General introduction
The present study

The aim of this thesis is three-fold: (1) to examine conflicts and attitudes towards smoking in a single-smoking relationship, (2) to establish the effectiveness of partner support in the form of dyadic planning to quit and (3) to gain insight into partner behaviours and cognitions that play a role during a quit attempt. This project will yield important insights into how single-smoking couples deal with smoking and which aspects of their relationship withhold or motivate the smoking partner to quit. Furthermore, it is the first step towards a novel, cost-effective intervention in which the non-smoking partner is involved to help the smoker to quit smoking.

Tobacco smoking: a global health issue

Tobacco smoking is still a serious health issue worldwide. In 2015, the percentage of current smokers of the world population (aged > 15 years) was as high as 20% (World Health Organisation, 2018). The health consequences that follow from the use of tobacco are well known and substantial. Currently, tobacco is responsible for the death of about six million individuals worldwide each year (World Health Organisation, 2018), which makes tobacco the largest preventable cause of death (American Cancer Society, 2014) and still an important issue to this day. The World Health Organisation aims for a smoking prevalence of 16% in 2025 (World Health Organisation, 2018). Although smoking rates have shown a small downward trend over the past years, the current prevalence rate is still too high indicating that smoking cessation remains difficult. Hence, besides preventive measures there is a need for effective intervention programs and a deeper understanding of the mechanisms that play a role in a quit attempt. This thesis aims to contribute to both objectives by developing and testing a new intervention and examining daily behaviour and cognitions following a quit attempt, taking into account one of the most important influences on health behaviour: one’s romantic partner (Falba & Sindelar, 2008).

Tobacco smoking and cessation in a couples’ context

Most theories predicting health behaviour change, such as smoking, primarily focus on individual processes. For example, the most prominently used and effective methods for smoking cessation are nicotine-replacement therapy, Champix and educational training (Heydari et al., 2014) that specifically target the addiction and are solely aimed at the smoker. However, smokers have to be motivated to quit first, thereby changing cognitions and subsequent behaviour. Various studies on health behaviour change, including smoking, are aimed at predicting motivation and intention to change, as well as maintenance of health behaviour. For example, the Health Action Process Approach describes the motivational phase in which the intention to change behaviour is predicted by action self-efficacy, outcome
expectancies and risk perception (Schwarzer, 2008). However, while health behaviour change, such as quitting smoking, is often studied from an individual perspective, it actually occurs in a social context (Jackson et al., 2015). The Theory of Planned Behaviour, for example, does somewhat acknowledge the role of the social context by including subjective norm (next to attitude and perceived behavioural control; Ajzen, 1991). The subjective norm describes the perception of social pressure from persons in one’s environment to perform the behaviour (e.g., “Most people who are important to me think that I should quit smoking”; Sheeran et al., 2001). The Theory of Planned Behaviour is fairly successful in predicting the intention to quit smoking, however, subsequent real smoking reduction is difficult to predict (Moan & Rise, 2006) as is maintenance of behaviour (Sheeran et al., 2001). Apparently, additional predictors should be considered to provide more insight into actual behaviour change and maintenance of behaviour. A very important contributor to health behaviour change is one’s romantic partner (Falba & Sindelar, 2008). Understanding the close social environment and its associations with a quit attempt can be of important added value to the existing research on smoking cessation.

Spouses most often have a concordant smoking status (Castelnuovo et al., 2009). That is, most couples consist of either two smokers or two non-smokers. That is because individuals tend to choose a partner that is similar to them ( assortative mating) and partners will likely develop a common life-style through which they directly influence each others health behaviour (Wilson, 2002). When a couple consists of two smokers, so-called dualsmoking couples, they have the best chance of a successful quit attempt when they quit together (Margolis & Wright, 2016). However, when their partner does not quit with them, it is most difficult for these smokers to quit. Even when the couple does decide to quit together, other difficulties might arise. For example, partners tend to adjust their self-control levels to the lower level of their partner: individuals high in self-control make more indulgent choices when their partner has low self-control (Dzhogleva & Lamberton, 2014). Therefore, when one partner has a relapse, this might also undermine the other partner’s goal progress (Fitzsimons & Finkel, 2015). Moreover, by witnessing someone failing to perform a behaviour, one might experience a decrease in self-efficacy (Bandura, 1997). This might jeopardize the quit attempt as self-efficacy is an important contributor to smoking cessation (e.g., Clyde et al., 2019; Ockene et al., 2000). So, when two smokers try to quit together, they could be either more successful or undermine each others quit attempts. Given these possibly hindering influences of a smoking partner, it is understandable that most couple research on smoking cessation focussed on dual-smoking couples (e.g., Tooley & Borrelli, 2017; Warner et al., 2018), while smokers with a non-smoking partner are studied less.
Single-smoking couples: smokers who have a non-smoking partner

