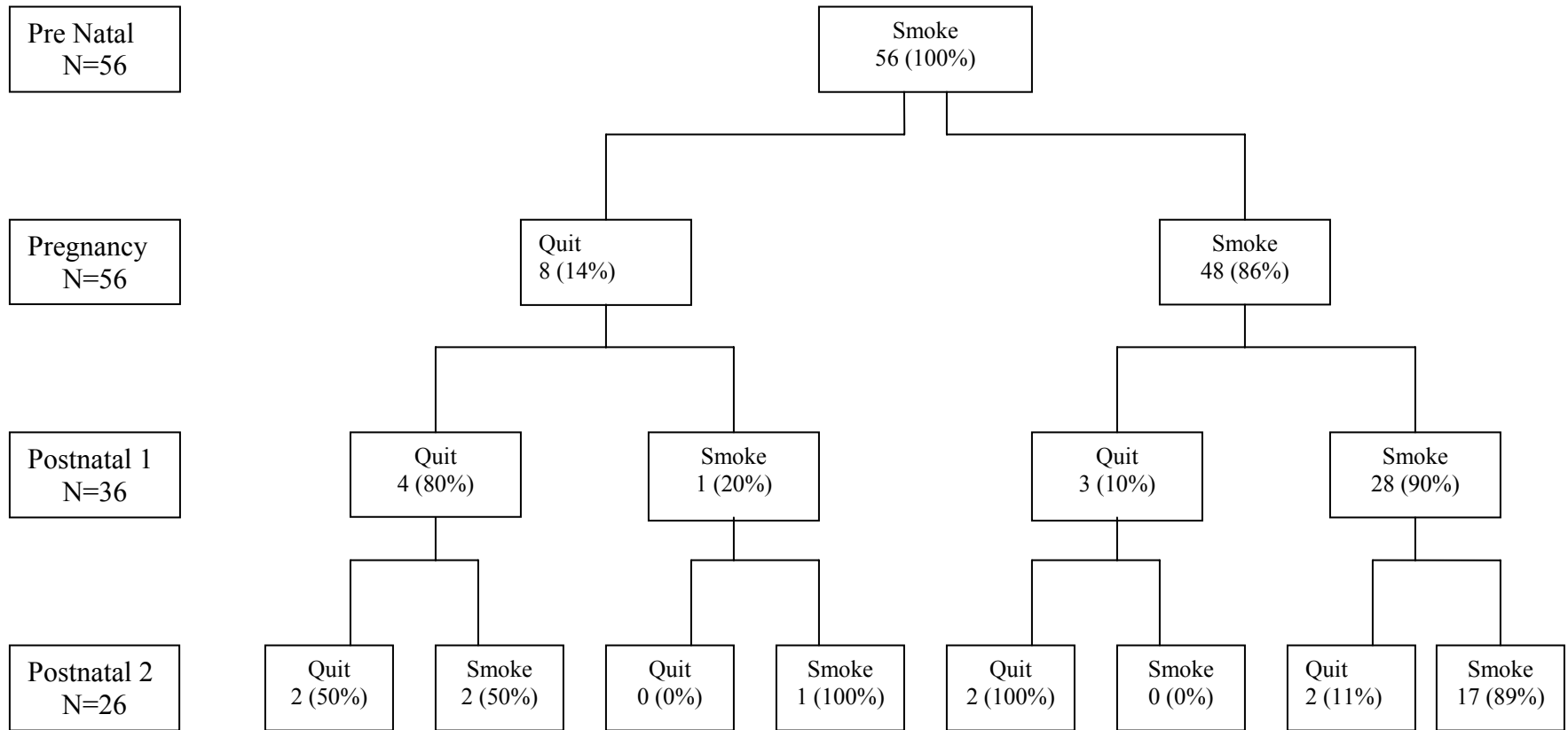
Figure 1. Rates of smoking status by level of participation in the study.

Note: Percentages represent the proportion of participants remaining with complete data from the cell above.

Role of Stress, Depression, Social Support, and Physician Advice on Intentions to Quit and

Smoking Behaviour

Previous studies of pregnant women have reported that high levels of stress and

depression and poor social support are associated with a higher probability of smoking and of

relapse to smoking during the postpartum period (Paarlberg et al., 1999). As such, these

variables were examined in relation to the smoking behaviour and smoking intention variables

in the current study. Depression was measured using the Edinburgh Postnatal Depression

Scale (EPDS), in which 10 is the cut-off score for depression. Stress was measured using the

PSS with higher scores indicating a higher level of stress (maximum score of 40). To measure

social support, participants were asked to rate both the level of support received from family,

friends, partner, and physician, as well as the importance of each in their decisions regarding

smoking behaviour. The physician advice variable has been described above.

It was hypothesized that higher levels of stress and depression would be related to

higher smoking rates and lower intentions to quit, while higher rates of social support and

physician advice to quit would indicate lower smoking rates and higher quit intentions.

However, as can be seen in Table 6, at T1, while there is a trend that supports this hypothesis,

none of these predictors were significantly related to quitting intentions. Further, none of the

variables were found to significantly correlate with smoking behaviour (see Table 7), though

stress and depression were significantly correlated with one another as were physician advice

to quit and social support to quit. Similar results were obtained at T2 and T3.

Table 6

Reported levels of stress, depression, social support, and physician advice by quitting

intentions at T1

	Intending to Quit N=24 M(SD)	Unsure of intentions N=24 M(SD)	Intending NOT to quit N=8 M(SD)	Sig. test	p
Depression	8.90 (3.51)	9.50 (4.48)	12.42 (6.63)	F(2,42)= 1.65	0.21
Stress	28.17 (6.00)	31.00 (5.43)	30.13 (10.71)	F(2.53)= 1.13	0.33
Social support to quit	3.01 (.86)	3.18 (.49)	2.57 (.50)	F(2,52)= 2.15	0.13
Importance of social support to quit	3.31 (1.33)	2.94 (1.20)	2.76 (.74)	F(2.52)= 0.80	0.46
Physician advice to quit	N=14 (58.3%)	N=9 (39.1%)	N=1(14.3%)	χ2(4)= 4.96	0.29

Table 7

Correlations of Smoking Behaviour with Stress, Depression, Social Support, and

Physician Support at T1

	Weekly average of cigarettes smoked	Depression	Stress	Social support to quit	Importance of social support to quit	Physician advice to quit
Weekly average of cigarettes smoked	1	0.21	0.03	-0.16	0.04	-0.10
Depression		1	0.46*	-0.16	-0.15	-0.18
Stress			1	0.01	-0.09	-0.11
Social support to quit				1	0.32*	0.29*
Importance of social support to quit					1	0.29*
Physician advice to quit						1

Note: *=p<.05

As can be seen in Table 6, participants reported feeling only somewhat supported by others (M= 3.03, SD =0.69) and that others' opinions were only somewhat important to them (M= 3.08, SD =1.21). This likely reflects the unstable nature of their current family, peer, and romantic relationships within this population. Participants were also likely to have partners, friends, and family members who smoked, and identified during interviews that a significant risk factor for smoking would be having to spend time with other smokers, suggesting that for some, being around family and friends was more likely to increase smoking behaviour.

The failure of stress and depression to predict smoking may, in part, be due to a restricted range effect as there was little variability in participant responses on these variables. Overall means at T1 for depression (M= 9.69, SD =4.53) and stress (M= 27.66, SD =6.61) indicate that participants in this sample were experiencing high levels of stress and depression relative to the general population. This is not surprising given that participants were drawn from low-income, high-needs populations. However, there was significant variability in smoking behaviour and intention within this sample, reinforcing the need to explore other factors that may be involved in health-behaviour decisions in this population.

Relationship of Stress and Depression to Reasons Model and Self-Determination Theory

While stress and depression levels were not significantly related to smoking behaviour and quit intentions, it is worthwhile considering their relationship with Reasons Model and Self-Determination Theory. No specific hypotheses were made regarding the relationships among these variables; however, exploratory correlational analyses were conducted. At T1, neither stress nor depression were significantly correlated with reasons for quitting smoking. However, both stress and depression were related to reasons against quitting. There was no

significant correlation between stress or depression and Level I reasons against quitting, but both stress and depression were significantly correlated with Level II and Level III reasons against quitting (Table 8). An analyses was also conducted to determine whether the correlations of the levels with stress and depression were significantly different from one another (Cohen & Cohen, 1983). As can be seen in Table 8, the correlations between depression and Level II, and depression and Level III were both significantly stronger than the correlation between stress and Level I reasons against quitting. The pattern was identical for correlations of the Levels with stress, though at a marginally significant level. This is consistent with the distinctions between levels in the Reasons Model as Level I is evidence-based and therefore should be less linked to reported experiences of stress and depression. In contrast, Level II and Level III are more affective and self-relevant in nature, and this finding suggests that individuals with higher levels of stress and depression feel they are less capable of making positive changes in their smoking behaviour and see their smoking behaviour as being a significant part of their self-concept.

The relationships between stress and depression and the variables measuring SDT were also examined. Research with SDT has shown that levels of autonomous motivation, autonomous support from others, and perceived competence are all related to a sense of well-being and mental health (Deci & Ryan, 2000). Within the current sample, individuals who report higher levels of stress and depression are hypothesized to feel less competent in their ability to quit, feel less support from the partners, and subsequently may report lower levels of autonomous motivation to quit. In fact depression was

Table 8

Correlations of level of depression (EPDS) and stress (PSS) with levels I, II, and III reasons against quitting smoking at T1

Correlations of Reasons Against Quitting with EPDS	Correlation A	Correlation B	Difference	t(53)	P
Level I (A)	-0.06	0.56	-0.62	-4.81	<.01
Level II (B)					
Level II(A)	0.56	0.52	0.04	0.32	ns
Level III (B)					
Level I (A)	-0.06	0.52	-0.58	-3.97	<.01
Level III (B)					

Correlations of Reasons Against Quitting with PSS	Correlation A	Correlation B	Difference	t(53)	P
Level I (A)	0.12	0.36	-0.24	-1.61	<.1
Level II (B)					
Level II (A)	0.36	0.37	0.00	-0.04	ns
Level III (B)					
Level I (A)	0.12	0.37	-0.24	-1.51	<.1
Level III (B)					

significantly negatively correlated with perceived competence to quit smoking (PCS; $r = -.37$, $p < .05$) such that higher levels of depression were related to lower levels of competence, while reported stress was not (PSS; $r = -.23$, $p = .10$). Stress and depression levels were not related to feelings of autonomous or controlled motivation to quit smoking or level of support from partner (though this would not be expected within this sample given the unstable nature of partner relationships). Again, these findings suggest a need for further examination of Reasons Model and SDT in a participant sample with less extreme scores on measures of stress and depression.

Reasons Model

Participants were asked to rate the extent to which reasons for quitting smoking (SRQ-Quitting) and reasons against quitting smoking (SRQ-Smoking) were true for them using a 1 to 7 scale ('not at all true' to 'very true'). As indicated above, these reasons were derived from the existing literature on pregnant and postpartum women, and from the semi-structured interviews with pregnant women during the pilot study. Each item for the Reasons Model was then categorized into one of the three levels of reasoning based on pre-determined ratings of the level each reason best fit. The first was more evidence-based reasons (Level I), the second was personal barriers or motivators to engage in the behaviour (Level II), and the third reflected reasons consistent with core values and beliefs (Level III). In general, responses on the Reasons Model questionnaires indicated that participants endorsed more reasons for quitting than reasons to continue smoking (see Table 9).

Reasons for Quitting Smoking: Across all three time periods, Level I and Level III reasons for quitting were consistently endorsed as being somewhat true to quite true for participants (see Table 9). In Level I, participants endorsed reasons such as "Because of the

health risks to my baby" (M=5.98, SD= 1.39) and "Because nicotine gets into breastmilk" (M= 5.29. SD= 1.96) as being quite true for them. At Level III, reasons such as "Because the health of my baby is important to me" (M=6.45. SD=1.18) and "Because my baby has no choice when inside me" (M=5.70, SD=1.66) were endorsed. In contrast, Level II reasons for quitting were more strongly endorsed during the postpartum periods than prenatally. Participants endorsed items such as "Because my breathing is better when I don't smoke" (M=5.29, SD=1.90) and "Because cigarettes are too expensive" (M=5.17, SD1.89). Consistent with the Reasons Model, this pattern of results suggests that evidence of the negative health effects of smoking and core values against smoking behaviour were consistently endorsed as reasons for quitting smoking across all three time periods. In contrast, barriers to quitting became more salient for participants after their baby was born, and with the additional experience of attempting to reduce their smoking behaviour or quit after bringing home their baby.

Reasons Against Quitting Smoking. A different pattern emerged when reasons against quitting smoking were examined, with participants generally being less likely to endorse reasons against quitting than reasons for quitting. As can be seen in Table 9, Level I reasons were less strongly endorsed as true during T1 than T2 and T3. Level II reasons were fairly consistently endorsed as being "somewhat true" across all three time periods, while Level III reasons are consistently endorsed as only "a little true" across the three time periods. Participants endorsed Level I reasons against smoking such as "People can have healthy kids even if they smoke during pregnancy" (M=4.46, SD=1.58) and "Because I don't believe smoking leads to low birthweight babies" (M=2.71, SD=1.86).

Table 9

Mean response on Reasons Model levels across all three time periods

Reasons Model Variables	N	M	SD
1. T1 -Level I Reasons for quitting	56	4.73	1.29
2. T1 - Level II Reasons for quitting	56	3.66	1.29
3. T1 - Level III Reasons for quitting	56	5.05	1.23
4. T1 - Level I Reasons against quitting	56	2.74	1.14
5. T1 – Level II Reasons against quitting	56	3.17	1.09
6. T1 - Level III Reasons against quitting	56	2.26	0.94
7. T2 - Level I Reasons for quitting	36	5.16	1.64
8. T2 – Level II Reasons for quitting	36	3.94	0.78
9. T2 - Level III Reasons for quitting	36	5.30	1.02
10. T2 – Level I Reasons against quitting	36	2.87	1.69
11. T2 –Level II Reasons against quitting	36	3.36	1.18
12. T2 - Level III Reasons against quitting	36	2.50	1.13
13. T3 – Level I Reasons for quitting	26	5.01	1.21
14. T3 – Level II Reasons for quitting	26	4.01	0.70
15. T3 - Level III Reasons for quitting	26	5.20	1.04
16. T3 - Level I Reasons against quitting	26	3.12	1.67
17. T3 – Level II Reasons against quitting	26	3.38	1.20
18. T3 - Level III Reasons against quitting	26	2.57	1.02
19. T1 – Average Reasons for quitting	56	4.43	1.08
20. T1 – Average Reasons against quitting	56	2.82	0.86
21. T2– Average Reasons for quitting	36	4.67	1.10
22. T2 – Average Reasons against quitting	36	2.98	1.01
23. T3 – Average Reasons for quitting	26	4.67	1.02
24. T3 – Average Reasons against quitting	26	3.06	1.09

*Note: Range for Smoking Reasons Questionnaires is 1 'not at all true' to 7 'very true'.

However, Level II reasons "Because I am physically addicted to cigarettes" (M=4.18, SD=2.34 and "Because it helps me to deal with stress" (M=4.77, SD=1.99). Level III reasons such as "Because I don't have the will-power to quit" (M=2.71, SD= 1.86) and "Because I have an addictive personality" (M=2.64, SD= 1.78) were not strongly endorsed at all three time periods. While participants were generally less likely to endorse reasons against quitting, they were least likely to report core values and beliefs that are inconsistent with quitting (Level III) and most likely to endorse barriers to quitting as a reason for continuing to smoke (Level II). Evidence-based reasons (Level I) in support of smoking seem to be less relevant after the baby is born, and may be related to a perception that the health risk of smoking is lower for a child who is no longer inside their body.

Relationship of the Levels For and Against Quitting Smoking. Table 10 presents the correlation matrix of the levels for and against quitting smoking across the three time periods. The measures of reasons for quitting tended to positively correlate with one another, and the measures of reasons against quitting tended to positively correlate with one another across time, though not as strongly. This is consistent with previous findings using the Reasons Model (Rempel et al., 2005). Either a small negative correlation or zero correlation was found between the two classes of reasons – reasons for quitting and reasons against quitting. As these classes ask about two opposite behaviours (quitting versus not quitting), it might be expected that the two are negatively correlated with one another. However, consistent with the research of Rempel and Fong (2005) there appears to be considerable independence in the reasons for these two sets of reasons, with very small correlations between the two sets of reasons. This supports the Reasons Model view that individuals have reasons both for and against engaging in a behaviour, and that it is important to understand an individual's pros and

cons in predicting their intentions to engage in a health behaviour. This finding is also consistent with findings reported by Rempel and Fong (2005), who examined the Reasons Model in the context of breastfeeding and found that women endorsed both reasons for and against breastfeeding, and that the two sets of reasons were relatively independent from one another.

Factor Structure of the Reasons Model: An exploratory factor analysis of the items on the Reasons Questionnaires was done to determine whether there was evidence to support a three-factor model, consistent with the theorized structure. Exploratory factor analyses were completed for the SRQ-Quitting and the SRQ-Smoking at T1 and T2. The Maximum Likelihood procedure with Promax rotation was used for all analyses. Table 11 outlines the factor structures that best fit the data for the SRQ-Quitting at T1 and T2.

For the SRQ-Quitting at T1, a four-factor structure emerged which explained 49.6% of the variance. The third and fourth factors were fairly consistent with Levels II and III of the Reasons Model. Factors 1 and 2 had item loadings from Level I items, with Factor One representing Level I reasons for quitting for the baby (e.g. lower risk of SIDS, lower risk of stillbirth or miscarriage) while Factor 2 best represents Level I reasons for quitting for the mother (e.g. my breathing is better, lower health risks for myself).

The correlation between Factor 1 and Factor 2 was low ($r=.28$), suggesting that they do represent separate constructs for participants. The inter-factor correlations ranged from $r=.23$ (Factors 1 and 3) to $r=.54$ (Factors 2 and 4).

Table 10

Correlations of Reasons Model variables across T1 and T2

Variable (Level)	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.
1. T1 SRQQ (I)	.52*	.58*	-.23	.06	-.14	.65*	.23	.33	-.13	-.16	-.10	.59*	.29	.34	-.22	-.09	-.07
2. T1 SRQQ (II)	1	.59*	-.07	.01	-.08	.37*	.29	.45*	.01	-.13	-.06	.60*	.48*	.54*	-.31	-.03	.08
3. T1 SRQQ (III)		1	.07	.25	-.02	.27	.18	.35*	-.11	-.10	-.08	.32	.47*	.44*	-.16	.04	.02
4. T1 SRQS (I)			1	.34*	.23	-.21	.10	.02	.13	.11	-.02	-.37	.22	.16	.43*	.21	.19
5. T1 SRQS (II)				1	.62*	-.03	.40*	.26	-.04	.39*	.10	-.16	.34	.02	.23	.42*	.31
6. T1 SRQS (III)					1	-.14	.17	.06	-.03	.32	.32	-.05	-.01	-.16	-.02	.25	.37
7. T2 SRQQ (I)						1	.22	.40*	-.18	-.27	-.25	.70*	.25	.25	-.12	-.11	-.18
8. T2 SRQQ (II)							1	.59*	.35*	.62*	.36*	.07	.75*	.40*	.25	.70*	.61*
9. T2 SRQQ (III)								1	-.08	-.10	-.04	.24	.48*	.43*	.07	.20	.40*
10. T2 SRQS (I)									1	.34*	.18	-.34	.23	.10	.63*	.43*	.46*
11. T2 SRQS (II)										1	.60*	.35	.32	.09	.48*	.61*	.40*
12. T2 SRQS (III)											1	-.27	.23	.04	.16	.51*	.60*
13. T3 SRQQ (I)												1	.24	.44*	-48*	-.23	-.14
14. T3 SRQQ (II)													1	.54*	.29	.64*	.52*
15. T3 SRQQ(III)														1	-.11	-.12	-.05
16. T3 SRQS (I)															1	.54*	.40*
17. T3 SRQS (II)																1	.81*
18. T3 SRQS (III)																	1

Note: *=p<.05

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A three-factor structure of the SRQ-Quitting is shown for T2 data (Table 11), and was found to explain 48.0% of the variance. At T2 the items related to pregnancy were not administered. Since the pregnancy items formed one factor at T1, it was expected that the removal of these items would reduce the solution to three factors. However, while the three factors show some consistency with the three levels of Reasons Model, there are a number of items that do not appear to fit well within any of the three factors. As well, the factors are significantly correlated with one another (r= .50 between Factor 1 and 2, r= .57 between Factor 1 and 3, and r=.53 between Factor 2 and 3). Similar results were found for SRQ-Smoking in which no reasonable number of factors emerged to provide an interpretable reduction of the data (see Table 12). This is not surprising given the similarity of some of the items between the three levels, and is consistent with past research using the Reasons Model. The lack of an observable factor structure at T2 may also have been affected by the low number of participants (N=36), but regardless, the results do not provide empirical evidence to support a specific number of factors for reasons against quitting. Given this, the three factor model (i.e. Levels I, II, and III) will be used for analyses as it is the structure theorized by the Reasons Model.

Path Analyses with Reasons Model

The Reasons Model was developed as a model of health behaviour change describing how reasons for engaging in a healthy behaviour affect intentions to engage in that behaviour. It was hypothesized that Level III reasons would be predictive of Level I and Level II reasons, but would also have an impact on intentions to quit independent of Levels I and II.

Table 11

Factor loadings for reasons for quitting questionnaire at T1 and T2

SRQQ Items at T1	Level	Factor				SRQQ Items at T2	Level	Factor		
		1	2	3	4			1	2	3
Lower risk of SIDS	I	.86				Nicotine gets into breast milk	I	.87		
Low risk of low birthweight	I	.80				Lower health risks to self	I	.84		
Baby can get addicted to nicotine	I	.70				Lower health risks to baby	I	.77		
Lower risk of stillbirth /miscarriage	I	.69				Lower risk of SIDS	I	.55		
Just because I am pregnant	I	.61				Not physically addicted	II	.41		
Lower health risks to baby	I	.60				I'm independent	III	-.34		
Clothes and house smell better	I		.98			I'm a good mother	III	.33		
Breath smells better	I		.87			Pressure from partner	II	.32		
My breathing is better	I		.62			Breath smells better	I		.84	
Lower health risks to self	I		.56			Clothes and house smell better	I		.82	
Doctor told me to quit	II		.51			Providing for my child is important	III		.80	
Smoking turns placenta green	I		.42			Health of baby is important	III		.71	
Feel nauseous when I smoke	II			.76		I intended to quit anyways	II		.71	
Smell of cigarettes is gross	II			.63		Smell of cigarettes is gross	II		.67	
I'm a good mother	III			.63		Cigarettes are too costly	II		.55	
Easier to quit when pregnant	II			.59		I am strong-willed and can quit	III		.26	
Not physically addicted	II			.58		I feel good about myself	III			.98
Pressure from partner	II			.52		Family is important and want to do what is best	III			.81
Cigarettes are too costly	II			.45		My breathing is better	I			.68
Fewer colds and illnesses	II			.43		Fewer colds and illness	II			.53
Intended to quit anyway	II			.38		Doctor told me to quit	II			.23
Family is	III				.77					

Factor loadings for reasons for quitting questionnaire at T1 and T2

SRQQ Items at T1	Level	Factor				SRQQ Items at T2	Level	Factor		
		1	2	3	4			1	2	3
important and want to do what's best										
Providing for child is important	III				.75					
Nicotine in breast milk	I				.71					
Feel good about myself	III				.66					
Health of baby important to me	III				.64					
I am strong-willed and can quit	III				.61					
I'm independent	III				.58					
Baby has no choice inside me	III				.57					

Table 12

Factor loadings for reasons against quitting questionnaire at T1 and T2

SRQS Items at T1	Level	Factor			SRQS Items at T2	Level	Factor		
		1	2	3			1	2	3
I am physically addicted to cigarettes	II	.89			I am physically addicted to cigarettes	I	.94		
It helps me to deal with stress	II	.74			I have physical cravings for cigarettes	II	.92		
I have physical cravings for cigarettes	II	.73			I have an addictive personality	III	.67		
It's a ritual, I always smoke at certain times	II	.64			I don't have the will-power to quit	II	.57		
It gives me time to myself	II	.63			I don't think about it, I just do it	III	.55		
My baby and I are exposed to ETS	II	.57			I am not breastfeeding	I	.42		
I have an addictive personality	III	.56			Not going to let others tell me what to do	III	.37		
I don't think about it, I just do it	III	.45			I like the social part of smoking	II	.22		
I stopped taking drugs and alcohol	II	.43			Cutting back is almost as good as quitting	I		.87	
I like to smoke when I'm bored	II	.39			It's a ritual, I always smoke at certain times	I		.82	
Cutting back is almost as good as quitting	II		.69		It gives me time to myself	I		.80	
My doctor told me not to quit due to stress	I		.68		It helps me to deal with stress	I		.62	
People can have healthy kids even if they smoke	I		.66		Quitting makes you too moody	I		.55	
Quitting makes you too moody	II		.65		Health risks to baby are low if you smoke away	I		.47	
Health risks to baby are low if you smoke away	I		.48		Chance of baby dying of SIDS is small	I		.37	
Smoking doesn't lead to low birthweight	I		.47		Reminds me of my life before children	III		.27	
I don't want to gain too much	II		.46		I have an emotional tie to	III		.24	

SRQS Items at T1	Level	Factor			SRQS Items at T2	Level	Factor		
		1	2	3			1	2	3
weight					smoking				
Doctor told me not to quit as baby is addicted	I		.46		I am a follower, I smoke when others do	III		.20	
Chance of baby dying of SIDS is small	I		.42		I don't have the motivation to quit	II			.85
I can't use stop smoking aids	II		.42		My baby and I are exposed to ETS	II			.64
I don't plan to breastfeed	I		.40		I like to smoke when I'm bored	II			.58
Not going to let others tell me what to do	III		.35		I want to lose the baby weight	II			.58
I don't have the motivation to quit	II			.90	I stopped taking drugs and alcohol	II			.35
I don't have the will-power to quit	II			.82					
I like the social part of smoking	II			.53					
I am a follower, I smoke when others do	III			.36					
I have an emotional tie to smoking	III			.32					
It reminds me of life before children	III			.25					
39.52% variance accounted for					42.92% variance accounted for				

Level I and Level II reasons were hypothesized to predict intentions to quit and smoking

behaviour. The same analyses were completed using both smoking behaviour and quit

intentions as the dependent variable. In generally, the results tended to be slightly more robust

when predicting smoking behaviour with the Reasons Model. However, in keeping with the

cognitive orientation of the Reasons Model and with the original hypotheses, only the

analyses using quit intentions were presented here. Path analyses with T3 data were not

completed due to the small N.

Path Analysis of Reasons Model at T1. Figure 2 outlines the relationship of reasons at

T1 to quit intentions at T1. Consistent with the hypothesis above, Level III reasons for quitting

smoking were predictive of Level I and II reasons for quitting. Within reasons against

quitting, Level III was only a significant predictor of Level II reasons.

While all three levels of reasons for quitting significantly correlated with quit

intentions, they were not found to be significant predictors within the model. Only Level III

reasons against quitting were found to significantly predict quit intentions.

Path Analysis of Reasons Model at T2. Figure 3 presents the relationship of reasons to

quit intentions at T2. During this first postpartum session, Level III reasons for quitting

continue to be significant predictors of Level I and Level II reasons for quitting, while only

Level II reasons against quitting are significantly predicted by Level III reasons against

quitting. However, in contrast to the T1 model, only Level I reasons for quitting stands out as

a marginally significant predictor of quit intentions while Level III reasons against quitting

does not.

Figure 2. Reasons Model at T1 predicting intentions for quitting smoking at T1

Element	Value
T1 Level 3 reasons for quitting	
T1 Level 2 reasons for quitting	
T1 Level 1 reasons for quitting	
T1 Level 2 reasons against quitting	
T1 Level 1 reasons against quitting	
T1 Level 3 reasons against quitting	
T1 Quitting Intentions	

(.586 *)
. 586*

(.581*)
.581*

(.361*)
.203

(.382*)
.172

(.301*)
.074

(.624*)
.624*

(.226)
.226

(-.140)
.066

(-.187)
-.089

(-.349*)
-.338*

R^2=.243

(Zero Order Correlations)
Regression weights
Note: * = *p*<.05

62
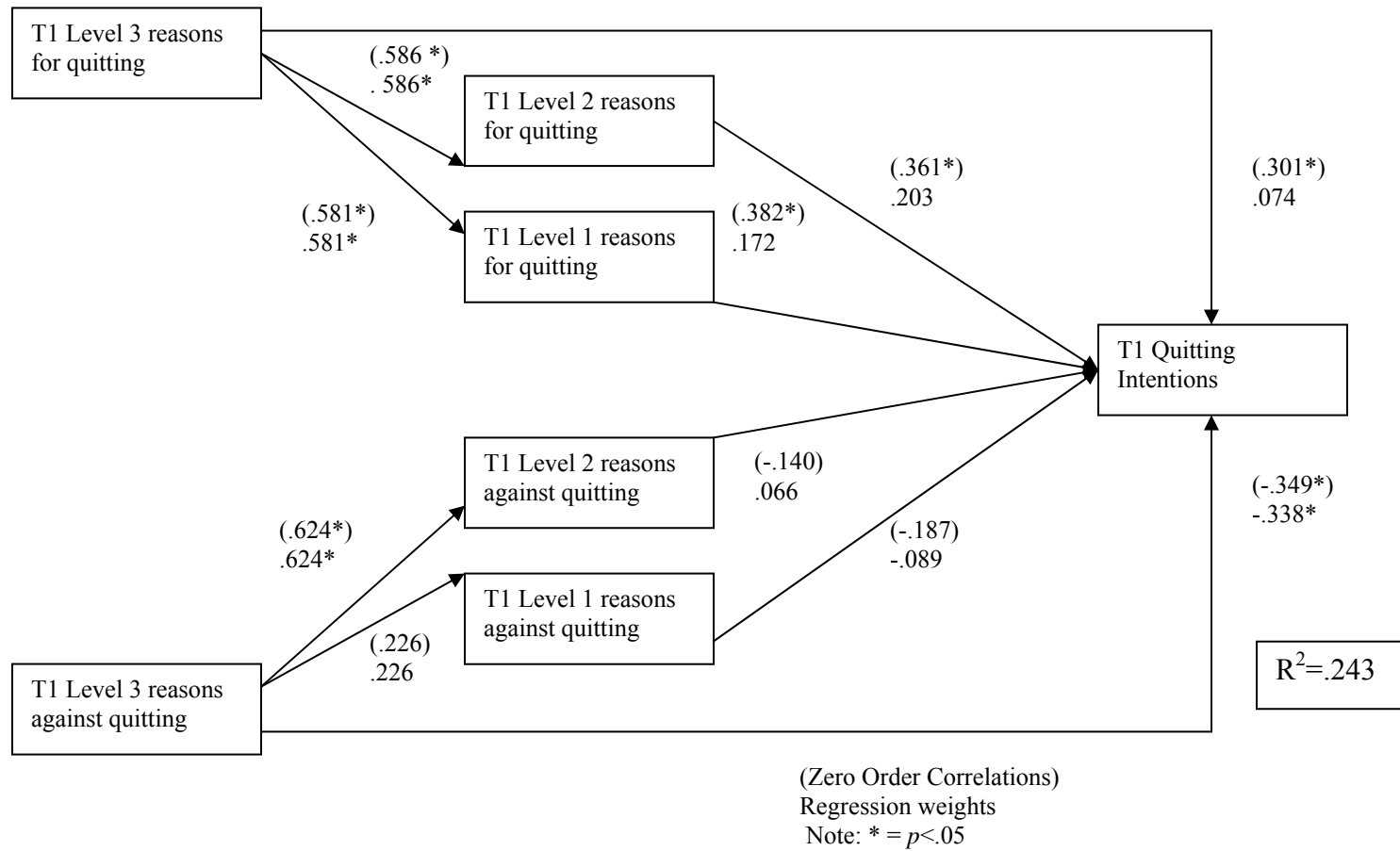
Figure 3. Reasons Model at T2 predicting intentions for quitting at T2

T2 Level 3 reasons for quitting

(.587*)
.601*

T2 Level 2 reasons for quitting

(.396*)
.414*

T2 Level 1 reasons for quitting

(.568*)
.410^

(.158)
.001

(.457*)
.313

T2 Quitting Intentions

(-.352*)
-.171

(-.294^)
-.073

T2 Level 2 reasons against quitting

.595*
.595*

(-.118)
+.007

T2 Level 1 reasons against quitting

(.182)
.182

T2 Level 3 reasons against quitting

R^2=.421
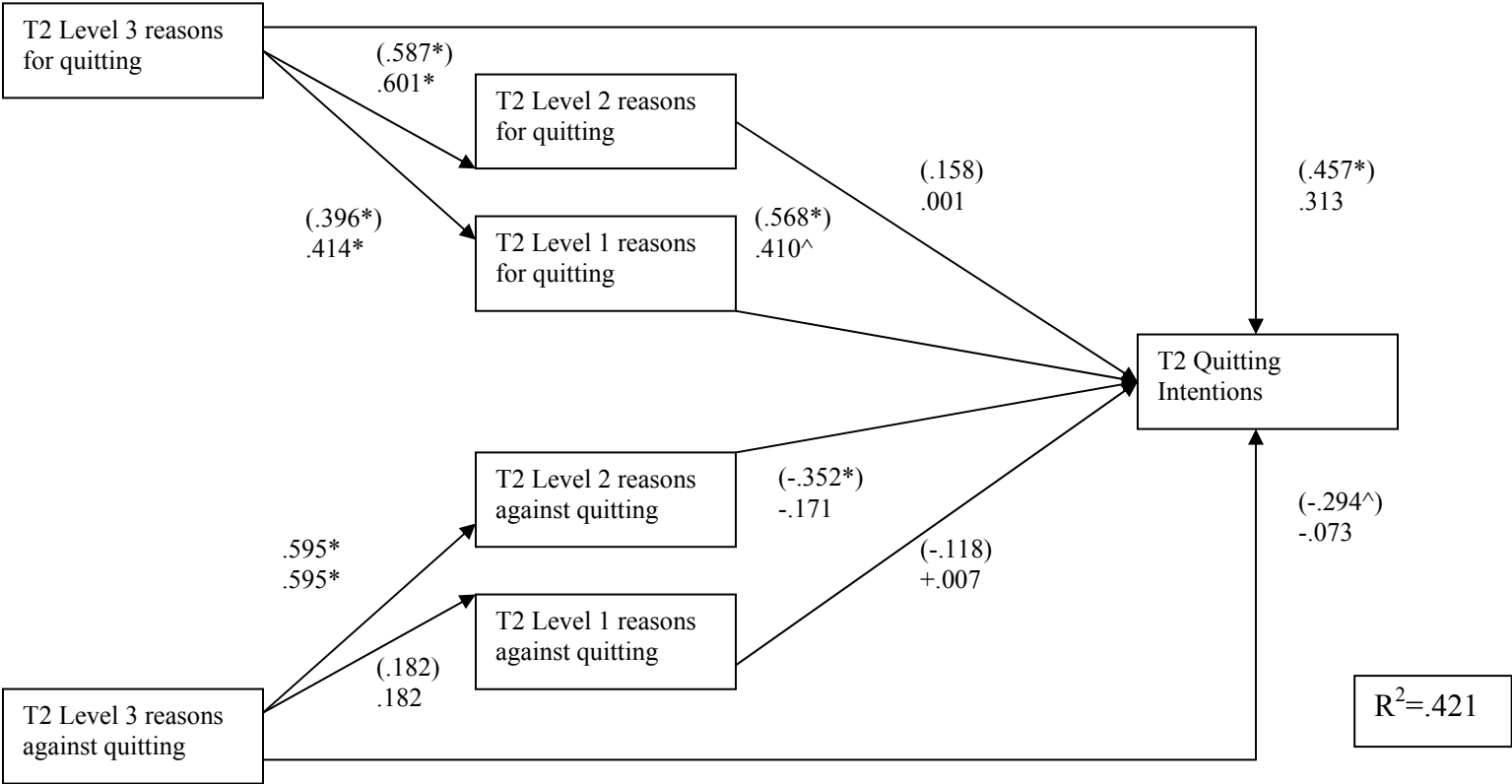
(Zero Order Correlations)
Regression weights
Note: * = *p*<.05, ^=*p*<.10

Figure 4. Reasons Model At T1 predicting intentions for quitting smoking at T2

T1 Level 3 reasons for quitting

(.734*)
.734*

T1 Level 2 reasons for quitting

(.695*)
.695*

T1 Level 1 reasons for quitting

(.444*)
.348^

(.440*)
.304

(.325*)
-.102

T2 Quitting Intentions

T1 Level 2 reasons against quitting

(-.133)
+.085

(-.169)
-.034

(-.278)
-.209

.624*
.545*

T1 Level 1 reasons against quitting

(.226)
.136

T1 Level 3 reasons against quitting

R²=.310

(Zero Order Correlations)
Regression weights
 Note: * = *p*<.05, ^=*p*<.10
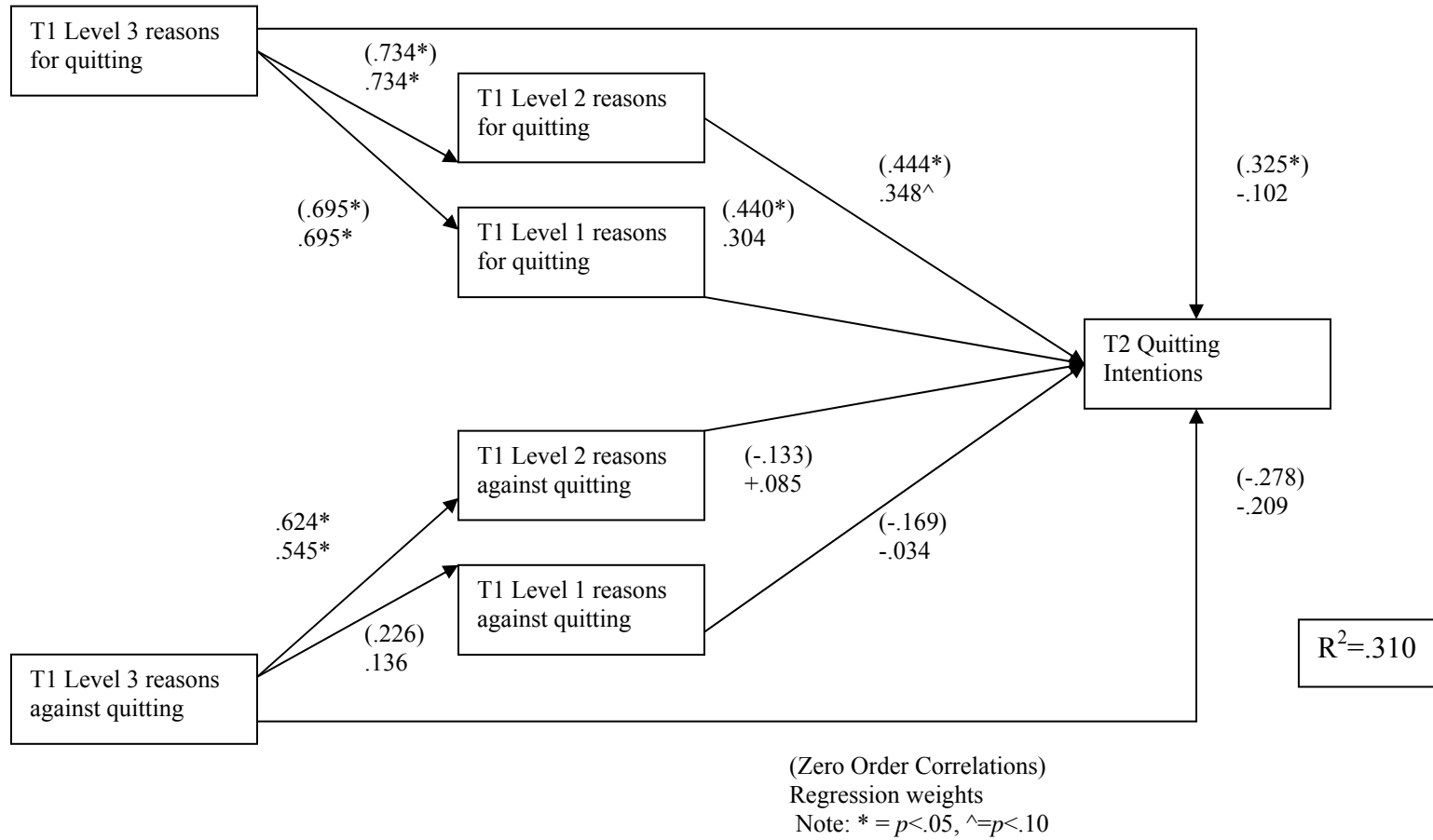
Path Analysis of Reasons Model Over Time: Figure 4 presents reasons measured at T1 predicting quit intentions at T2. The relationship of the levels with one another remains consistent with the models presented above. However, in this analysis, Level II reasons for quitting emerges as the only marginally significant predictor of quit intentions. That is, participants' ratings of personal strengths or aids for quitting smoking at T1 were predictive of their reported intentions to quit at T2.

Self-Determination Theory

Self-Determination Theory (SDT) is also a measure of health-behaviour change that examines that measures levels of autonomous and controlled motivation to engage in a behaviour, perceived competence to carry out the behaviour, and level of support from others both generally and specific to quitting smoking. Two questionnaires were used to measure motivation to quit smoking: the TSRQ, which assesses motivation generally, and the PSRQ, which assesses motivation to quit smoking specifically during pregnancy.

Factor analyses were completed on both questionnaires to determine whether the current data support a two-factor model with autonomous motivation and controlled motivation or whether they are better conceptualized as a single bipolar factor. A secondary reason for these analyses was to determine which of the TSRQ or PSRQ was a better predictor of smoking behaviour.

As with the Reasons Model variables, factor analyses were completed using the Maximum Likelihood method with a Promax rotation to determine the number of factors with an eigenvalue greater than one. Both scales supported a two-factor model, but the TSRQ was a better fit for the current data set (see Table 13). At T1, a two-factor model

65

Table 13

Factor loadings for motivation to quit smoking questionnaire

T1 Motivation to Quit Smoking	Factor One	Factor Two	T2 Motivation To Quit Smoking	Factor One	Factor Two
Responsibility for own health	.87		Important choice I want to make	.92	
Important choice I want to make	.85		Important for being healthy	.89	
Best thing for my health	.85		Responsibility for own health	.79	
Carefully thought it out and it is important to me	.82		I would feel bad about myself if I smoked	.79	
Important for being healthy	.82		Consistent with life goals	.77	
Feel guilty or ashamed if smoked	.67		Carefully thought it out and it is important to me	.71	
Consistent with life goals	.61		Feel guilty or ashamed if smoked	.60	
I want others to see I can do it	.56		Best thing for my health	.43	
Others would be upset with me if I smoked		.93	1 I want others to see I can do it		.85
I feel pressure from others to quit		.88	I want others to approve of me		.84
I want others to approve of me		.81	Easier to do what I am told than think about it		.75
I would feel bad about myself if I smoked		.64	I feel pressure from others to quit		.27
Easier to do what I am told than think about it		.46	Others would be upset with me if I smoked		.24

explained 60.60 % of the variance, and it explained 51.38 % at T2.