Approximately 35% of the smokers have a non-smoking partner (Margolis & Wright, 2016; Rüge et al., 2008). These smokers might be better off than smokers with a smoking partner, as they are not dependent on the intention and successfulness of their partner, and are (therefore) often more willing to quit (Dollar et al., 2009). Smokers in a relationship with a non-smoking partner, with whom they form so-called single-smoking couples, experience several benefits from their relationship with regard to their smoking behaviour. For example, a non-smoking partner has a beneficial influence on smoking reduction and cessation (e.g., Homish and Leonard, 2005). Specifically, these smokers use less tobacco (Homish & Leonard, 2005), more often try to quit (Dollar et al., 2009), and are often more successful in quitting (Margolis & Wright, 2016), compared to smokers with a smoking partner. These smokers seem to be in a favourable environment to quit smoking. Yet, some smokers continue to smoke despite the promising influence of a non-smoking partner. Less is known about the role of smoking in the relationship of these persistent single-smoking couples: do non-smoking partners consider smoking an issue and does it affect the couples’ relationship?

Conflicts and attitudes towards smoking in a single-smoking relationship

Non-smokers are typically more negative towards their partners’ smoking behaviour than smokers (Palmer et al., 2000). One can imagine that in some couples smoking might be an issue that gives rise to conflicts and arguments between spouses. Individuals often have an ideal perception of how one’s partner should be like. When the reality is not consistent with this expectation, partners engage in strenuous attempts to change their partner (Overall et al., 2006). Additionally, a negative attitude towards smoking in combination with the situation of being in a relationship with a smoker could create cognitive dissonance. This dissonance leads to activities focused on dissonance reduction by the non-smoking partner (Festinger, 1957). For example, partners might try to convince their partner to quit, or change their attitude towards smoking. When partners try to reduce unhealthy behaviours of the other partner, negative tactics (e.g., negative emotions or withdrawing affection) are often used (Butterfield & Lewis, 2002). In line with this, smoking-related interactions characterized by conflict predominantly occur in single-smoking couples (Bottorff et al., 2005). These conflicts might thus be caused by partners who attempt to influence or change the smokers’ behaviour.

Over time, a discordancy in smoking behaviour is related to a significantly reduced relationship satisfaction (Homish et al., 2009). This seems to indicate that smoking is still an issue in long-term single-smoking couples and even affects their relationship. Some couples might have found a way to live with the smoking behaviour to maintain a long-term relationship and have integrated it in their daily lives without issues. That is, some partners
might have accepted the smoking behaviour, have less negative attitudes towards smoking and engage in conflicts less frequently, while others might still have a negative attitude and the wish that their partner would stop smoking. These conflicts could in turn affect their relationship, as experiencing conflicts is related to a lower relationship satisfaction (Cramer, 2006). **Chapter 2** focusses on the first aim of this thesis: to understand the role of smoking in a single-smoking relationship.