Correlational analyses between the SDT variables also supported the use of the TSRQ over the PSRQ as it correlated more strongly with other SDT variables and the behavioural smoking variable. Previous research involving SDT and smoking cessation has focused mainly on levels of autonomous motivation. Consistent with past research, it was hypothesized that pregnant smokers would be less likely to feel motivated by controlled means (i.e. by others) than autonomous motivation to quit smoking. However, as can be seen in Table 14, controlled motivation to quit was significantly correlated with autonomous motivation to quit in that higher levels of one indicated higher levels of the other. Autonomous and controlled motivation to quit were also significantly correlated with perceived competence with higher levels of motivation indicating higher levels of perceived competence to quit.

When only those participants who reported having a partner at T1 were included, partner support to quit smoking was positively correlated with autonomous and controlled motivation to quit smoking. However, this relationship was not observed at T2 and T3. This change in partner support likely reflects the change and instability in partner status over time discussed above. As well, general partner support only correlated with partner support to quit smoking (r= .45, p<.05), and did not correlate with any of the other SDT variables.

Motivation to Quit Smoking. Participants consistently reported moderate levels of autonomous motivation to quit smoking across the three time periods (see Table 15). The strongest endorsements were for items such as "Because I want to take responsibility for my own health (M=5.11, SD=1.75) and "Because I personally believe it is the best thing

Table 14

Correlations of Self-Determination Theory variables across all three time periods

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. T1 –Autonomous Motivation	1	.53*	.50*	.33*	.32	-.01	.21	-.05	.42*	.17	.13	-.14
2. T1 – Controlled Motivation		1	.42*	-.03	.38*	.48*	.35*	-.38	.49*	.56*	.43*	-.49*
3. T1- Perceived Competence to Quit			1	.20	.13	-.02	.63*	-.11	-.03	.07	.27	-.32
4. T2 -Partner Support to Quit Smoking				1	.38	-.04	.14	.35	.03	-.20	-.62*	.20
5. T2 –Autonomous Motivation					1	.61*	.49*	.18	.73*	.48*	.35	-.02
6. T2 – Controlled Motivation						1	.31	-.20	.52*	.57*	.35	-.06
7. T2- Perceived Competence to Quit							1	.01	.10	.29	.48*	-.35
8. T2 -Partner Support to Quit Smoking								1	-.08	-.07	-.23	.73*.
.9. T3 –Autonomous Motivation									1	.71*	.43*	-.08
10. T3 – Controlled Motivation										1	.59*	-.26
11. T3- Perceived Competence to Quit											1	-.16
12. T3 -Partner Support to Quit Smoking												1

Note: *=p<.05

for my health (M=4.89, SD=1.92). Overall, controlled motivation to quit smoking was less

strongly endorsed, though was again consistent over the three time periods. Items endorsed

from this scale included "Because I would feel guilty or ashamed if I smoked" (M=3.38, SD

=2.11) and "Because I would feel bad about myself if I smoked" (M=3.13, SD=1.95). These

results suggest that participants generally reported autonomous motivation to quit smoking as

more relevant to them than controlled motivation. However, as with the Reasons Model,

participants did endorse both controlled and autonomous motivation for quitting smoking,

reinforcing the need to determine the role that both types of motivation play in predicting

smoking behaviour.

Perceived Competence. As with the motivation variables, participants consistently

reported moderate levels of competence to quit smoking across all three time periods (see

Table 15). These included items such as "I feel confident in my ability to not smoke" (T1;

M=4.46, SD=1.89) and "I am able to meet the challenge of not smoking" (T1; M=3.98,

SD=2.16).

Partner Support to Quit Smoking. Despite the instability of romantic relationships

among participants, their ratings of partner support were also relatively consistent across the

three time periods (see Table 15). This finding suggests that those who were in relationships at

the time they completed the questionnaire found their partner to be supportive of their

decisions surrounding smoking behaviour. However, these findings are inconsistent with

reports made during the semi-structured interviews in which participants often commented on

a need to lie about their smoking behaviour when partners pressured them to quit or a struggle

to stay quit while their partner encouraged them to smoke or smoked in their presence when

they were attempting to quit. The contrast between these two type of reports suggests that a

desire to believe or present their partner as supportive (social desirability) may have affected their responses to these items. It is also difficult to interpret these responses given the high level of instability in relationships with different participants rating different partners at each of the time periods. Positive ratings of support may also reflect an overly positive outlook based on a reconciliation or start of a new relationship.

Table 15

Mean response on Self-Determination Theory variables across three time periods

Variable	N	M	SD
1. T1 - Autonomous motivation to quit	55	4.53	1.65
2. T1 - Controlled motivation to quit	55	2.96	1.50
3. T1 - Perceived competence to quit smoking	52	3.82	1.91
4. T1 - Partner support to quit smoking	40	4.51	1.60
5. T2 - Autonomous motivation to quit	35	4.02	1.66
6. T2 - Controlled motivation to quit	35	2.69	1.36
7. T2 - Perceived competence to quit smoking	33	3.87	2.01
8. T2 - Partner support to quit smoking	26	4.70	1.72
9. T3 - Autonomous motivation to quit	25	4.63	1.59
10. T3 - Controlled motivation to quit	25	2.97	1.64
11. T3 - Perceived competence to quit smoking	25	3.95	2.01
12. T3 - Partner support to quit smoking	21	4.69	1.52

Note: Range of response for self-determination questionnaires is 1 'not at all true' to 7 'very true'.

Path Analyses for Self-Determination Theory. While the Reasons Model has typically

been used to predict intentions to engage in health behaviour, SDT has tended to examine

changes in the behaviour itself. For the current analyses, the measure of smoking behaviour

was the average number of cigarettes smoked weekly during pregnancy. As well, SDT studies

have examined the impact of partner support on health behaviour. However, many participants

in the present study did not have consistent or steady partners, and for those that did, there was

a poor relationship between partner support and the other SDT variables of motivation,

perceived competence, and smoking behaviour. For that reason the path models presented

here examined the impact of only perceived competence, autonomous motivation, and

controlled motivation on smoking behaviour. Autonomous motivation and controlled

motivation were set to correlate with one another, and all three variables were hypothesized to

directly predict smoking behaviour. As with Reasons Model, T3 path analyses were not

completed.

Path Analysis of SDT at T1 Predicting Smoking Behaviour at T1. Figure 5 shows that

both controlled motivation to quit smoking and perceived competence were significant

predictors of smoking behaviour such that higher levels of each predicted a lower weekly

average of cigarettes smoked. However, autonomous motivation was not found to be a

significant predictor of smoking behaviour. Given the high correlation between controlled and

autonomous motivation, a test for a suppression effect was completed. The model was tested

without controlled motivation; however, this did not significantly affect the path coefficient

for autonomous motivation, indicating that, within the current sample, autonomous motivation

was not a meaningful predictor of smoking behaviour.

Figure 5. Self-Determination Theory at T1 predicting smoking behaviour at T1
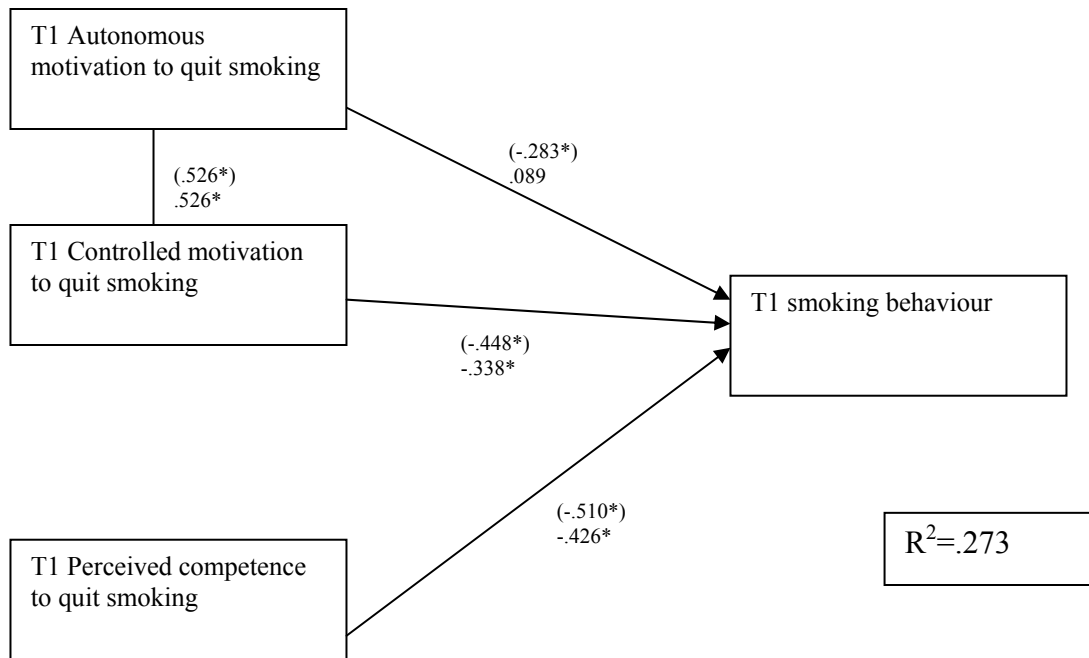
(zero order correlations)
Regression weights
Note: *=*p*<.05

Figure 6. Self-Determination Theory At T2 predicting smoking behaviour at T2

T2 Autonomous motivation to quit smoking	
T2 Controlled motivation to quit smoking	
T2 Perceived competence to quit smoking	

(.608*)
.608*

(.-.233)
.127

(-258)
-.169

(-.529*)
-.528*

T2 smoking behaviour

R²=.297
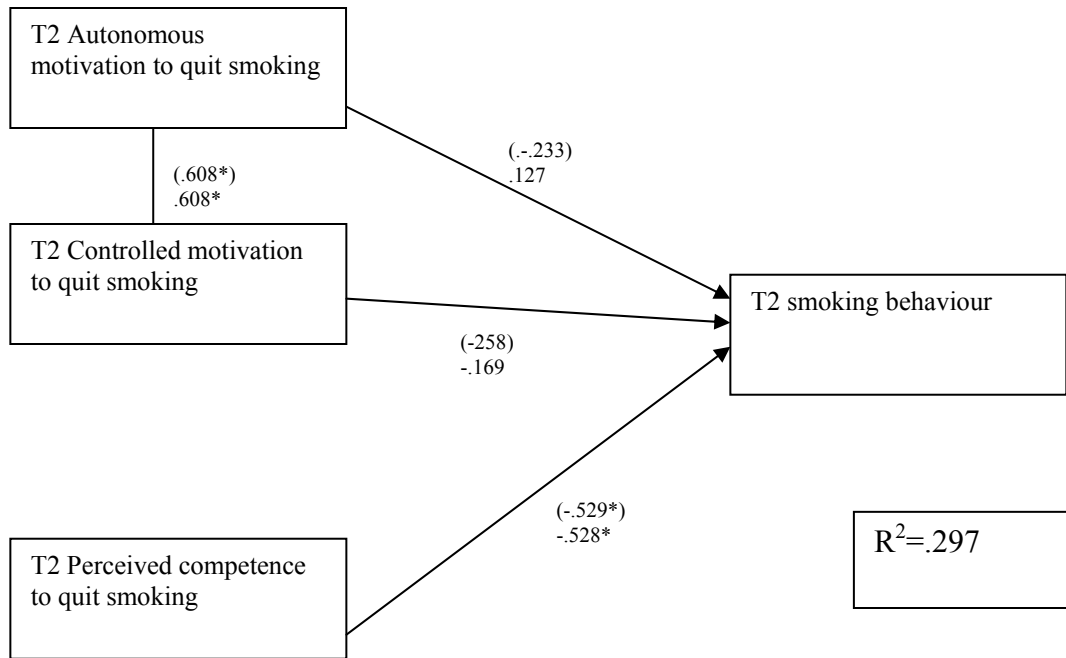
(zero order correlations)
Regression weights
Note: *=*p*<.05

Path Analysis of SDT at T2 Predicting Smoking Behaviour at T2. At T2, only perceived competence remained a significant predictor of smoking behaviour such that higher levels of perceived competence predicted lower levels of smoking behaviour (see figure 6). Thus, regardless of reported motivations to quit smoking, at T2 it is the level of confidence they feel in quitting smoking that predicts how much they are smoking.

Path Analysis of SDT Over Time. An unexpected effect was found when predicting smoking behaviour at T2 using SDT at T1 (figure 7). In this model, perceived competence remains a significant predictor of smoking behaviour such that higher levels of perceived competence predict lower rates of smoking. However, higher levels of autonomous motivation to quit at T1 was found to predict *higher* levels of smoking behaviour at T2, and controlled motivation to quit was not a significant predictor. This finding is contrary to SDT and may reflect instability in the path analysis due to the small numbers at T2. However, it may also indicate that participants who had higher rates of smoking attempted to compensate for this behaviour by reporting stronger motivation not to smoke. This effect may also differ between primagravida and multigravida participants, and suggests the need to consider whether this finding will differ by level of experience.

Figure 7. Self-Determination Theory At T1 predicting smoking behaviour at T2


```
┌─────────────────────┐
│ T1 Autonomous       │
│ motivation to quit  │
│ smoking             │
└─────────────────────┘
         │        (.069)
   (.615*)         .439*
    .526
┌─────────────────────┐                    ┌──────────────────────┐
│ T1 Controlled       │                    │ T2 smoking behaviour │
│ motivation          │                    │                      │
│ to quit smoking     │                    └──────────────────────┘
└─────────────────────┘
         (-221)
         -.268
                        (-.296)
                        -.348*
┌─────────────────────┐                    ┌──────────────────────┐
│ T1 Perceived        │                    │   R²=.238             │
│ competence          │                    └──────────────────────┘
│ to quit smoking     │
└─────────────────────┘
```
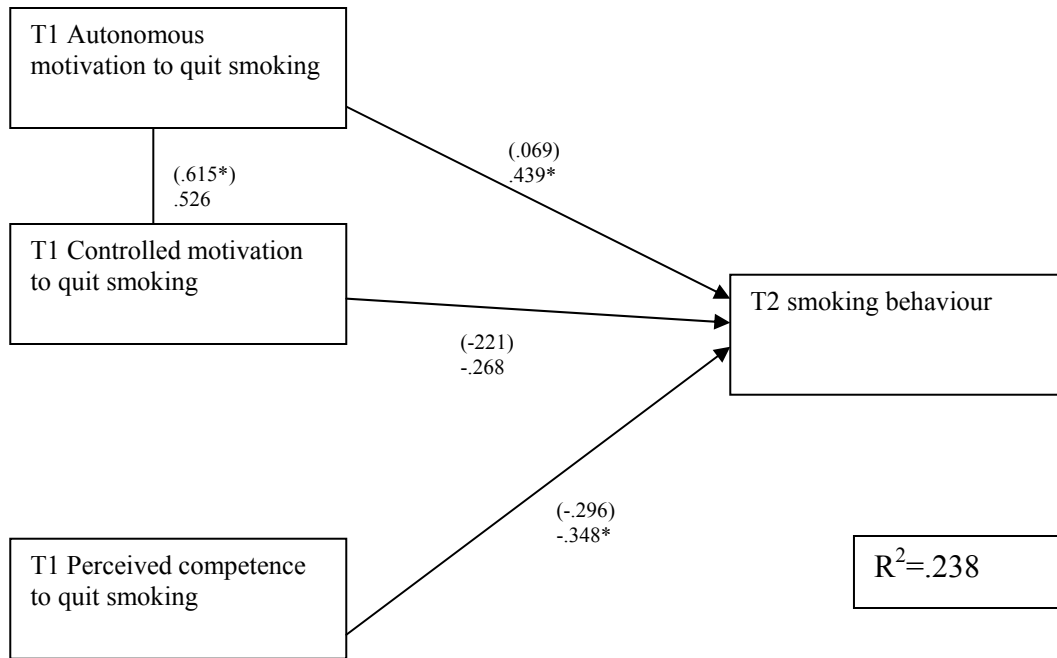
(zero order correlations)
Regression weights
Note: *=*p*<.05

The Role of Experience in Quit Intentions and Smoking Behaviour

It was hypothesized that participants with prior experience in quitting smoking or being pregnant would differ in their responses on the Reasons Model and SDT measures, and that those with more experience would be better able to predict their intent to quit smoking and smoking behaviour than those who had no prior experience. Within the current sample, all participants reported having experience with attempting to quit smoking prior to becoming pregnant, and as such, no comparative analyses by quit experience were possible. However, there was an almost even split between those who were pregnant for the first time (primagravida), and those who had been pregnant before (multigravida). An examination of the relationship between level of experience with smoking behaviour and intentions revealed a significant difference in which primagravida mothers smoked fewer cigarettes at T1 (t(55) = 9.24, p<.01, see Figure 8) and were marginally more likely to intend to quit smoking at T1 ($\chi^2(2)$ = 5.12, p=.07). Thus, an interesting pattern emerges in which primagravida mothers dramatically reduce their smoking rates between pre-pregnancy and pregnancy, then initially increase their smoking rates postpartum. In contrast, multigravida participants have smaller initial decrease in smoking rates from pre-pregnancy to pregnancy, and maintain a fairly consistent level of smoking across the pregnancy and postpartum periods (see Table 16).

As would be expected, age was the only other variable found to vary with the number of pregnancies (t(55)=26.78, p<.01) with primagravida mothers being significantly younger than multigravida mothers.

Figure 8. Weekly number of cigarettes smoked by level of experience.
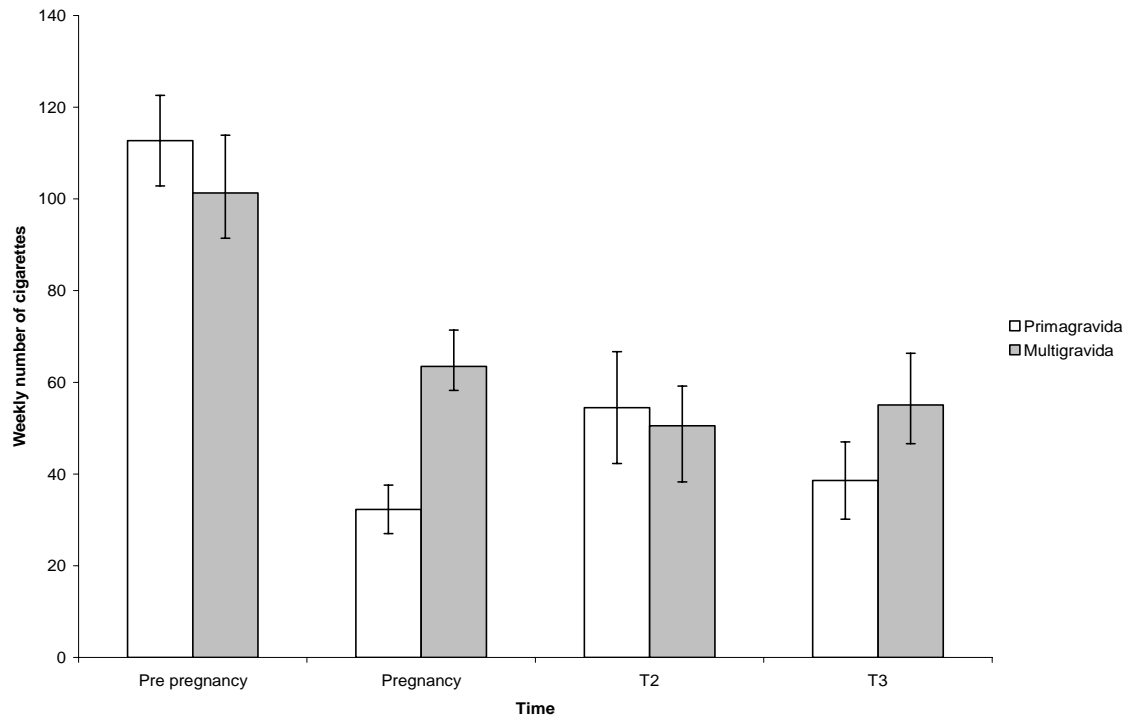
Note: Error bars indicate standard error of the mean.

Table 16

Characteristics of primagravida mothers and multigravida mothers

| Variable Name | Primagravida Mothers N=27 | | Multigravida Mothers N=29 | | | |
	M	SD	M	SD	Sig. test	p value
Cigarettes smoked weekly before pregnancy	112.70	51.30	101.31	64.12	$t(54) = 0.72$	0.48
Cigarettes smoked weekly at T1	32.26	27.36	63.52	42.50	$t(54) = -3.25$	0.00*
Cigarettes smoked weekly at T2	54.47	47.26	50.52	39.70	$t(34) = 0.27$	0.79
Cigarettes smoked weekly at T3	38.64	27.99	55.14	42.07	$t(23) = -1.12$	0.28
Age	17.96	1.97	25.07	6.80	$t(54) = -5.23$	0.00*
Stress level	26.63	8.27	26.29	5.70	$t(54) = -0.03$	0.97
Depression level	9.43	4.73	9.92	3.12	$t(43) = -0.36$	0.72
Maternal attachment (T2)	42.22	2.53	42.90	3.25	$t(34) = -0.67$	0.51
% told to quit by physician	12	44.4%	12	41.4%	$\chi^2(2) = 2.14$	0.34
% with current partner	20	74%	19	65.5%	$\chi^2(1) = 0.48$	0.49
Intention to quit	14	51.9%	10	34.5%	$\chi^2(1) = 1.72$	0.19

Note: *=$p<.05$

Table 17

Comparison of primagravida mothers and multigravida mothers on Self-

Determination Theory variables and Reasons Model variables at T1 and T2

Variable Name	Primagravida Mothers			Multigravida Mothers			Sig. test	p
	M	SD	N	M	SD	N		
T1- Level I reasons for quitting	5.12	1.01	27	4.37	1.43	29	t(54)=2.26	0.03*
T1- Level II reasons for quitting	3.88	1.07	27	3.44	1.45	29	t(54)=1.29	0.20
T1- Level III reasons for quitting	5.26	1.16	27	4.86	1.30	29	t(54)=1.22	0.23
T1- Level I reasons against quitting	2.26	0.92	27	3.18	1.56	29	t(54)=-3.28	0.00*
T1- Level II reasons against quitting	3.06	0.98	27	3.28	1.19	29	t(54)=-0.73	0.47
T1- Level III reasons against quitting	1.97	0.63	27	2.53	1.11	29	t(54)=-2.30	0.03*
T1- Autonomous motivation to quit	4.78	1.59	27	4.28	1.69	28	t(53)=1.14	0.26
T1- Controlled motivation to quit	3.20	1.29	27	2.72	1.68	28	t(53)=1.21	0.23
T1- Perceived competence to quit	4.08	1.76	26	3.57	2.06	26	t(50)=0.96	0.34
T1- Partner support to quit	4.19	1.80	20	4.83	1.34	20	t(38)=-1.26	0.22
T2- Level I reasons for quitting	5.24	1.60	15	5.10	1.70	20	t(33)=0.26	0.80
T2- Level II reasons for quitting	4.01	0.81	15	3.89	0.77	21	t(34)=0.42	0.68
T2- Level III reasons for quitting	5.42	0.78	15	5.21	1.18	20	t(33)=0.60	0.55
T2- Level I reasons against quitting	3.20	1.95	15	2.63	1.49	21	t(34)=0.99	0.33
T2- Level II reasons against quitting	3.42	1.21	15	3.31	1.18	21	t(34)=0.28	0.78
T2- Level III reasons against quitting	2.51	1.17	15	2.49	1.14	21	t(34)=0.06	0.95

T2- Autonomous motivation to quit	3.66	1.53	15	4.29	1.74	20	t(33)=-1.12	0.27
T2- Controlled motivation to quit	2.35	1.24	15	2.94	1.42	20	t(33)=-1.29	0.21
T2- Perceived competence to quit	3.45	2.04	14	4.18	1.99	19	t(31)=-1.04	0.31
T2- Partner support to quit	4.38	2.13	11	4.93	1.34	15	t(24)=-0.80	0.43

Note: *=p<.05

An examination of the Reasons Model was completed to better understand the differences between primagravida mothers and multigravida mothers. It was hypothesized that level of experience with pregnancy and childrearing would affect reported reasons for and against quitting smoking. Overall, primagravida mothers gave stronger endorsements of reasons for quitting ($F(1, 55) = 3.86$, $p<.05$) and weaker endorsements of reasons against smoking ($F(1, 55) = 4.40$, $p<.05$) than multigravida mothers. More specifically, it was hypothesized that at T1, Level I reasons would be more predictive of quitting intentions at T1 for primagravida participants as they had no direct experience with which to base their reasons, while Level II reasons would be better predictors at T2 with the additional experience. For multigravida participants, Level II reasons were hypothesized to be more predictive of quitting intentions across all time periods. Level III was expected to remain fairly stable regardless of experience level.

As can be seen in Table 17, this hypothesis was partially supported as primagravida mothers more strongly endorsed Level I reasons for quitting ($F(1,55)=5.10$, $p<.05$) and against quitting than multigravida mothers ($F(1,55)=10.78$, $p<.05$). At TI, primagravida mothers also endorsed Level III reasons against smoking more strongly than did multigravida mothers ($F(1,55)=5.27$, $p<.05$). However, at T2, no significant differences were found between the two participant groups on the levels of the Reasons Model as the primagravida mothers reported stronger endorsements of the Level I and Level III reasons against quitting while the multigravida mothers gave stronger endorsements of Level I reasons for quitting. No significant differences were found between primagravida and multigravida participants on the SDT variables. However, separate path analyses for SDT by level of experience were carried out in an attempt to better understand the unexpected findings with controlled and

autonomous motivation.

Path Analyses of the Reasons Model by Level of Experience with Pregnancy. Given these significant differences between primagravida participants, it is worth considering whether there is a difference in the ability of Reasons Model levels to predict intentions to quit. As was found previously, the results tended to be more robust when using the Reasons Model to predict smoking behaviour, however, a number of differences were also observed between primagravida and multigravida participants when predicting intentions to quit.

　　A Comparison of Reasons Model at T1 by Level of Experience. As can be seen in Figure 9, a number of differences exist between the primagravida and multigravida participants. Only Level III reasons against quitting significantly predicts Level I and II reasons against quitting for primagravida participants, and none of the levels are found to be significant predictors of intentions to quit. However, for multigravida participants, Level III reasons for quitting was found to significantly predict Level I and Level II reasons for quitting, and Level III reasons against quitting also significantly predicts Level II reasons against quitting. Further, Level II reasons for quitting was a marginally significant predictor of intentions to quit, while Level III reasons against quitting was a significant predictor of intentions to quit.

　　A Comparison of Reasons Model at T2 by Level of Experience. Figure 10 displays the comparison of the respective ability of Reasons Model to predict intentions to quit at T2 for primagravida and multigravida participants. The pattern of significant pathways for multigravida participants is identical to that of T1. However, for the primagravida participants, only Level I reasons for quitting and Level II reasons against quitting emerge at

significant predictors of intentions to quit.

A Comparison of Reasons Model by Level of Experience Across Time. When looking at the ability of Reasons Model measured at T1 to predict quitting intentions at T2, again the predictive ability seems much stronger for the multigravida participants than the primagravida participants. Level III reasons for quitting remains a significant predictor of Levels I and II and all three levels were found to be significant predictors of quitting intentions. For reasons against quitting, Level III was is a significant predictor of Level II reasons only. For the primagravidas, only Level II reasons against quitting and Level III reasons for quitting stood out as significant predictors of quitting intentions.

Path Analyses of Self-Determination Theory by Level of Experience with Pregnancy. As with the Reasons Model, a number of differences were also noted in the ability of SDT to predict smoking behaviour for primagravida versus multigravida participants.

A Comparison of SDT at T1 by Level of Experience. As can be seen in figure 12, the unexpected positive relationship between autonomous motivation and smoking behaviour emerged only for only primagravida participants at T1. That is, higher levels of cigarette smoking are associated with higher levels of reported autonomous motivation to quit smoking. For multigravida participants, perceived competence to quit smoking was generally found to be a strong predictor of smoking behaviour with lower levels of cigarette consumption related to higher levels of perceived competence to quit. Controlled motivation also tended to be a good predictor of smoking behaviour, though was not significant.

Figure 9. A comparison of the T1 Reasons Model predicting quitting intentions at T1 for primagravida (upper panel) and multigravida (lower panel) mothers.

Upper panel:

T1 Level 3 reasons for quitting

(.297)
.297

(.236)
.236

T1 Level 2 reasons for quitting

T1 Level 1 reasons for quitting

(.143)
-.067

(.258)
.173

(.252)
.275

T1 quitting intentions

(.674*)
.674*

T1 Level 2 reasons against quitting

T1 Level 1 reasons against quitting

(.406*)
.406*

(-.297)
-.371

(-.194)
.038

(-.226)
-.036

T1 Level 3 reasons against quitting

R^2=.236

(Zero Order Correlations)
Regression weights
Note: * = *p*<.05

Lower panel:

T1 Level 3 reasons for quitting

(.747*)
.747*

(.763*)
.763*

T1 Level 2 reasons for quitting

T1 Level 1 reasons for quitting

(.429)
.445^

(.364^)
.248

(.283)
-.286

T1 quitting intentions

(.619*)
.619*

T1 Level 2 reasons against quitting

T1 Level 1 reasons against quitting

(.001)
.001

(-.016)
.240

(-.028)
-.050

(-.332^)
-.454*

T1 Level 3 reasons against quitting

R^2=.300

(Zero Order Correlations)
Regression weights
Note: * = *p*<.05, ^=*p*<.10

Figure 10. A comparison of the T2 Reasons Model predicting quitting intentions at T2 for primagravida (upper panel) and multigravida (lower panel) mothers.
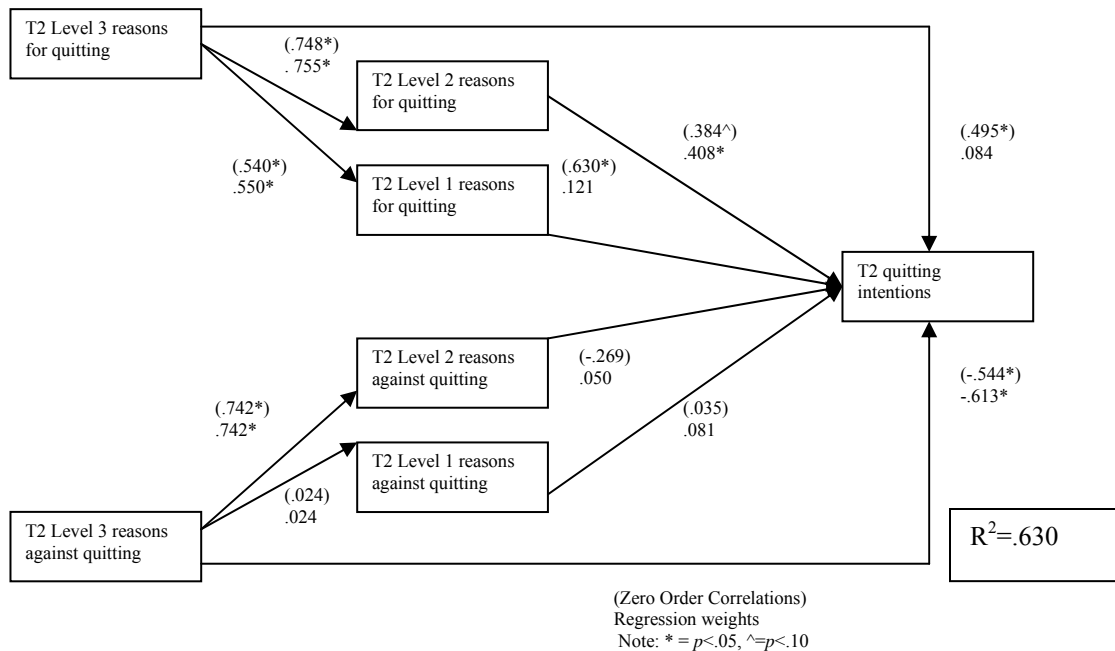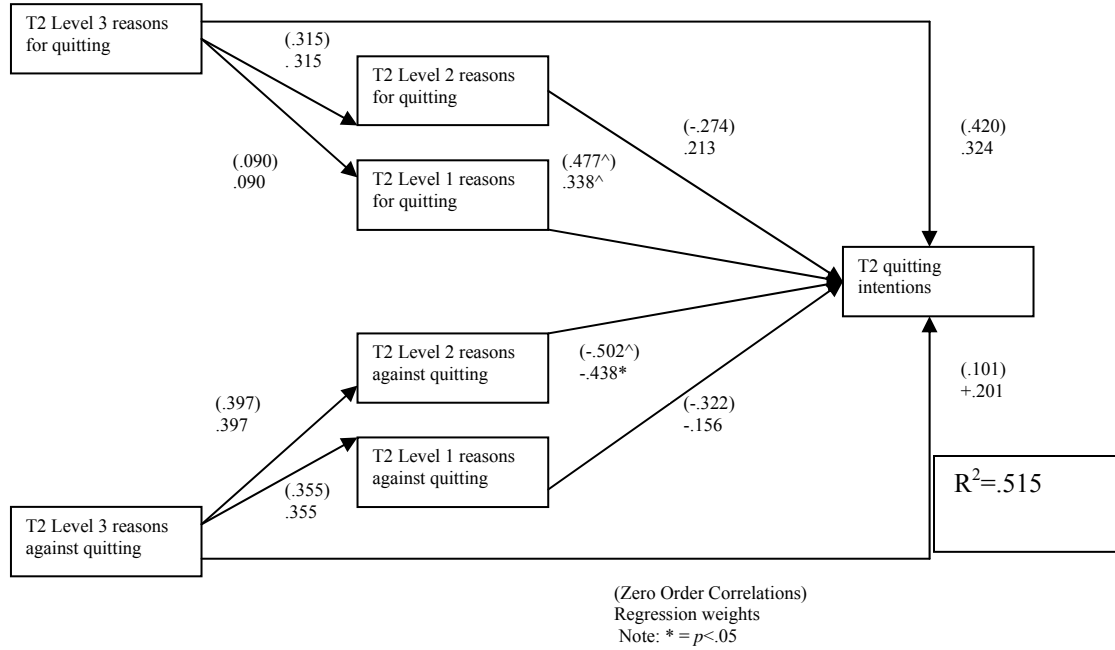
Figure 11. A comparison of the T1 Reasons Model predicting quitting intentions at T2 for primagravida (upper panel) and multigravida (lower panel) mothers.

Upper panel:

T1Level 3 reasons for quitting → (.574*) .574* → T1 Level 2 reasons for quitting

T1Level 3 reasons for quitting → (.494*) .494* → T1 Level 1 reasons for quitting

T1 Level 2 reasons for quitting → (.465^) .-.036 → T2 quitting intentions

T1 Level 1 reasons for quitting → (.346) -.073 → T2 quitting intentions

T1Level 3 reasons for quitting → (.445) .613^ → T2 quitting intentions

T1 Level 3 reasons against quitting → (.475*) .475* → T1 Level 2 reasons against quitting

T1 Level 3 reasons against quitting → (.046) .046 → T1 Level 1 reasons against quitting

T1 Level 2 reasons against quitting → (-.282) -.443* → T2 quitting intentions

T1 Level 1 reasons against quitting → (-.246) -.155 → T2 quitting intentions

T1 Level 3 reasons against quitting → (-.172) +.184 → T2 quitting intentions

R^2=.512

(Zero Order Correlations)
Regression weights
Note: * = p<.05, ^=p<.10

Lower panel:

T1 Level 3 reasons for quitting → (.780*) .780* → T1 Level 2 reasons for quitting

T1 Level 3 reasons for quitting → (.747*) .747* → T1 Level 1 reasons for quitting

T1 Level 2 reasons for quitting → (.435*) .492^ → T2 quitting intentions

T1 Level 1 reasons for quitting → (.519*) .617* → T2 quitting intentions

T1 Level 3 reasons for quitting → (.288) .550^ → T2 quitting intentions

T1 Level 3 reasons against quitting → (.604*) .604 → T1 Level 2 reasons against quitting

T1 Level 3 reasons against quitting → (.112) .112 → T1 Level 1 reasons against quitting

T1 Level 2 reasons against quitting → (.063) .092 → T2 quitting intentions

T1 Level 1 reasons against quitting → (.142) -.091 → T2 quitting intentions

T1 Level 3 reasons against quitting → (.312) .337 → T2 quitting intentions

R^2=.449

(Zero Order Correlations)
Regression weights
Note: * = p<.05, ^=p<.10

A Comparison of SDT at T2 by Level of Experience. In the T2 data (figure 13) the

relationship between autonomous motivation and smoking behaviour is no longer significant.

For primagravida participants, controlled motivation is the only significant predictor of

smoking behaviour, while perceived competence is the only significant predictor of smoking

for multigravida participants.

A Comparison of SDT Across Time by Level of Experience: As with the T1 data,

autonomous motivation to quit smoking emerges as a significant predictor of smoking

behaviour at T2 for primagravida participants. This would suggest that it is only the ratings of

autonomous motivation at T1 that predict increases in smoking behaviour across time periods.

For multigravida participants, perceived competence and controlled motivation remain strong

predictors of smoking behaviour.

Relationships between Reasons Model and Self-Determination Theory

As can be seen in Tables 18-21, a number of significant correlations exist between

Reasons Model variables and SDT variables. In particular, correlations were noted between

autonomous motivation and controlled motivation with reasons for quitting for both

primagravida and multigravida participants. This suggests that participants who more strongly

endorse reasons for quitting smoking are also more likely to feel motivated to quit smoking

(both autonomous and controlled motivation).

Figure 12. A comparison of the T1 Self-Determination Theory predicting smoking behaviour at T1 for primagravida (upper panel) and multigravida (lower panel) mothers.
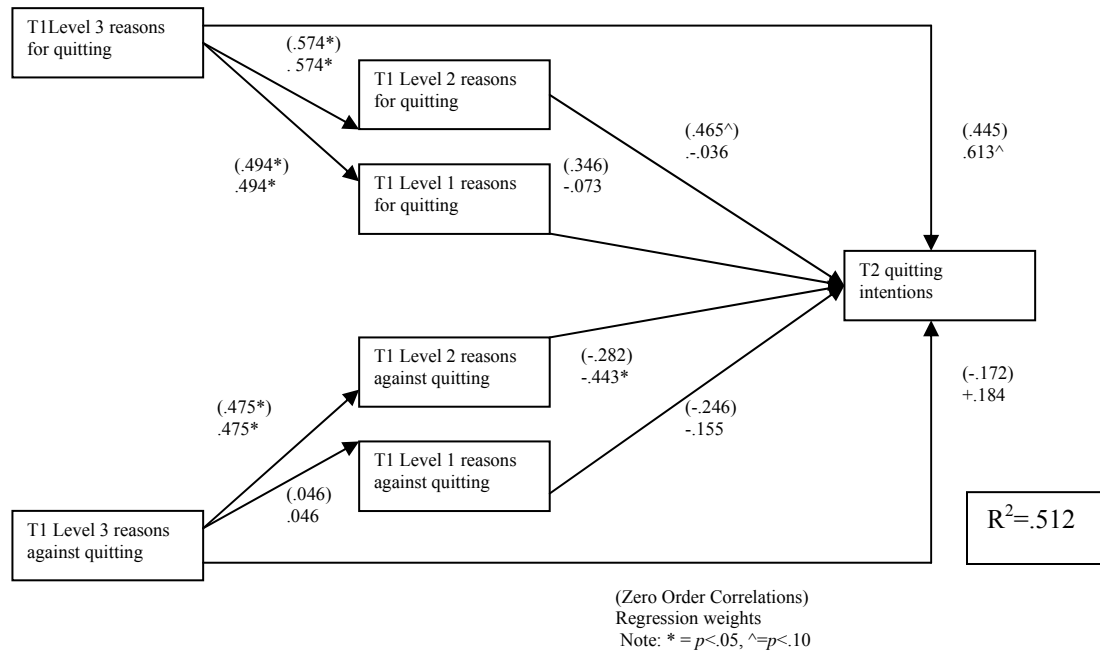

T1 Autonomous motivation to quit smoking

T1 Controlled motivation to quit smoking

T1 Perceived competence to quit smoking

(.415*)
.415*

(-.016)
.326^

(-.367^)
-.332^

(-.400*)
-.432*

T1 smoking behaviour

R²=.313

(zero order correlations)
Regression weights
Note: *=p<.05

T1 Autonomous motivation to quit smoking

T1 Controlled motivation to quit smoking

T1 Perceived competence to quit smoking

(.587*)
.587*

(.383*)
.021

(-452*)
-.282

(-..64*)
-.453*

T1 smoking behaviour

R²=.292

(zero order correlations)
Regression weights
Note: *=p<.05

Figure 13. A comparison of the T2 Self-Determination Theory predicting smoking behaviour at T2 for primagravida (upper panel) and multigravida (lower panel) mothers.

T2 Autonomous motivation to quit smoking

(.715*)
.715*

T2 Controlled motivation to quit smoking

(-.350)
.072

T2 Perceived competence to quit smoking

(-.492^)
-.503*

T2 smoking behaviour

(-.290)
-.154

(zero order correlations)
Regression weights
Note: *=*p*<.05

R²=.230

T2 Autonomous motivation to quit smoking

(.521*)
.521*

T2 Controlled motivation to quit smoking

(-.139)
.228

T2 Perceived competence to quit smoking

(-.079)
.013

T2 smoking behaviour

(-.744)
-.776*

(zero order correlations)
Regression weights
Note: *=*p*<.05

R²=.657

Figure 14. A comparison of the T1 Self-Determination Theory predicting smoking behaviour at T2 for primagravida (upper panel) and multigravida (lower panel) mothers.
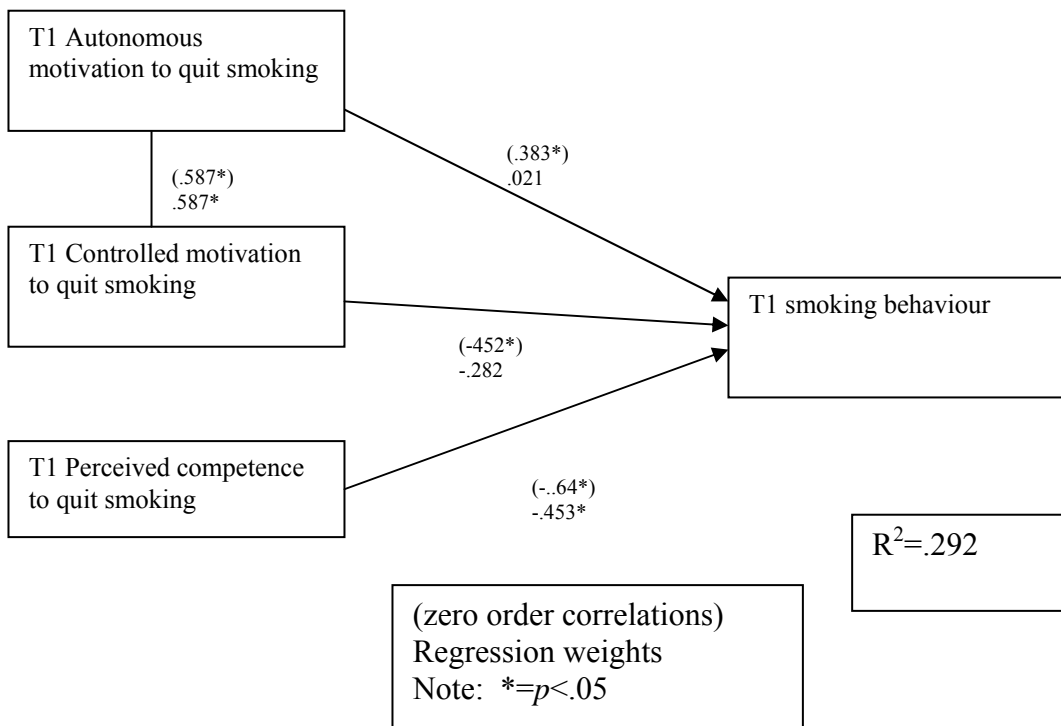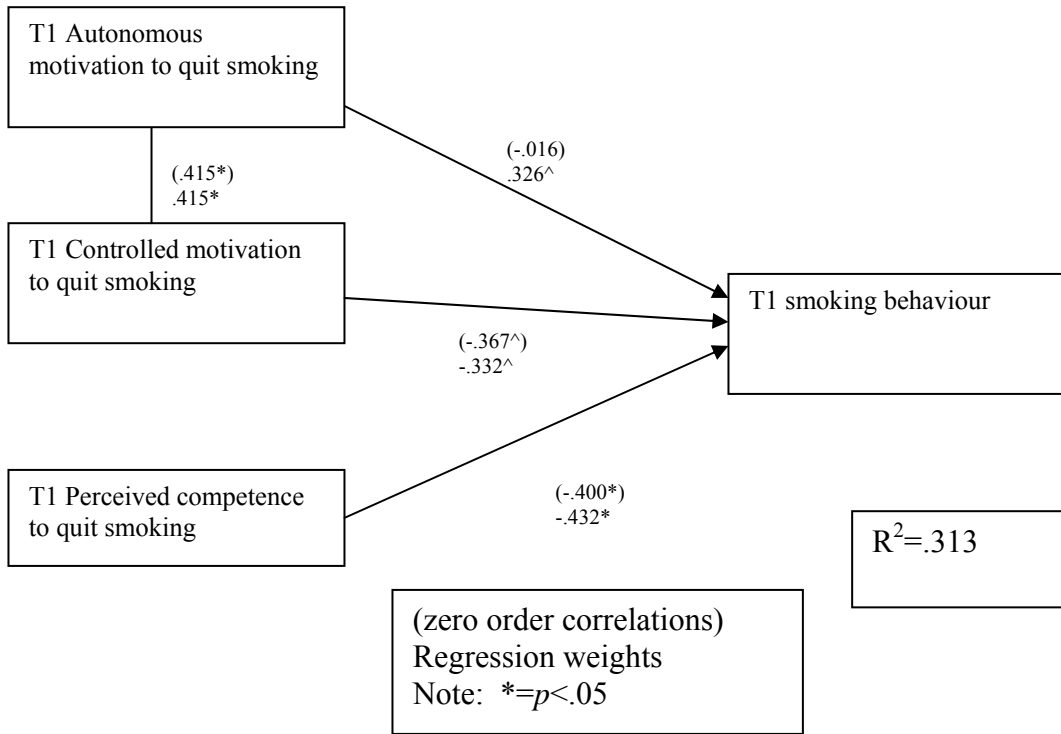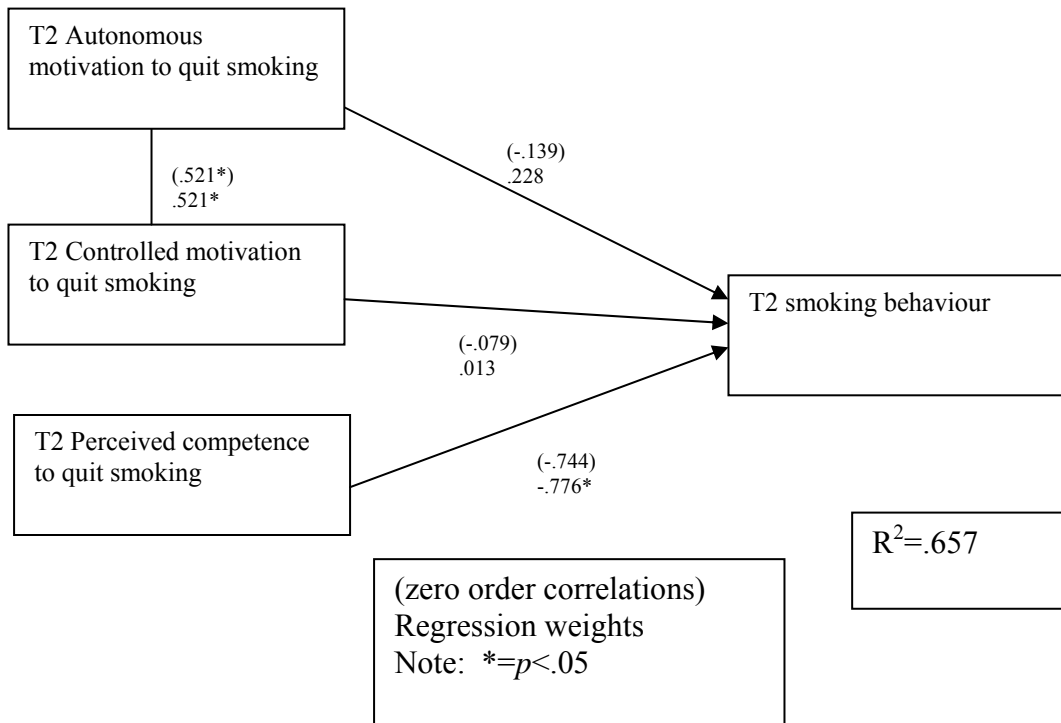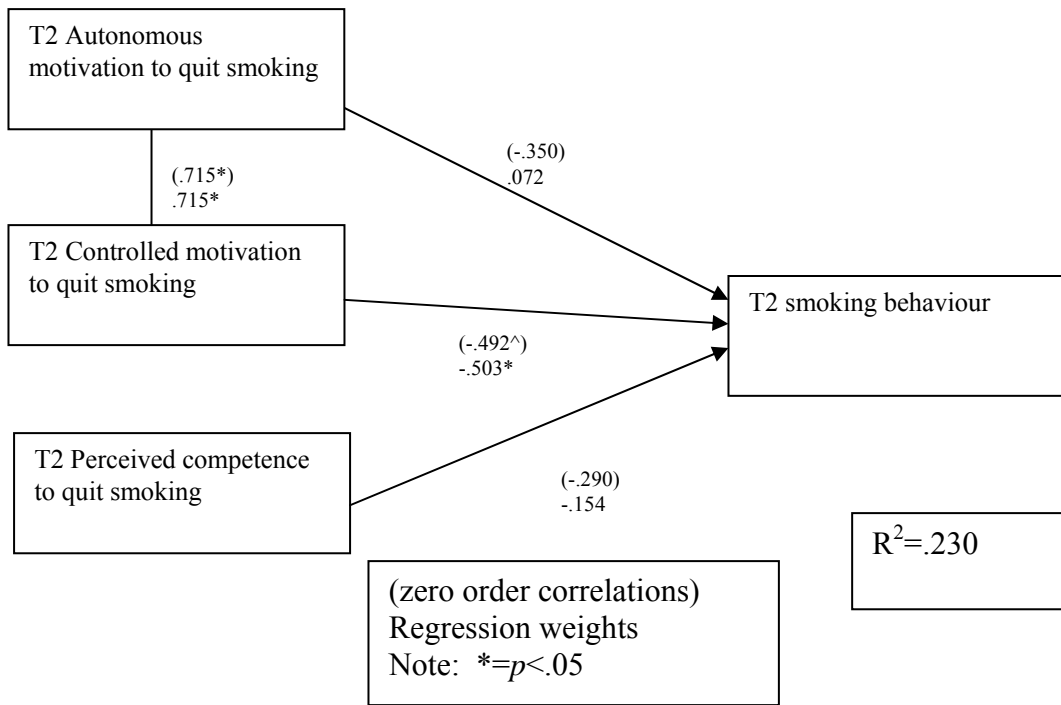
Table 18

Correlations of Self-Determination Theory Variables and Reasons Model levels at T1 for

primagravida participants

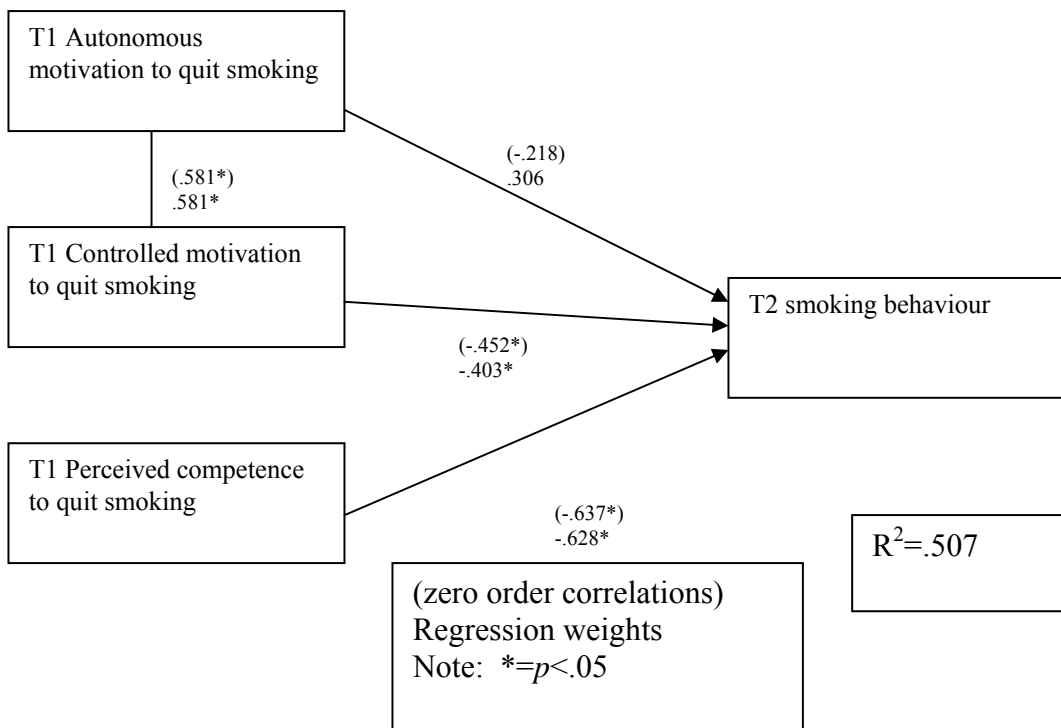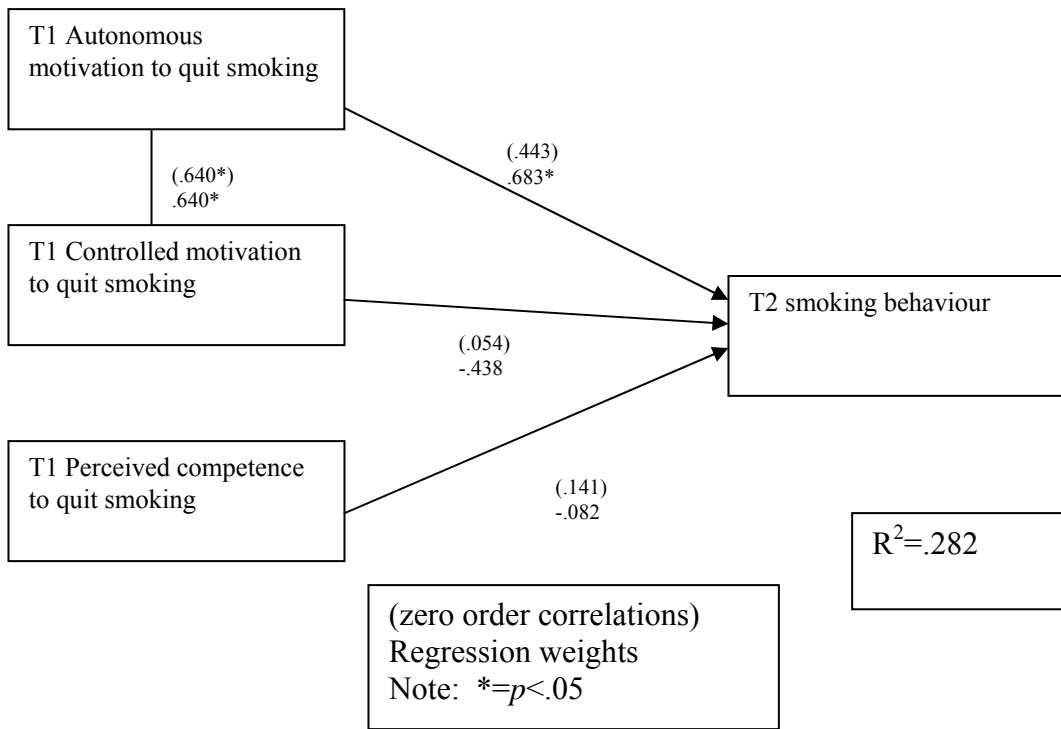| Variable at T1	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Level I Reasons for quitting	1	.21	.24	-.40*	-.14	-.17	.29	.38^	.24
2. Level II Reasons for quitting		1	.30	-.10	-.26	-.08	.44*	.51*	-.49*
3. Level III reasons for quitting			1	.18	.37^	.05	.56*	.49*	.35
4. Level I reasons against quitting				1	.19	.00	.06	.17	.12
5. Level II reasons against quitting					1	.67*	-.16	.12	-.14
6. Level III reasons against quitting						1	-.30	.03	-.23
7 Autonomous motivation to quit							1	.42*	.46*
8. Controlled motivation to quit								1	.40*
9. Perceived competence to quit									1

Note: *=p<.05, ^=p<.10

Table 19

Correlations of Self-Determination Theory variables and Reasons Model levels at T1 for

multigravida participants

Variable at T1	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Level I Reasons for quitting	1	.64*	.76*	.02	.22	-.01	.75*	.57*	.51*
2. Level II Reasons for quitting		1	.75*	.05	.19	-.02	.58*	.71*	.55*
3. Level III reasons for quitting			1	.18	.37^	.05	.56*	.49*	.35
4. Level I reasons against quitting				1	.19	.00	.06	.17	.12
5. Level II reasons against quitting					1	.62*	.21	.19	-.32
6. Level III reasons against quitting						1	-.03	.15	-.35
7 Autonomous motivation to quit							1	.59*	.51*
8. Controlled motivation to quit								1	.42*
9. Perceived competence to quit									1

Note: *=p<.05, ^=p<.10

Table 20

Correlations of Self-Determination Theory Variables and Reasons Model levels at T2 for

primagravida participants

Variable at T2	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Level I Reasons for quitting	1	-.04	.09	-.26	-.20	.11	.29	.43	-.27
2. Level II Reasons for quitting		1	.32	.74*	.85*	.48^	-.12	.04	.12
3. Level III reasons for quitting			1	.03	-.04	.11	.57*	.40	.68*
4. Level I reasons against quitting				1	.66*	.36	-.27	.04	.22
5. Level II reasons against quitting					1	.40	-.30	-.19	-.20
6. Level III reasons against quitting						1	-.38	-.20	-.19
7 Autonomous motivation to quit							1	.71*	.51^
8. Controlled motivation to quit								1	.34
9. Perceived competence to quit									1

Note: *=p<.05, ^=p<.10

Table 21

Correlations of Self-Determination Theory Variables and Reasons Model levels at T2 for

multigravida participants

Variable at T2	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Level I Reasons for quitting	1	.40^	.54*	-.14	-.33	-.49*	.58*	.19	.51*
2. Level II Reasons for quitting		1	.75*	-.02	.45*	.27	.39	.53*	.21
3. Level III reasons for quitting			1	-.19	-.14	-.11	.54*	.54*	.57*
4. Level I reasons against quitting				1	.03	.02	.02	-.19	.29
5. Level II reasons against quitting					1	.74*	-.30	.06	-.48*
6. Level III reasons against quitting						1	-.16	.35	-.46*
7 Autonomous motivation to quit							1	.52*	.47*
8. Controlled motivation to quit								1	.26
9. Perceived competence to quit									1

Note: *=p<.05, ^=p<.10

An Examination of the Reasons Model and Self-Determination Theory by Level of Experience

As a means of examining the effect of pregnancy experience on smoking behaviour within the Reasons Model, a sequential multiple regression analysis was employed with weekly average of cigarettes smoked as the dependent variable. All variables were standardized. As SDT is a more-established model of health behaviour change, the SDT variables of perceived competence (*b*= -.42, p< .01) autonomous motivation (*b*= .11, p = .48), and controlled motivation (*b*= -.33, p= .02)were entered first, with higher levels of perceived competence and controlled motivation predicting lower levels of smoking behaviour. The Reasons Model variables of summed reasons for quitting (*b*= -.42, p= .01)and summed reasons against smoking (*b*= .29, p= .01) were entered next, with higher ratings of reasons for quitting and lower ratings of reasons against quitting predicting lower levels of smoking behaviour. The level of experience variable (*b*= .39, p= .08) was entered next (i.e. primagravida vs. multigravida), and was marginally significant with primagravida participants smoking less than multigravida participants. Lastly, the interaction terms between level of experience with the SDT and Reasons Model variables were entered, and none were found to be significant predictors of smoking behaviour (see Table 22), indicating that within the current study, primagravida and multigravida participants do not significantly differ from one in terms of the ability of SDT or Reasons Model to predict smoking behaviour.

Table 22

Predicting smoking behaviour by level of experience using Self-Determination Theory and

merged Reasons Model levels

Interaction Term	*b*	p
Perceived competence x level of experience	.22	.44
Autonomous motivation x level of experience	-.18	.52
Controlled motivation x level of experience	.18	.53
Summed reasons for quitting smoking x level of experience	-.64	.09
Summed reasons against quitting smoking x level of experience	.29	.22

DISCUSSION

The current study was aimed at better understanding the unique pathways and barriers to abstaining from smoking during pregnancy and the postpartum period in order to better predict who is most at risk for an increase in smoking behaviour or relapse from quitting smoking. The study employed two theoretical models of health behaviour change that have been shown to provide an understanding of health behaviours by looking at the experiences and cognitions of the individual. Prior to this study, neither the Reasons Model nor Self-Determination Theory had been applied to research with pregnant smokers, but both had the potential to provide information about pregnant smokers by going beyond previously established (mainly demographic) risk factors of smoking during pregnancy and the postpartum period. This was particularly relevant for the current sample as the majority of participants were in the high-risk group for continued smoking and relapse (e.g. younger, low income, high levels of stress), and consistent with previous research, very few of these participants were able to quit completely. However, differences did exist in terms of intentions to quit smoking and ability to significantly reduce the number of cigarettes smoked during pregnancy and the postpartum period. These differences in intentions to quit and smoking behaviour were predicted by both the Reasons Model and Self-Determination Theory, indicating that, as was predicted, both models provide add important insights into an individual's level of risk for smoking behaviour. The current study also found that primagravida and multigravida participants differed in terms of their thoughts about their smoking behaviour and their ability to successfully predict intent to quit and smoking behaviour.

The prenatal nutrition classes that participants in this study were drawn from were run through the local health unit and targeted at low income and higher needs populations. For this reason participants tended to be younger, to be in unstable romantic relationships, and to report high levels of stress and depression. Despite their relative youth, participants were evenly split in terms of whether this was a first or subsequent pregnancy. All participants were smokers prior to becoming pregnant, and all but one had attempted to quit at least once prior to the time of the interviews. The majority of participants reported an intention to quit during pregnancy, yet very few were able to quit or to maintain quit status throughout their participation in the study. Nevertheless, smoking rates dropped significantly from pre-pregnancy to pregnancy rates, while exhibiting a trend of increasing again after the baby was born.

All participants were able to identify at least some of the risks of smoking during pregnancy, although did not always see the risk as relevant to them. For example, many dismissed the risk of having a low infant birthweight baby as being either untrue, or as being a positive outcome. Participants were aware of health risks of smoking postpartum, though most reported an intention to smoke outside after their baby was born with the belief that this would significantly reduce the health risk to their infant. While the majority of participants were aware that this did not fully negate any adverse effects on their infant, a proportion of participants did tend to see this as almost equal to not smoking at all. Further, participants were aware that smoke would still be on their clothes and bodies, but did not seem to fully understand the potential adverse health effect it may have on their children. While pregnant women are well aware of the risks of smoking during pregnancy, their understanding of the health risks of infant

exposure to environmental tobacco smoke are less clear, suggesting a need for ongoing education and support to stay quit or reduce smoking after the baby is born.

Stress management was most often reported as a main reason for continuing to smoke as well as needing a break and having family members or friends who smoked around them. The main reason cited for not smoking was related to the health of the baby as well as to their own health. Participants tended to report that partners and family members were supportive of a decision to quit smoking, though they also noted that a risk factor for smoking was the presence of family members and friends who smoked. Thus, while family and friends may attempt to support pregnant women by encouraging them not to smoke, they may, collectively, exist as a source of mixed messages if some continue to smoke. This seemed to become more of a risk factor during the postpartum period, with family and friends being more likely to smoke around participants and less likely to provide advice to stay quit. Past research has identified the role of partner smoking status as a significant risk factor for continued smoking during pregnancy and postpartum relapse (Johnson et al., 2004; Lelong et al., 2001), and indicated the need to include partners in any intervention for pregnant women. The qualitative interviews with the current population are consistent with this finding, and suggest that partners, family, and friends can be most helpful if pregnant women are able to socialize without smoking, and continue to receive encouragement throughout the pregnancy and postpartum period.

In terms of support from family doctors and obstetricians, physicians were seen as generally supportive, but only in educating women about the risks of smoking during pregnancy. None of the participants reported that their physician had discussed any quit methods with them. While relatively recent approval of nicotine replacement therapies (NRT) such as the nicotine patch has been granted for pregnant woman, this information was not given to any of the

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participants. Quite the opposite, many seemed to think that NRT was not an option for them. This is consistent with previous research which has shown that many physicians will ask and advise about smoking, but only 35 percent provide assistance by providing material or by spending more than two minutes talking with patients about their smoking behaviour, by prescribing NRT or by telling them about programs and only 8 percent arranged for follow-up with patients in regard to their smoking (Goldstein et al., 1998).

Even more disturbing in the present study was the finding that around one third of participants received advice from physicians *not to quit* either due to the hypothesized added stress on the fetus or due to the belief that the baby was addicted to nicotine and would go through withdrawal. While it is unknown what information was actually given to participants by their physicians, this was reported with high enough frequency to suggest a need to reaffirm and perhaps re-educate some physicians with clear and appropriate advice for their pregnant patients.

Future research is warranted in terms of the role physicians can play in helping women to reduce their smoking behaviour during pregnancy and postpartum. Within the region from which participants were drawn, one of the nurses with Waterloo Region Health Unit had attempted to start a quit smoking group for pregnant smokers. Unfortunately, very few individuals called to voice an interest, and there did not seem to be support from the medical community to refer patients to the group. Previous research has shown that physician interventions (Ershoff, Quinn, Mullen, & Lairson, 1990; Lawrence et al., 2005) have had limited success beyond the difficulty in recruiting such patients, yet the current study found that messages not to quit, whether directly or indirectly conveyed, have had powerful impact in guiding behaviour among the participants. One woman reported not quitting as she was given a pamphlet on what to do if she smoked while pregnant and interpreted that as saying it was okay not to quit.

Role of Stress, Depression, and Maternal-Infant Bonding on Smoking Behaviour and Quitting

Intentions

High levels of stress and depression as well as more specific mental health diagnoses have been related to continued smoking and relapse with pregnant smokers (Cornelius et al., 2004). For this reason, these variables were assessed in the current study as was their relationship to variables from the Reasons Model and from Self-Determination Theory. However the majority of participants rated themselves as being highly stressed and as exhibiting symptoms of depression in the clinical range, producing a ceiling effect in these data. This high level of emotional distress is not surprising given the participant sample, which was largely drawn from a high-needs group of younger mothers who were either single or in unstable romantic relationships. While neither stress nor depression were found to be related to quitting intentions or to smoking behaviour, they were related to Level I and Level II reasons against quitting (Reasons Model) and perceived competence to quit (SDT). Even within this restricted range, it was noted that participants who were highest in levels of stress and depression felt less competent to quit smoking and more strongly endorsed barriers to quitting and a self-concept consistent with continuing to smoke. This finding is consistent with the respective theories of Reasons Model and SDT, but does suggest the need for further research with a sample across a broader range of reported stress and depression levels to permit a better understanding of the impact of stress and depression on an individual's cognitions and subsequent ability to make positive health behaviour changes. Maternal-infant bonding was also assessed in terms of its relationship to levels of stress and depression, and was hypothesized to impact motivation and ability to make positive changes in smoking behaviour. However, a ceiling effect existed here as well, in which all women reported high levels of bonding to their infants during the postpartum

periods (T2 and T3), and no relationship was found between level of bonding with smoking behaviour and quitting intentions. These findings on maternal-infant bonding was also in contrast to participant interviews in which some women were reported difficulties with their newborn relating to constant crying or lack of sleep. As such, it may be necessary to assess maternal-infant bonding in either an interview format or using more subtle questions, as social desirability likely affected participant responses.

Reasons Model

The ability to test Reasons Model was hindered by a small participant sample and a lack of empirical support for the tri-level structure of the Reason Model. However, overall, the current study provided some initial support for the Reasons Model. It was hypothesized that Level III reasons both for and against quitting would significantly predict their respective Level I and Level II reasons, and this was generally seen within the path models.

Within the whole sample, a trend was seen in which participants consistently endorsed Level III reasons for quitting across the pregnancy and postpartum time periods. However, participants were more likely to endorse Level I reasons to quit during pregnancy and Level II reasons to quit during the postpartum periods. This was consistent with findings from Rempel and Fong (2005) that, initially, women were more likely to focus on factual Level I reasons for breastfeeding during their pregnancy, but with more experience with the behaviour their focus shifted more to barriers and aids to breastfeeding (Level II reasons).

Also consistent with Rempel and Fong (2005) was the finding that, while there were some negative correlations between reasons to quit and reasons not to quit, overall the levels were independent of one another, as participants were endorsing both reasons for and against quitting. This suggests that it is important to help pregnant women identify reasons they want to

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quit, but it is just as important to identify reasons used to justify continued smoking or seen as barriers to quitting. In order to have a successful intervention, the Reasons Model would suggest it is necessary to address an individual's specific reasons as opposed to simply attempting to replace or supplant them with reasons to quit.

It was hypothesized that all three levels of reasons, both for and against quitting, would be predictive of intentions to quit. However, this hypothesis was not supported within the current sample, as different levels were found to be significant at different times. Level III reasons were most consistently found to be a significant predictor of intentions to quit, pointing to the importance of understanding a woman's individual barriers to quitting, particularly those that are most relevant to her personal beliefs and views about herself.

Analyses with the Reasons Model using the whole sample were somewhat supportive of the hypotheses, but suggested the need to determine whether level of experience played a role in self-reports on the Reasons Model measures, and the impact this had on the ability of the Reasons Model to predict intentions to quit. As such, the ability of the Reasons Model to predict intentions to quit was analyzed separately for primagravida and multigravida participants. Given the small sample size, many of the comparisons between groups were not possible. However, a trend was noted in which multigravida participants tended to report reasons that were more predictive of intentions to quit than were the reasons reported by primagravida participants at T1 and T2. These findings are supportive of hypotheses made regarding level of experience, and indicate that those with more experience with pregnancy and childrearing have a better understanding of the reasons for and against quitting that are relevant for them. Multigravida participants were better able to accurately identify reasons in determining their intentions regarding smoking behaviour as well as their actual behaviour. Attitude-behaviour consistency

research (Fazio et al., 1978b) would suggest this is related to the nature of the information collected (i.e. direct versus indirect). Primagravida women receive information through physicians, partners, family members, and books in determining whether or not to quit smoking. Almost universally, this advice and information points to the need to quit smoking. However, multigravida women have the experience bringing home a newborn infant that not only gives them insight into how they will react, but also into whether the advice from others is accurate for them. Women with prior experience who have healthy children are more aware of the impact of bringing home and infant, and may be more likely to dismiss health risks such as low birthweight or respiratory illness.

Self-Determination Theory

It was hypothesized that autonomous motivation and perceived competence would be strong predictors of current and future smoking behaviour, and that controlled motivation would not have as strong an impact. While perceived competence to quit was consistently found to be a strong predictor of smoking behaviour, it was controlled motivation that seemed to play the largest role in predicting a reduction in smoking behaviour. However, it should be noted that autonomous motivation and controlled motivation were significantly correlated with one another, and that the factor analyses revealed a less clean division between the two types of motivation than had been found in other studies of SDT, suggesting that the distinction between autonomous and controlled motivation is less clear within the current participant sample.

This lack of distinction may be suggestive of a relationship between a woman's drive to be responsible for her child's health (i.e. autonomous motivation) with a more controlled motivation to quit smoking as they are carrying a child means that they are no longer making decisions solely for themselves. Thus, while they may have autonomous motivation to do what is

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best for their child, they may also feel a sense of controlled motivation from their child and others in feeling they had to quit smoking because of the baby, despite not wanting to. During the interviews, many women commented that this is not just their body, that the baby has no choice when they are inside me, and that they were more likely to listen to what others had to say regarding their smoking behaviour.

This may also reflect the fact that they are also more responsive to pressure from their physician and others to quit smoking or reduce their smoking. Further, others in their lives (perhaps out of concern for the baby) may increase the pressure they put on women during pregnancy as opposed to when they are not pregnant.

The results of the current study suggest a need to better understand the relationship between the two types of motivation for pregnant women. This is a unique population for whom controlled motivation may take on a more prominent role given the woman's need to think about the needs of the infant and the need to put aside her own needs. This situation thus may psychologically be closer to controlled motivation than autonomous motivation, and this may explain the pattern of results. However, it has also been noted in Greaves et al. (2003) that while many women do quit for the health of their child, an intervention has the best chance of succeeding long-term when it takes into consideration the environment in which women are trying to quit and helps women identify more long-term motivations to quit smoking.

Both partner support to quit and general level of support from partner were also expected to be strong predictive factors against increased smoking behaviour. That may be true in populations with relatively stable relationships. However, the current sample consisted largely of women in short-term and frequently changing relationships. As such, hypotheses regarding partner support could not be tested.

Within SDT, when primagravida participants were examined separately from the multigravida participants, autonomous motivation had a *positive* relationship with smoking for primagravida participants such that higher levels of reported autonomous motivation were related to *higher* levels of smoking behaviour. While the possibility that this might be a suppression effect from controlled motivation was examined, it was not found to be the case. It is unclear how to interpret this finding, though may suggest that first time mothers who were smoking more attempted to compensate for their behaviour by having a stronger motivation to quit, and this motivation may have also have been more strongly influenced by messages from others to quit.

Relationship of Reasons Model and Self-Determination Theory

As expected, a number of similarities were found between the two theoretical models of health behaviour change. There was consistency within the models in terms of their ability to predict both quitting intentions and smoking behaviour, and both tended to do better when predicting smoking behaviour, making for more coherent comparisons between the two models. Examination of the items used to measure the variables for Reasons Model and of SDT suggested a number of similarities. However, differences emerged in terms of the way in which the items were categorized. Both models provide valuable insight into the cognitions of the pregnant smoker, yet categorize these cognitions in different ways. The Reasons Model organizes an individual's thoughts about health behaviour in terms of level of personal relevance and meaning, while SDT organizes thoughts in terms of feelings of competence, type of motivation, and awareness of the kind of supports available to them. The Reasons Model also differs from SDT as it also explicitly measures barriers to quitting or reasons for *not* engaging in a health behaviour, while SDT does not. This difference turned out to be important in terms of

the ability of the predictive ability of the two models, suggesting that understanding the barriers to engaging in health behaviour may be a useful complement to SDT. However, it should also be noted that a significant element of SDT could not be included in the present study as it was not possible to include level of autonomous support from partner in the analysis due to a lack of stability among the relationships of participants. For future research with pregnant smokers, it may be useful to include support not only from romantic partners, but also to identify the presence or absence of other supports (e.g. parents, friends, physicians) in determining their role in helping pregnant women to change their smoking behaviour.

Implications for Harm Reduction and Intervention

The findings for both the Reasons Model and Self-Determination Theory suggests a number of ways in which the theoretical models can guide interventions aimed to help pregnant women reduce their smoking behaviour or quit smoking and to maintain the change over the postpartum period, and consistent with participant reports, maintain this change indefinitely.

While a number of extensive interventions have been attempted with pregnant smokers, success has been minimal and typically related to only short-term success postpartum (Mullen et al., 1997; Secker-Walker et al., 1998). Both the Reasons Model and SDT have the potential to provide valuable assessment tools that may guide more tailored and individualized interventions for participants based on their reported cognitions about quitting smoking. Given the differences over time, it also suggests the need for ongoing assessment of reasoning and motivation regarding smoking behaviour, particularly for primagravidas whose thoughts and experiences may change quite drastically from pregnancy to the postpartum. Assessment of both reasons for and against engaging in a behaviour as well as the environment or context in which an individual is attempting to make positive behaviour changes seem to be important factors in determining the

types of supports needed. Comments from participants regarding support (or lack thereof) from family, friends, and physicians suggests a need for clear, explicit, and consistent advice given across the pregnancy and postpartum periods. Partners and family members would benefit from education about the health risks both during pregnancy and postpartum, as well as information about how they can support someone who is pregnant and trying to quit. Participants reported that the support they received was negatively impacted by the smoking behaviour of their family and friends, and the noticeable change in level of encouragement after the baby is born. While controlled means of motivation may have a short-term impact of smoking behaviour (e.g. doing it for the baby, pressure from my husband), this does not translate well into long-term behaviour change, or a supportive intervention. It suggests the need for further research to identify ways in which pregnant women can move away from quitting for others and start to develop more long-term goals and strategies of quitting smoking for themselves to see long-term reductions in smoking behaviour.

Given the ratings of the primagravidas that were generally less consistent with their actual intentions to quit and smoking behaviour, it may be helpful to work with pregnant smokers to create more realistic goal setting and ways to deal with potential "failures" if they do not meet their expectations. Primagravida participants tended to report lofty goals of quitting, yet when interviewed, had few ideas as to how this would happen. In addition, interventions aimed at primagravida women may benefit from focusing increased support immediately after the baby is born to help them maintain their success during pregnancy.

Limitations of the Current Study

A main limitation of the current study was the small sample size and substantial attrition rate. Both of these factors limited the number of analyses possible. In many ways the current

study is an initial exploration of the research questions. However, the number of significant effects and findings observed, despite the small sample size, does suggest that this is a research area worth further study. It will be important to follow-up with a larger sample to better determine the ability of Reasons Model and SDT to predict differences in rates of intentions to quit and smoking behaviour.

A second limitation of the study was the short duration during which participants were followed. Time constraints did not allow for longer term follow-up of participants, but it is likely that changes in smoking behaviour and intentions to quit would have been better observed over long time periods, as previous research has noted that many women are able to maintain abstinence up to 6 months postpartum (Severson et al., 1997).

The population from which the study sample was drawn, in some ways, represents a limitation of the present study. As noted above, the majority of participants tended to report high levels of stress and depression. This does not present a representative sample of women who smoke or are trying to quit during pregnancy, but does focus on those who have been identified as most at risk for continued smoking behaviour and postpartum relapse. However, the negative relationship between stress and depression with reasons against quitting and perceived competence to quit suggests the need to further examine the role of stress and depression on an individual's thinking about their health behaviour and ability to make positive shifts in their thinking and subsequent behaviour.

Further, comparisons between women who quit smoking and those who did not were not possible as only a few were able to quit completely during pregnancy, and even fewer were able to maintain quit status. However, there is some research literature that suggests reducing the number of cigarettes smoked may be a useful and more feasible harm reduction model for those

who are unable to quit smoking completely. Windsor, Li, Boyd, and Hartmann (1999) found that a 50 percent decrease in smoking rate significantly improved the infant's birthweight in contrast to those whose mothers continued to smoke at the same rate. Many of the women in the current study were able to reduce their weekly smoking rate to one or two cigarettes a day during their pregnancy, and some noted that not being able to use nicotine replacement therapies or medications to quit smoking prevented them from fully being able to quit, while others intended to quit and were attempting to gradually cut back to zero. Future research is needed to explore the issue of a harm reduction model for pregnant and postpartum women as opposed to a model of total abstinence. As has been suggested by the genetic research on the effect on smoking on fetuses (de la Chica et al., 2005), it may be helpful to identify pregnant smokers as light, moderate, or heavy smokers and assess differences in terms of their cognitions surrounding their smoking behaviour.

Final Conclusions

The current study has provide an initial step in exploring the reasons and motivations that affect a pregnant woman's ability to make positive changes in her smoking behaviour. It has shown the importance of looking beyond the unchanging demographic variables or level of physical addiction that distinguishes women who are able to quit and maintain quit status from those who continue to smoke or relapse, as well as gaining a better understanding of why women continue to smoke or relapse despite wanting to quit and stay quit. This study suggests the need to incorporate a more individualized understanding of smoking behaviour based on level of direct experience, their motivations and reasoning both for and against reducing their smoking, and the influence of those around them. While further research is needed, the current study suggests that all of these factors will be important in both assessing for risk and developing

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successful interventions with pregnant smokers to allow them to meet and sustain their goal of

quitting smoking.

Reference List

American College of Obstetricians and Gynecologists (2007). *Substance abuse in pregnancy* (Rep. No. 195).

Bottorff, J. L., Johnson, J. L., Irwin, L. G., & Ratner, P. A. (2000). Narratives of smoking relapse: The stories of postpartum women. *Research in Nursing & Health, 23,* 126-134.

Bullock, L. F., Mears, J. L., Woodcock, C., & Record, R. (2001). Retrospective study of the association of stress and smoking during pregnancy in rural women. *Addictive Behaviors, 26,* 405-413.

Cohen, J. & Cohen, P. (1983). *Applied multiple regression/correlation for the behavioral sciences*. (2nd ed.) Hillsdale, NJ: Erlbaum.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24,* 385-396.

Condon, J. T. & Corkindale, C. J. (1998). The assessment of parent-to-infant attachment: Development of a self-report questionnaire instrument. *Journal of Reproductive and Infant Psychology, 16,* 57-76.

Cornelius, M. D., Leech, S. L., & Goldschmidt, L. (2004). Characteristics of persistent smoking among pregnant teenagers followed to young adulthood. *Nicotine and Tobacco Research, 6,* 159-169.

Cox, J. L., Holden, J. M., & Sagovsky, R. (1987). Detection of postnatal depression: Development of the 10-item Edinburgh Postnatal Depression Scale. *British Journal of Psychiatry, 150,* 782-786.

Curry, S. J., McBride, C., Grothaus, L., Lando, H., & Pirie, P. (2001). Motivation for smoking cessation among pregnant women. *Psychology of Addictive Behaviors, 15,* 126-132.

de la Chica, R. A., Ribas, I., Giraldo, J., Egozcue, J., & Fuster, C. (2005). Chromosomal instability in amniocytes from fetuses of mothers who smoke. *JAMA, 293,* 1212-1222.

Deci, E. L. & Ryan, R. M. (2008). Self-determination theory: An approach to human motivation@personality-questionnaires. Retrieved February 4, 2008 from. http://www.psyc.rochester.edu/sdt/measures/index.html [On-line].

Deci, E. L. & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11,* 227-268.

Dejin-Karlsson, E., Hanson, B. S., Ostergren, P. O., Ranstam, J., Isacsson, S. O., & Sjoberg, N. O. (1996). Psychosocial resources and persistent smoking in early pregnancy--a population study of women in their first pregnancy in Sweden. *Journal of Epidemiology and Community Health, 50,* 33-39.

Delpisheh, A., Attia, E., Drammond, S., & Brabin, B. J. (2006). Adolescent smoking in pregnancy and birth outcomes. *European Journal of Public Health, 16,* 168-172.

Ershoff, D. H., Quinn, V. P., Boyd, N. R., Stern, J., Gregory, M., & Wirtschafter, D. (1999). The Kaiser Permanente prenatal smoking-cessation trial: when more isn't better, what is enough? *American Journal of Preventive Medicine, 17,* 161-168.

Ershoff, D. H., Quinn, V. P., & Mullen, P. D. (1995). Relapse prevention among women who stop smoking early in pregnancy: a randomized clinical trial of a self-help intervention. *American Journal of Public Health, 11,* 178-184.

Ershoff, D. H., Quinn, V. P., Mullen, P. D., & Lairson, D. R. (1990). Pregnancy and medical cost outcomes of a self-help prenatal smoking cessation program in a HMO. *Public Health Rep., 105,* 340-347.

Ey, J., Holberg, L., Aldous, M., & Wright, A. (1995). Passive smoke exposure and otitis media in the first year of life. *Pediatrics, 95,* 670-677.

Fazio, R. H. & Zanna, M. P. (1978b). On the predictive validity of attitudes: the roles of direct experience and confidence. *Journal of Personality, 46,* 228-243.

Fazio, R. H. & Zanna, M. P. (1978a). Attitudinal qualities relating to the strength of the attitude-behavior relationship. *Journal of Experimental Social Psychology, 14,* 398-408.

Gaffney, K. F. & Henry, L. L. (2007). Identifying risk factors for postpartum tobacco use. *Journal of Nursing Scholarship, 39,* 126-132.

Goldstein, M. G., DePue, J. D., Monroe, A. D., Lessne, C. W., Rakowski, W., Prokhorov, A. et al. (1998). A population-based survey of physician smoking cessation counseling practices. *Preventive Medicine, 27,* 720-729.

Greaves, L., Cormier, R., Devries, K., Bottorff, J. L., Johnson, J. L., & Kirkland, S. A. D. (2003). *Expecting to quit: A best practices review of smoking cessation internvetions for pregnant and postpartum girls and women.* Vancouver, BC: British Columbia Centre of Excellence for Women's Health.

Haslam, C. & Draper, E. S. (2001). A qualitative study of smoking during pregnancy. *Psychology, Health & Medicine, 6,* 95-99.

Johnson, I. L., Ashley, M. J., Reynolds, D., Goettler, F., Lee-Han, H., Stratton, J. et al. (2004). Prevalence of smoking associated with pregnancy in three Southern Ontario Health Units. *Canadian Journal of Public Health, 95,* 209-213.

Kallen, K. (2001). The impact of maternal smoking during pregnancy on delivery outcome. *European Journal of Public Health, 11,* 329-333.

Klonoff-Cohen, H., Edelstein, S., Serfkowitz, E., & et.al. (1995). The effect of passive smoking and tobacco exposure through breast milk on sudden infant death syndrome. *JAMA, 273,* 795-798.

Lambers, D. & Clark, K. (1996). The maternal and fetal physiologic effects of nicotine. *Perinatology, 20,* 115-126.

Lawrence, T., Aveyard, P., Cheng, K. K., Griffin, C., Johnson, C., & Croghan, E. (2005). Does stage-based smoking cessation advice in pregnancy result in long-term quitters? 18-month postpartum follow-up of a randomized controlled trial. *Addiction, 100,* 107-116.

Lelong, N., Kaminski, M., Saurel-Cubizolles, M. J., & Bouvier-Colle, M. H. (2001). Postpartum return to smoking among usual smokers who quit during pregnancy. *European Journal of Public Health, 11,* 334-339.

Lowe, J. B., Windsor, R., Balanda, K. P., & Woodby, L. (1997). Smoking relapse prevention methods for pregnant women: a formative evaluation. *American Journal of Health Promotion, 11,* 244-246.

Lu, Y., Tong, S., & Oldenburg, B. (2001). Determinants of smoking and cessation during and after pregnancy. *Health Promotion International, 16,* 355-365.

Mascola, M. A., Van Vunakis, H., & Tager, I. B. (1998). Exposure of young infants to environmental tobacco smoke: breastfeeding among smoking mothers. *American Journal of Public Health, 88,* 893-896.

McBride, C. M., Curry, S. J., Lando, H. A., Pirie, P. L., Grothaus, L. C., & Nelson, J. C. (1999). Prevention of relapse in women who quit smoking during pregnancy. *American Journal of Public Health, 89,* 706-711.

McBride, C. M. & Pirie, P. L. (1990). Postpartum smoking relapse. *Addictive Behaviors, 15,* 165-168.

Meichenbaum, D. & Fong, G. T. (1993). How individuals control their own minds: A constructive narrative perspective. In D.M.Wegner & J. W. Pennebaker (Eds.), *Handbook of mental control. Century psychology series* (pp. 473-490). Englewood Cliffs, NJ, US: Prentice-Hall, Inc.

Mullen, P. D., Richardson, M. A., Quinn, V. P., & Ershoff, D. H. (1997). Postpartum return to smoking: who is at risk and when. *American Journal of Health Promotion, 11,* 323-330.

Mullen, P. D., Pollak, K. I., & Kok, G. (1999). Success attributions for stopping smoking during pregnancy, self-efficacy, and postpartum maintenance. *Psychology of Addictive Behaviors, 13,* 198-206.

Paarlberg, K. M., Vingerhoets, J. J. M., Passchier, J., Heinen, A. G. J. J., Dekker, G. A., & van Geijn, H. P. (1999). Smoking status in pregnancy is associated with daily stressors and low well-being. *Psychology & Health, 14,* 87-96.

Pbert, L., Ockene, J. K., Zapka, J., Ma, Y., Goins, K. V., Oncken, C. et al. (2004). A community health center smoking-cessation intervention for pregnant and postpartum women. *American Journal of Preventive Medicine, 26,* 377-385.

Prochaska, J. O. & Diclemente, C. C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology, 51,* 390-395.

Ratner, P. A., Johnson, J. L., Bottorff, J. L., Dahinten, S., & Hall, W. (2000). Twelve-month follow-up of a smoking relapse prevention intervention for postpartum women. *Addictive Behaviors, 25,* 81-92.

Regan, D. T. & Fazio, R. H. (1977). On the consistency between attitudes and behavior: look to the method of attitude formation. *Journal of Experimental Social Psychology, 13,* 28-45.

Rempel, L. A. (2004). Factors influencing the breastfeeding decisions of long-term breastfeeders. *J.Hum.Lact., 20,* 306-318.

Rempel, L. A. & Fong, G. T. (2005). Why Breastfeed? A longitudinal test of the reasons model among first-time mothers. *Psychology & Health, 20,* 443-466.

Rempel, L. A. (2000). Why breastfeed? Applying the reasons model to infant feeding decisions. *Dissertation Abstracts International: Section B: The Sciences and Engineering 61(6-B), 3326.*

Ryan, R. M. & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55,* 68-78.

Salihu, H. M., Aliyu, M. H., Pierre-Louis, B. J., & Alexander, G. R. (2003). Levels of excess infant deaths attributable to maternal smoking during pregnancy in the United States. *Maternal and Child Health Journal, 7,* 219-227.

Samet, J. M., Lewit, E. W., & Warner, K. E. (1994). Involuntary smoking and childrens' health. *Future Child, 4,* 94-119.

Secker-Walker, R. H., Solomon, L. J., Flynn, B. S., Skelly, J. M., & Mead, P. B. (1998). Smoking relapse prevention during pregnancy. A trial of coordinated advice from physicians and individual counseling. *American Journal of Preventive Medicine, 15,* 25-31.

Severson, H. H., Andrews, J. A., Lichtenstein, E., Wall, M., & Akers, L. (1997). Reducing maternal smoking and relapse: long-term evaluation of a pediatric intervention. *Preventive Medicine, 26,* 120-130.

Sondergaard, C., Henriksen, T. B., Obel, C., & Wisborg, K. (2001). Smoking during pregnancy and infantile colic. *Pediatrics, 108,* 342-346.

Stillman, R., Rosenberg, M., & Sachs, B. (1986). smoking and reproduction. *Fertility and Sterility, 46,* 545-566.

Stoddard, A. M. & Gray, B. (1997). Maternal smoking and medical expenditures for childhood respiratory illness. *American Journal of Public Health, 87,* 205-209.

Stotts, A. L., DiClemente, C. C., & Dolan-Mullen, P. (2002). One-to-One: A motivational intervention for resistant pregnant smokers. *Addictive Behaviors, 27,* 275-292.

Substance abuse and mental health Administration (1999). *National household survey on drug abuse*. Bethesda, MD: National Institute on Drug Abuse.

Valanis, B., Lichtenstein, E., Mullooly, J. P., Labuhn, K., Brody, K., Severson, H. H. et al. (2001). Maternal smoking cessation and relapse prevention during health care visits. *American Journal of Preventive Medicine, 20,* 1-8.

Van't Hof, S. M., Wall, M. A., Dowler, D. W., & Stark, M. J. (2000). Randomised controlled trial of a postpartum relapse prevention intervention. *Tobacco Control, 9 Suppl 3,* III64-III66.

Williams, G. C., Cox, E. M., Hedberg, V. A., & Deci, E. L. (2000). Extrinsic life goals and health-risk behaviors in adolescents. *Journal of Applied Social Psychology, 30,* 1756-1771.

Williams, G. C. & Deci, E. L. (1996). Internalization of biopsychosocial values by medical students: A test of self-determination theory. *Journal of Personality and Social Psychology, 70,* 767-779.

Williams, G. C., McGregor, H. A., Sharp, D., Levesque, C., Kouides, R. W., Ryan, R. M. et al. (2006). Testing a Self-Determination Theory Intervention for Motivating Tobacco Cessation: Supporting Autonomy and Competence in a Clinical Trial. *Health Psychology, 25,* 91-101.

Williams, G. C., McGregor, H. A., Zeldman, A., Freedman, Z. R., & Deci, E. L. (2004). Testing a Self-Determination Theory Process Model for Promoting Glycemic Control Through Diabetes Self-Management. *Health Psychology, 23,* 58-66.

Williams, G. C., Minicucci, D. S., Kouides, R. W., Levesque, C. S., Chirkov, V. I., Ryan, R. M. et al. (2002). Self-determination, smoking, diet and health. *Health Education Research, 17,* 512-521.

Williams, G. G., Gagné, M., Ryan, R. M., & Deci, E. L. (2002). Facilitating autonomous motivation for smoking cessation. *Health Psychology, 21,* 40-50.

Wilson, P. M., Longley, K., Muon, S., Rodgers, W. M., & Murray, T. C. (2006). Examining the contributions of perceived psychological need satisfaction to well-being in exercise. *Journal of Applied Biobehavioral Research, 11,* 243-264.

Windsor, R. A., Li, C. Q., Boyd, N. R., Jr., & Hartmann, K. E. (1999). The use of significant reduction rates to evaluate health education methods for pregnant smokers: A new harm reduction behavioral indicator? *Health Education & Behavior, 26,* 648-662.

Zeldman, A., Ryan, R. M., & Fiscella, K. (2004). Motivation, autonomy support, and entity beliefs: Their role in methadone maintenance treatment. *Journal of Social & Clinical Psychology, 23,* 675-696.

APPENDICES

Recruitment script

My name is _____. I am a researcher with the Department of Psychology at the University of Waterloo. We are currently working with Dr. Geoffrey Fong and one of his doctoral students, Jennifer Davidson-Harden. We are currently studying the issues that women who are pregnant face when they smoke, and the staff have graciously allowed me to speak to you today to invite you to take part in the study.

The purpose of this study is to understand the various issues that women who smoke, or who have quit or are trying to quit, face during their pregnancies and after the baby is born. I know this can be a sensitive subject. However, I want to make it clear that this is not a stop smoking program, and there won't be any pressure to quit. I am interested in finding out from pregnant women who smoke about their thoughts and experiences both during their pregnancy, and during the post-partum period. In order to do so, we are looking for women in their third trimester who are currently smokers, have cut back smoking since becoming pregnant, or quit because of your pregnancy. I want to talk to all of you, to make sure that we get all those different perspectives.

So for those of you who are interested in the study, what would this involve? It would involve completing an interview and a questionnaire at three different points in time: before your baby is born, 1-2 months after your baby is born, and 3-4 months after your baby is born. Each session will be approximately 40 minutes. The interview can either take place over the phone, or in person. During each interview I will ask you a number of questions about your thoughts and experiences surrounding smoking during your pregnancy, as well as your thoughts about smoking after the baby is born. If your choose to do the interview over the phone, the questionnaire will be sent out to you along with a self-addressed stamped envelope for you to return to us.

Your decision to participate is wholly your own. The staff are aware of my study and have given me permission to speak with you today about it. However, the final decision about whether to participate in this study or not is yours. No matter what you decide, this will not affect the care you receive. Further, please note that if you initially choose to participate you can withdraw from the study at any time with no penalty or bearing on the care your receive here.

To show our appreciation for your participation in this study, you will receive a gift certificate valued at $20 for each interview. This study has been reviewed and received ethics clearance from the Office of Research Ethics at the University of Waterloo.

So that I can get information on who is interested in participating, I'd like all of you to fill out this form. It will take just 2-3 minutes and everyone who is currently in their third trimester, smokers or not, can answer the questions. This form lets me know either that you are not interested in participating, or at the very least, that you would like to know more about the study. If you leave your contact information, I will call you and talk with you some more about the

study, and hopefully set up a time for the interview. If you are not interested in participating, please do not write down you contact information. When you are done, please place your form in the envelope and return it to me.

Thanks very much for your time.

Phone Scripts

Initial Phone Contact
Script:

Hi. May I speak to _____?

IF NOT THERE: Do not leave a message on the answering machine, if another person picks up:

Okay, when would be a good time to call her back?

IF THEY WANT TO KNOW WHO YOU ARE: "My name is _____ and I'm calling about a Pregnancy Study we're doing at the University of Waterloo.

IF THERE:

It's _____ calling with the Pregnancy and Smoking Study. I'm calling as you had indicated that you would be interested in learning more about the study. Is this a good time to talk? Okay, what I'll do is tell you a little more about the study, and then give you the chance to answer any questions. Then you can let me know whether or not you'd be interested in participating.

First, can I ask, are you someone who is currently smoking or has cut back or quit due to your pregnancy? (IF NOT, THEY CANNOT PARTICIPATE). Also, can you tell me how old you are? (MUST BE AT LEAST 16)

The study involves three sessions, the first of which takes place while you are still pregnant. It involves a brief interview and then filling out a series of short questionnaires. You can do the interview over the phone or in person, and we'll basically be asking you questions about your thoughts and experiences about smoking and pregnancy. So, all the questions will really be about smoking and pregnancy. The questionnaire should take no more than 30 minutes to complete, and will be mailed to you if you chose to do the interview over the phone. The second two sessions will take place approximately one month and three months after you baby is born. I know this is a busy time for you, so we try to keep these sessions as short as possible. They both also involve a brief interview and filling out questionnaires. If you choose to participate, you will receive a gift certificate valued at $20 for each session. The study has been approved by our Ethics Board at the University of Waterloo. Do you have any questions?

Okay, does this sound like something you would be interested in doing?

Great, now would you prefer the interview to take place over the phone or in person?
IF IN PERSON: It can be in your home, and would involve two members of our research team attending, both female.

Okay, let's set up a time to do the interview.

IF A PHONE INTERVIEW: I'd like to find a time for you in which you can be alone if possible.

Okay, now the gift certificates we are offering are to Zehr's, Walmart, or Fairview Mall. Which do you think you'd prefer?

Great, _____ will call you/see you at _____, and at that time she will go over some of this information and get your verbal/written consent before starting the interview. Thanks very much!

Second and Third Phone Contacts During Post-Partum Period

Hello, may I please speak to _____ Hello, my name is _____ and I'm calling about the Pregnancy and Smoking study you have been taking part in. Is this a good time to talk? Great, would it be possible for us to schedule a time to do the second/third short interview?

IF NO: Okay. I'd like to thank you for your participation thus far. Do you have any questions about the study? I will send out a letter to you which gives you a summary of the study and provides you with some contact information should you have any questions about the study at a later time.

IF YES: Okay, now would you prefer the interview to take place over the phone or in person?

Okay, let's set up a time to do the interview (CONSULT SCHEDULE).

IF A PHONE INTERVIEW: I'd like to find a time for you in which you can be alone if possible.

Okay, now the gift certificates we are offering are to Zehr's, Walmart, or Fairview Mall. Which do you think you'd prefer?

Great, _____ will call you/see you at _____, and at that time she will go over some of this information and get your verbal/written consent before starting the interview. Thanks very much!

Introduction at the Interviews

Hello, may I please speak to _____? Hello, my name is _____ and I'm calling regarding a study you agreed to participate in concerning pregnant women and smoking. Is this still a good time to do the interview with you?
NO: Alright, can we set up another time to speak?
YES: Great. Before we get started, I'd just like to remind you what the study is about and what kinds of questions I'll be asking you today. I'll also give you a chance to ask questions.

IF A PHONE INTERVIEW: If that all sounds good to you, I'll ask that you give verbal agreement to participate in the study, and we'll begin (The informed consent letter would be read here). I will also be mailing out the questionnaire for you to complete and return to us.

IF IN PERSON: I'll also give you this information letter to read over, and ask that you provide written consent to participate in the study and we'll begin. At the end of the interview, I'll ask you to complete a questionnaire

<u>Reminder Letter</u>

Study: Pregnancy and Smoking Study
Researchers: Dr. Geoffrey T. Fong, Jennifer Davidson-Harden
Affiliation: Department of Psychology, University of Waterloo
Contact Information: 519-888-4567, x33597

Dear _____,

We are sending this letter as a reminder that you will be contacted by telephone to schedule a second interview for the Pregnancy and Smoking Study you participated in during the third trimester of you pregnancy.

We recognize that this is an extremely busy time for you, and we will do everything possible to schedule the interview at a time that is convenient for you.   However, we also recognize that there are some circumstances in which it is not possible for you to continue participation with this study. If this is the case, please feel free to call us at 519-888-4567, ext. 33597. You can either discuss your situation with one of the researchers of the study or simply leave your name and phone number and indicate that you do not want to be contacted further. At that point, we will send you some information about the study as well as contact information both for us at the University of Waterloo and community support resources.

I would like to assure you that this study has been reviewed and received ethics clearance through the Office of Research Ethics. Should you have any comments or concerns resulting from your participation in this study, please contact Dr. Susan Sykes in the Office of Research Ethics at 519-888-4567 Ext. 36005.

Thank you for your participation in this project.

Participant Contact Agreement

Please complete this form concerning the Pregnancy and Smoking Study you have just heard about. If you would like a researcher to call you and tell you more about the study, please include your name and phone number. At that time, we will answer any questions you might have about the study and we will ask if you would like to participate.

How far along in your pregnancy are you? _____

Is this your first pregnancy? _____

☐   Yes, I will allow a researcher to contact me about the Pregnancy and Smoking Study. I have been told that this study meets strict ethical standards. I understand that any information I provide will be confidential and will only be used for the Pregnancy and Smoking Study

☐   No, I am not interested in learning more about this study or participating.

        If no, please indicate why: _____

If you answered YES, please provide the following information:

Name: _____

Phone Number: _____

What is a good time of day to call you? Please circle all that apply.

Morning   Afternoon   Evening

If you would like, please record specific times to call (e.g. only between 6-10pm; only on weekdays):

_____

Information Letter

Study: Pregnancy and Smoking Study
Researchers: Dr. Geoffrey T. Fong, Jennifer Davidson-Harden
Affiliation: Department of Psychology, University of Waterloo
Contact Information: 519-888-4567, x33597

If you choose to take part in this study, you will be asked some questions about your experiences and thoughts about both your pregnancy and smoking. As well, you will be asked about your thoughts and plans concerning smoking after your baby is born. We are interested in getting a better understanding of the unique issues faced by women who smoke, or are trying to quit smoking, while pregnant and during the post-partum period. Further, we are interested in following up with you after your baby is born to continue to discuss your thoughts and experiences surrounding smoking, and to see if this changes once your baby is born.

The study involves three sessions, each of which involves an interview and a questionnaire. The first session will take place during your pregnancy and will last approximately one hour. We will schedule the second and third sessions with you at approximately two months and four months after your baby is born. Both will be similar to the first interview, but should take less time to complete. You can choose to do the interviews over the phone or in person. If you chose to have the interview over the phone, we'll mail the questionnaire out to you.

Due to the length of time between interviews, we are also asking for an alternate contact number (e.g. the phone number of a friend or family member) that we could call should we be unable to contact you. However, you can still participate in the study even if you do not wish to give us an alternate contact number.

Your participation in this study is completely your choice. As well, your decision to participate or not has no effect on the care you receive through the Waterloo Region Health Unit. If you chose to take part in this study, you can refuse to answer any questions you are not comfortable with, and can stop the session at any time with no negative consequences. You should also be aware that no identifying information will be on any of the information you provide for us, so anything we publish as a result of this study would not have your name associated with it. As well, we keep all personal information strictly confidential. Only the researchers associated with the study have access to any identifying information (e.g. name, mailing address) collected during your participation.

The questions in these interviews will ask about your smoking behaviour and your thoughts and feelings about that behaviour. While we hope that this does not happen, it is possible that you may have a negative experience when asked to think about your smoking during your pregnancy. If you would like to talk with someone about your smoking during pregnancy, please let your interviewer know, or contact the Smokers Helpline at 1-877-513-5333 to receive information or support. After your baby is born, you may also want to contact Grand River Hospital's Antenatal

Clinic (591-749-4300 ext.2793) or Postpartum Disorders Support Group (519-749-4300 ext.2267). You could also contact a Community Health nurse at 519-883-2245 in Kitchener-Waterloo, and 519-621-6110 in Cambridge.

To thank you for you participation, you will receive a gift certificate valued at $20 for taking part in each session. If the interview takes place face-to-face, you will receive the gift at the end of the interview. If the interview takes place over the phone, the gift will be mailed to you soon after the interview.

The study has been reviewed and received ethics clearance from the Office of Research Ethics, whose job is to review research at the University of Waterloo. Any presentation of the data gathered from this study (in any publications or presentations based on the data) will be a summary of information given by all participants; no individual participants will be identified. Raw data will be retained for a period of at least seven years in a locked filing cabinet, and only the researchers of the study will have access to this data. If you have any questions about this study, please contact Jennifer Davidson-Harden (519-888-4567, x33597, e-mail: jmedavid@watarts.uwaterloo.ca) or Dr. Geoffrey Fong (519-888-4567, x33597, e-mail: gfong@watarts.uwaterloo.ca).

If you have any concerns resulting from your participation, please contact Dr. Susan Sykes, Office of Research Ethics, 519-888-4567, x36005.

<div align="center">Consent Form</div>

I have read the attached description of the study, and my signature below says that I agree to participate in this study. I understand that I can refuse to answer any questions or withdraw from the study at any time, and that this will have no negative consequences or any effect on the care I receive through the Waterloo Region Health Unit. I also understand that any information I provide in this study will remain completely confidential - no one, other than the researchers directly responsible for this study, will hear or see my responses. I have been given the chance to ask questions about this study and my participation in it, and have received satisfactory answers. I am aware that the study has been reviewed and received ethics clearance from the Office of Research Ethics, whose job is to review research at the University of Waterloo

Participant Name (please print clearly):_____

Signature: _____

Witness Name: _____

Signature: _____

Date: _____

<div align="center">Consent Form for Updated Contact Information</div>

I also understand that the researchers associated with this study would like to receive alternate contact information (e.g. the phone number of a friend or family member). I am aware that the study has been reviewed and received ethics clearance from the Office of Research Ethics, whose job is to review research at the University of Waterloo. In signing this consent form, I acknowledge that I am allowing the researchers of this study to use my alternate contact should they be unable to contact me to continue participation in the study.

ALTERNATE CONTACT NUMBER:_____

Participant Name (please print clearly):_____

Signature: _____

Witness Name: _____

Signature: _____

Date: _____

Appendix G

<u>Feedback Sheet</u>

Principal Investigators: Dr. Geoff Fong and Jennifer Davidson-Harden, Department of Psychology, 519-888-4567, x33597

We are grateful for your participation in our study, and we thank you for spending the time helping us with our research. As a reminder, the purpose of this study is to better understand the unique issues faced by women who smoke, or who are trying to quit smoking while pregnant or during the post-partum period. As well, we are interested in the thoughts and ideas pregnant women have about their smoking behaviour after the baby is born, and whether this changes post-partum.

The information you shared with us during your interviews gives us a better understanding of these issues, and may help health care professionals to have a more thorough and compassionate understanding of women who smoke during pregnancy and during the post-partum period. As well, it may help to educate health care professionals on what would be most useful in better helping women to reach their goals for their smoking both during pregnancy and after their baby is born.

If you would like to talk with someone about your smoking pregnancy, you can contact the Smokers Helpline at 1-877-513-5333 to get information or support. After your baby is born, you may also want to contact Grand River Hospital's Antenatal Clinic (519-749-4300 ext.2793) or Postpartum Disorders Support Group (519-749-4300 ext.2267). You could also contact a Community Health nurse at 519-883-2245 in Kitchener-Waterloo, and 519-621-6110 in Cambridge.

Please remember that any data about you as an individual participant will be kept confidential. Once our study is complete, we plan on sharing this information with the research community through seminars, conferences, presentations, and journal articles. If you are interested in receiving more information regarding the results of this study, or if you have any questions or concerns, please contact me at the phone number listed at the top of the page. If you would like a summary of the results, please let me know now by providing me with your contact information. When the study is completed, we will send it to you.

As with all University of Waterloo projects involving human participants, this project was reviewed by, and received ethics clearance through, the Office of Research Ethics at the University of Waterloo. Should you have any comments or concerns resulting from your participation in this study, please contact Dr. Susan Sykes in the Office of Research Ethics at 519-888-4567, Ext., 36005.

We recognize what a busy and hectic time this is for you, and really appreciate the time you have devoted to this study. We hope that this has been an interesting experience for you.

Sincerely,

Dr. Geoffrey T. Fong and Jennifer Davidson-Harden

Prenatal Questionnaire

Please answer the following questions to give us information about your smoking behaviour now and your plans for after your baby is born.

1. How old are you?   _____

2. How far along in your pregnancy are you? _____(weeks)

3. What is your due date? _____

4. How old were you when you began to smoke?   _____

5. Have you smoked 100 or more cigarettes over your lifetime?   Yes   No

6. Are you currently smoking?   Yes   No

If YES:

7. Do you smoke every day or less than every day?   Every Day   Less Than Every Day

   On average, how many cigarettes do you smoke each day? _____

8. Do you smoke at least once a week? Yes   No

9. On average, how many cigarettes do you smoke each week? _____

10. Do you smoke at least once a month?   Yes   No

11. On average, how many cigarettes do you smoke each month? _____

12. What are your plans for smoking up until your baby is born? (circle)

    To try to quit   To try to cutback   Have quit   Unsure

BEFORE YOUR PREGNANCY:

13. Did you smoke every day or less than every day (circle one)?

                     Every Day   Less Than Every Day

14. On average, how many cigarettes did you smoke each day? _____

15. Did you smoke at least once a week (circle one)?   Yes   No

16. On average, how many cigarettes did you smoke each week? _____

17. Did you smoke at least once a month?   Yes   No

18. On average, how many cigarettes did you smoke each month? _____

19. Which of the following situations are likely to make you want a cigarette? (Check all that apply)

___other people smoking around me
___after I eat
___when watching TV
___when I go for a walk
___when I'm bored
___when I'm stressed out
___when I'm angry
___when I need a break
___other _____

20. Which of the following helps to reduce your temptation to smoke?

___going for a walk
___thinking about my baby's health
___watching TV
___leaving the cigarettes in a room away from me
___getting my partner/a friend to keep all the cigarettes so I have to ask for one
___eating
___distracting myself
___other _____

21. If you have cut back or quit smoking, which of the following helped you to do so? (Check all that apply)

___   cutting back gradually
___   quitting cold turkey
___   nauseous reaction to cigarette smoke
___   forced to quit by someone else (e.g. partner, family member)

22. Do you currently have a romantic partner (circle one)?   Yes   No
(If no skip to question #27)

23. If yes, does your partner smoke (circle one)?   Yes   No

24. Do you currently live with your partner (circle one)?   Yes   No

25. Will you live with your partner when the baby is born (circle one)? Yes   No

26. Does your partner smoke in the house (circle one)?   Yes   No

27. Does your partner plan to quit smoking when the baby is born?   Yes   No

28. Which of the following advice is most like what your family doctor/obstetrician said to you about quitting smoking? (Check one)

___no advice given
___told me to quit/applauded my efforts to quit
___told me about the negative health effects of smoking during pregnancy
___gave me some strategies on how to quit
___told me to cut back but not to quit completely
___advised me to use the patch or nicotine gum to try and quit

29. Do you plan to quit smoking/stay quit after the baby is born (circle one)?

                              Yes   No   Unsure

30. If no, do you plan to (check all that apply):

___smoke in the house with the baby
___only smoke in the house when the baby is not there
___only smoke in a room that my baby does not stay in
___smoke in the house but only with a window open
___only smoke outside

31. If you do plan to quit or stay quit after the baby is born, how long do you intend to do so (check one)?

__Until I stop breastfeeding
__Until I return to work
__I would like to quit completely
__I haven't thought about it

32. How many pregnancies have you had including this one?   _____

For each of your previous pregnancies, please answer the following questions:

FIRST PREGNANCY:

Did you smoke during this pregnancy (circle one)?   Yes   No

Did you try to cut back or quit during this pregnancy (circle one)? Yes   No

Were there any complications with this pregnancy? _____
_____

Are there any current or past health concerns with this child?
_____

SECOND PREGNANCY:

Did you smoke during this pregnancy (circle one)?   Yes   No

Did you try to cut back or quit during this pregnancy (circle one)? Yes   No

Were there any complications with this pregnancy? _____
_____

Are there any current or past health concerns with this child?
_____

THIRD PREGNANCY:

Did you smoke during this pregnancy (circle one)?   Yes   No

Did you try to cut back or quit during this pregnancy (circle one)? Yes   No

Were there any complications with this pregnancy? _____
_____

Are there any current or past health concerns with this child?
_____

SRQ-Q (Prenatal)

The following questions relate to the reasons why you would stop smoking or continue not smoking either during your pregnancy or after your baby is born. Different people have different reasons for doing that and we want to know how true each of the following reason is for you. Please fill this out even if you are not planning to quit smoking.

Please indicate how true each reason is for you using the following scale:

	Not at all true	A little true		Somewhat true	Quite true		Very true
1. Because of the health risks to my baby	1	2	3	4	5	6	7
2. Because of the health risks to myself	1	2	3	4	5	6	7
3. Because I have heard smoking turns the placenta green/black	1	2	3	4	5	6	7
4. Because smoking can lead to low birth-weight babies	1	2	3	4	5	6	7
5. Because babies can become addicted to nicotine	1	2	3	4	5	6	7
6. Because there is an increased risk of SIDS if I smoke	1	2	3	4	5	6	7
7. Because nicotine gets into breast milk	1	2	3	4	5	6	7
8. Because my doctor told me to quit	1	2	3	4	5	6	7
9. Because smoking can lead to stillbirth or miscarriage	1	2	3	4	5	6	7
10. Just because I am pregnant	1	2	3	4	5	6	7
11. Because my breath stinks when I smoke	1	2	3	4	5	6	7
12. Because my clothes and house stink when I smoke	1	2	3	4	5	6	7
13. Because my breathing is better when I don't smoke	1	2	3	4	5	6	7
14. Because I feel pressure from my boyfriend/husband to quit	1	2	3	4	5	6	7
15. Because cigarettes are too expensive	1	2	3	4	5	6	7
16. Because I get fewer colds/illnesses when I quit	1	2	3	4	5	6	7
17. Because I am not physically addicted to cigarettes	1	2	3	4	5	6	7
18. Because I feel nauseous every time I smoke or even smell cigarette smoke	1	2	3	4	5	6	7
19. Because it's easier to quit when pregnant	1	2	3	4	5	6	7
20. Because I intended to quit anyways	1	2	3	4	5	6	7
21. Because the smell of cigarettes is gross to me.	1	2	3	4	5	6	7
22. Because I'm independent and don't follow the crowd.	1	2	3	4	5	6	7

23. Because I am a good mother and good mothers don't smoke.	1	2	3	4	5	6	7
24. Because providing for my child is important to me.	1	2	3	4	5	6	7
25. Because I feel good about myself when I quit or cut back.	1	2	3	4	5	6	7
26. Because my family is important to me and I want to do what is best for my family.	1	2	3	4	5	6	7
27. Because my baby has no choice when inside me.	1	2	3	4	5	6	7
28. Because I am strong-willed and can quit if I want to.	1	2	3	4	5	6	7
29. Because the health of my baby is important to me.	1	2	3	4	5	6	7

SRQ- S (Prenatal)

The following questions relates to the reasons why you would continue to smoke during your pregnancy and either continue to smoke or start smoking after your baby is born. Different people have different reasons for doing that and we want to know how true each of the following reason is for you. Please fill this out even if you have quit smoking.

Please indicate how true each reason is for you using the following scale:

	Not at all true	A little true		Somewhat true	Quite true		Very true
1. Because people can have healthy kids even if they smoke during pregnancy	1	2	3	4	5	6	7
2. Because I don't believe smoking leads to low birthweight babies	1	2	3	4	5	6	7
3. Because my doctor told me not to quit as the stress of quitting is worse on the baby	1	2	3	4	5	6	7
4. Because my doctor told me not to quit as the baby is addicted to nicotine	1	2	3	4	5	6	7
5. Because the health risks to the baby are low if you smoke away from the baby	1	2	3	4	5	6	7
6. Because the chance of a baby dying of SIDS is small	1	2	3	4	5	6	7
7. Because I don't plan on breastfeeding so my baby won't be exposed to nicotine	1	2	3	4	5	6	7
8. Because I am physically addicted to cigarettes	1	2	3	4	5	6	7
9. Because it's a ritual, I always smoke at certain times (e.g. after eating)	1	2	3	4	5	6	7
10. Because it gives me time to myself	1	2	3	4	5	6	7
11. Because quitting makes you too moody	1	2	3	4	5	6	7
12. Because it helps me to deal with stress	1	2	3	4	5	6	7
13. Because cutting back is almost as good as quitting	1	2	3	4	5	6	7
14. Because you can't use any stop smoking aids (e.g. the patch) when pregnant	1	2	3	4	5	6	7
15. Because I don't want to gain too much weight during my pregnancy	1	2	3	4	5	6	7
16. Because I have physical cravings for cigarettes	1	2	3	4	5	6	7
17. Because I like the social part of smoking	1	2	3	4	5	6	7
18. Because my baby and I are exposed to secondhand smoke anyways	1	2	3	4	5	6	7
19. Because I stopped taking drugs and/or alcohol, so this is my one pleasure	1	2	3	4	5	6	7
20. Because I like to smoke when I'm bored	1	2	3	4	5	6	7
21. Because I don't have the motivation to quit	1	2	3	4	5	6	7
22. Because I don't have the will-power to quit	1	2	3	4	5	6	7
23. Because I have an addictive personality	1	2	3	4	5	6	7

24. Because I have an emotional tie to smoking – it reminds me of someone/something important to me	1	2	3	4	5	6	7
25. Because I am a follower, I smoke when others smoke	1	2	3	4	5	6	7
26. Because I'm not going to let ex-smoking/non-smoking do-gooders tell me what to do	1	2	3	4	5	6	7
27. Because it reminds me of my life before children	1	2	3	4	5	6	7
28. It is not something I think about, I just do it	1	2	3	4	5	6	7

PBCS

Please finish the following sentence:

1. For me to quit smoking/stay quit after the baby is born will be:

| Very easy | Moderately easy | A little easy | In the middle | A little difficult | Moderately difficult | Very difficult |

Please indicate how much you agree with the following statements

2. I believe that I can quit for as long as I want

| Strongly Disagree | Moderately disagree | Somewhat disagree | In the middle | Somewhat agree | Moderately agree | Strongly agree |

3. How sure are you that you could quit and stay quit no matter what happens?

| Very unsure | Moderately unsure | Somewhat unsure | In the middle | Somewhat sure | Moderately sure | Very sure |

SNS

Use the following scale to indicate how much the people who are important to you encourage you to quit:

| 1 | 2 | 3 | 4 | 5 |
| Discourage Me from quitting | Neutral | Encourage Me to quit | Strongly Encourage me | Does not apply |

1. Would most people you know encourage you to quit smoking? _____
2. Would your partner encourage you to quit smoking? _____
3. Would your close family members encourage you to quit smoking? _____
4. Would your circle of friends encourage you to quit smoking? _____
5. Would your doctor encourage you to quit smoking? _____

How important are your partner's opinions about smoking after the baby is born?

| Not at all important | Slightly important | Somewhat important | Very important | Extremely important | Does not apply |

How important is your family's opinion about smoking after the baby is born?

| Not at all important | Slightly important | Somewhat important | Very important | Extremely important | Does not apply |

How important is your doctor's opinion about smoking after the baby is born?

| Not at all important | Slightly important | Somewhat important | Very important | Extremely important | Does not apply |

PSRQ-Q

In the following section, we list many reasons why you may want to quit smoking or continue to stay quit. Please fill this out even if you are not planning to quit smoking. Using the scale provided, please rate how true each statement is for you:

Why do I want to quit smoking?	Not at all true	A little true		Somewhat true	Quite true		Very true
1. Because people would think poorly of me if I smell of smoke	1	2	3	4	5	6	7
2. Because quitting smoking is something that is important to me.	1	2	3	4	5	6	7
3. Because it is important to me to take responsibility for my child.	1	2	3	4	5	6	7
4. Because other mothers will reject me if they know that I smoke	1	2	3	4	5	6	7
5. Because I want to feel healthier	1	2	3	4	5	6	7
6. Because I think it is the best thing for the health of my family	1	2	3	4	5	6	7
7. Because I want others to think well of me	1	2	3	4	5	6	7
8. Because I value being a healthy person and healthy people do not smoke	1	2	3	4	5	6	7
9. Because it is a challenge I want to tackle for me and my baby	1	2	3	4	5	6	7
10. Because it is something I want to do and I feel confident that I can do it	1	2	3	4	5	6	7
11. Because I would feel guilty if anything happened to my child because of my smoking	1	2	3	4	5	6	7
12. Because I would feel like a bad mother if I smoked	1	2	3	4	5	6	7
13. Because I would feel bad if my breastmilk was tainted with nicotine and it affected the health of my child	1	2	3	4	5	6	7
14. Because I want my doctor to approve of me	1	2	3	4	5	6	7
15. Because I want my boyfriend/husband to approve of me	1	2	3	4	5	6	7
16. Because I want to take responsibility for my health	1	2	3	4	5	6	7
17. Because my family and friends will be critical of me if I don't quit	1	2	3	4	5	6	7
18. Because my husband/boyfriend will be mad or disapproving of me if I don't quit	1	2	3	4	5	6	7

<u>Semi-Structured Interview During Pregnancy</u>

DUE DATE: _____

1. How old were you when you started smoking?

2. Have you ever tried to quit before? If so, how many times? What is the longest you have gone without smoking?

3. What are your plans for smoking after the baby is born?

4. If you are planning to quit, how long would you like to quit for?

5. Do you think quitting will be easier or more difficult after you baby is born? How?

6. What problems, if any, do you think will make it difficult to quit/stay quit after your baby is born?

7. How will you deal with these problems?

8. Are these benefits of not smoking at all the same or better as just not smoking around the baby? How?

9. Did your mother smoke when pregnant with you?

10. If YES, do you believe her smoking had any negative health effects on you?

11. What, if anything, has your doctor said to you about quitting?

12. Has your doctor given you any advice about how to quit/stay quit? Have they suggested anything quit aids like the nicotine patch or gum?

Thank you for telling us about your thoughts and experiences surrounding smoking during pregnancy.

Postpartum Questionnaire

Please answer the following questions to give us information about how things have been going for you since bringing home your baby.

1. Are you currently smoking (circle one)?   Yes   No

2. Do you smoke every day or less than every day (circle one)?

                          Every Day   Less Than Every Day

3. On average, how many cigarettes do you smoke each day? _____

4. Do you smoke at least once a week?   Yes   No

5. On average, how many cigarettes do you smoke each week? _____

6. Do you smoke at least once a month?   Yes   No

7. On average, how many cigarettes do you smoke each month? _____

8. Which of the following situations are likely to make you want a cigarette? (Check all that apply)

___other people smoking around me
___after I eat
___when watching TV
___when I go for a walk
___when I'm bored
___when I'm stressed out
___when I'm angry
___when I need a break
___other _____

9. Which of the following helps to reduce your temptation to smoke (Check all that apply)?

___going for a walk
___thinking about my baby's health
___watching TV
___leaving the cigarettes in a room away from me
___getting my partner/a friend to keep all the cigarettes so I have to ask for one
___eating
___distracting myself
___other _____

10. If you have cut back or quit smoking, which of the following helped you to do so (Check all that apply)?

___　　　cutting back gradually
___　　　quitting cold turkey
___　　　nauseous reaction to cigarette smoke
___　　　forced to quit by someone else (e.g. partner, family member)
___　　　nicotine replacement therapy (e.g. the patch, nicotine gum)
___　　　Zyban

11. Are there any current health concerns with your baby?

_____

12. Do you currently have a romantic partner?　　Yes　　No
(If no skip to question #16)

13. If yes, does your partner smoke?　　　　　　Yes　　No

14. Do you currently live with your partner?　　　Yes　　No

15. Does your partner smoke in the house?　　　　Yes　　No

16. Which of the following advice is most like what your family doctor said to you about quitting smoking? (Check one)

___no advice given
___told me to quit/applauded my efforts to quit
___told me about the negative health effects of smoking during pregnancy
___gave me some strategies on how to quit
___told me to cut back but not to quit completely
___advised me to use the patch, nicotine gum, or Zyban to try and quit

17. If you are currently smoking, are you (Check one):

___smoking in the house with the baby
___only smoking in the house when the baby is not there
___only smoking in a room that my baby does not stay in
___smoking in the house but only with a window open
___only smoking outside

18. If you have quit smoking, how long do you intend to do so (Check one)?

__Until I stop breastfeeding
__Until I return to work
__I would like to quit completely
__I haven't thought about it

SRQ-Q (Postpartum)

The following questions relates to the reasons why you would stop smoking or continue not smoking now that your baby is born. Different people have different reasons for doing that and we want to know how true each of the following reason is for you Please fill this out even if you are not planning to quit smoking.

Please indicate how true each reason is for you using the following scale:

	Not at all true	A little true		Somewhat true	Quite true		Very true
1. Because of the health risks to my baby	1	2	3	4	5	6	7
2. Because of the health risks to myself	1	2	3	4	5	6	7
3. Because there is an increased risk of SIDS if I smoke	1	2	3	4	5	6	7
4. Because nicotine gets into breast milk	1	2	3	4	5	6	7
5. Because my doctor told me to quit	1	2	3	4	5	6	7
6. Because my clothes and house stink when I smoke	1	2	3	4	5	6	7
7. Because my breathing is better when I don't smoke	1	2	3	4	5	6	7
8. Because I feel pressure from my boyfriend/husband to quit	1	2	3	4	5	6	7
9. Because cigarettes are too expensive	1	2	3	4	5	6	7
10. Because I get fewer colds/illnesses when I quit	1	2	3	4	5	6	7
11. Because I am not physically addicted to cigarettes	1	2	3	4	5	6	7
12. Because my breath stinks when I smoke	1	2	3	4	5	6	7
13. Because I intended to quit anyways	1	2	3	4	5	6	7
14. Because the smell of cigarettes is gross to me	1	2	3	4	5	6	7
15. Because I'm independent and don't follow the crowd	1	2	3	4	5	6	7
16. Because I am a good mother and good mothers don't smoke	1	2	3	4	5	6	7
17. Because providing for my child is important to me	1	2	3	4	5	6	7
18. Because I feel good about myself when I quit or cut back	1	2	3	4	5	6	7
19. Because my family is important to me and I want to do what is best for my family	1	2	3	4	5	6	7
20. Because I am strong-willed and can quit if I want to	1	2	3	4	5	6	7
21. Because the health of my baby is important to me	1	2	3	4	5	6	7

SRQ-S (Postpartum)

The following questions relates to the reasons why you would continue to smoke during continue to smoke or start smoking after your baby is born. Different people have different reasons for doing that and we want to know how true each of the following reason is for you. Please fill this out even if you have quit smoking.

Please indicate how true each reason is for you using the following scale:

	Not at all true	A little true		Somewhat true	Quite true		Very true
1. Because the health risks to the baby are low if you smoke away from the baby	1	2	3	4	5	6	7
2. Because the chance of a baby dying of SIDS is small	1	2	3	4	5	6	7
3. Because I am not breastfeeding so my baby isn't exposed to nicotine	1	2	3	4	5	6	7
4. Because I am physically addicted to cigarettes	1	2	3	4	5	6	7
5. Because it's a ritual, I always smoke at certain times (e.g. after eating)	1	2	3	4	5	6	7
6. Because it gives me time to myself	1	2	3	4	5	6	7
7. Because quitting makes you too moody	1	2	3	4	5	6	7
8. Because it helps me to deal with stress	1	2	3	4	5	6	7
9. Because cutting back is almost as good as quitting	1	2	3	4	5	6	7
10. Because I want to lose my baby weight	1	2	3	4	5	6	7
11. Because I have physical cravings for cigarettes	1	2	3	4	5	6	7
12. Because I like the social part of smoking	1	2	3	4	5	6	7
13. Because my baby and I are exposed to secondhand smoke anyways	1	2	3	4	5	6	7
14. Because I stopped taking drugs and/or alcohol, so this is my one pleasure	1	2	3	4	5	6	7
15. Because I like to smoke when I'm bored	1	2	3	4	5	6	7
16. Because I don't have the motivation to quit	1	2	3	4	5	6	7
17. Because I don't have the will-power to quit	1	2	3	4	5	6	7
18. Because I have an addictive personality	1	2	3	4	5	6	7
19. Because I have an emotional tie to smoking – it reminds me of someone/something important to me	1	2	3	4	5	6	7
20. Because I am a follower, I smoke when others smoke	1	2	3	4	5	6	7
21. Because I'm not going to let ex-smoking/non-smoking do-gooders tell me what to do	1	2	3	4	5	6	7
22. Because it reminds me of my life before children	1	2	3	4	5	6	7
23. It is not something I think about, I just do it	1	2	3	4	5	6	7

<u>Semi-Structured Interview at Each Post-Partum Session</u>

I would like to ask you a few questions about your smoking right now as well as your plans for the future.

1. Have your plans about smoking changed since the last time we spoke? What are they now? (If different: what has changed since the last time we spoke?)

2. How old is your baby right now?

3. Do you see yourself any differently as a new mother, and if so, how? Has this new image affected your smoking behaviour in any way?

IF NO DIFFERENT:
What is the experience of motherhood like for you right now?

4. How has motherhood been different that what you expected?

For each item mentioned:

5. Has this made it easier or harder to quit?