**Dyadic planning to quit with a non-smoking partner**

We know that non-smoking partners have a beneficial influence on and are motivated to change their partners’ smoking behaviour. However, it is unclear how partners can aid in interventions to increase the probability of successful smoking cessation. Partner support is viewed as an important contributing factor to smoking cessation (e.g., Key et al., 2004; Scholz et al., 2016). There have been many interventions that try to increase partner support during a quit attempt, for example by providing booklets to partners that describe activities related to support (Bastian et al., 2012) or telephonic counselling for partners (McBride et al., 2004). A meta-analysis examined these two and 12 other support enhancing interventions and concluded that most interventions were not successful in increasing partner support (Faseru et al., 2018). Perhaps interventions should not aim directly at increasing partner support, but involve the partner in the quit attempt, thereby making him or her part of the team. In smoking cessation, we could learn from the research on communal coping with chronic illness in a relationship context. Communal coping (or common dyadic coping) consists of two components: (1) appraisal of the illness as shared, and (2) collaboration to manage the illness and its demands (Helgeson et al., 2018). When a couple copes with breast cancer together as a unit, both patients and partners reported lower psychological distress (Meier et al., 2019). Common dyadic coping is also associated with better dietary and exercise adherence in couples with one partner who was diagnosed with diabetes (Johnson et al., 2013). The use of we-talk seems to be linked to a shared illness appraisal (Helgeson et al., 2018). In smoking cessation therapy for couples, we-talk can predict successful cessation 12 months after quitting (Rohrbaugh et al., 2012). It seems that when partners perceive the quit attempt as a shared process and goal, they are more effective. Therefore, perhaps increasing the commitment of the non-smoking partner by emphasizing the quit attempt as a shared goal is the way to go.

Planning interventions that use implementation intentions have been shown to be effective in changing health behaviour (Hagger & Luszczynska, 2014) and show promising results for smoking behaviour (Armitage, 2016). Implementation intentions are if-then plans that specify a certain behaviour within a situational context (Gollwitzer & Sheeran, 2006). These intentions help in achieving goals by showing enduring changes in behaviour. An
example of an implementation intention is: “If after breakfast I crave a cigarette, then I’m going to drink a glass of water instead.” Forming such if-then plans for moments of craving has been found to decrease smoking habits (i.e. smoking automatically without thinking about it) and the number of cigarettes smoked in a group of current smokers (Armitage, 2016).

The second aim of this thesis is to establish the effectiveness of partner support in the form of dyadic planning during a quit attempt. Therefore, Chapter 3 describes the protocol of a randomized controlled trial that involves non-smokers in their partners’ quit attempt, by asking the couple to create implementation intentions for the smoker together (i.e. dyadic planning). By involving the partner in the planning intervention, the non-smoker might not just be a support provider, but part of the team. Hence, the quit attempt can be considered a dyadic effort or challenge. Dyadic planning has never been considered in research on smoking cessation. But, it has been examined in the context of physical activity (Knoll et al., 2017) and pelvic-floor exercises (Burkert et al., 2011), where it was equally successful as individual planning. However, dyadic planning was related to better maintenance of exercises over time (Keller et al., 2015) and actual plan enactment of physical exercise (Keller et al., 2017). In Chapter 4 the effectiveness of a dyadic planning is compared to individual planning, for smoking cessation as well as relationship satisfaction.

Partner behaviours that play a role during a quit attempt

We previously described that non-smoking partners try to influence the smoking behaviour of their partner. This might be emphasized when the couple is the target of the intervention. The third aim of this thesis is to gain insight into partner behaviours that play a role during a quit attempt. Several studies have pointed out the important contribution of partner support to successful smoking cessation (e.g., Key et al., 2004; Scholz et al., 2016). Again, smokers with a non-smoking partner are in a beneficial environment, as non-smoking partners are more willing to support a quit attempt than smoking partners (VanDellen et al., 2016) and support from non-smoking partners is more effective in preventing a relapse compared to smokers’ support (Pollak & Mullen, 1997).

Positive behaviours acted out by partners can have different forms. Positive support (e.g., complimenting on not smoking, calming down) shows benefits for smoking cessation (Palmer et al., 2000; Rice et al., 1996). On the other hand, more direct attempts to influence one’s partners’ health behaviour can occur that involve regulation, influence and constraint (i.e., social control; Lewis & Rook, 1999). Examples of positive control are to persuade, point out responsibilities or make suggestions (Butterfield & Lewis, 2002). Positive control tactics are difficult to differentiate from social support, as these tactics might be considered supportive when smokers themselves are already trying to change. Social control might
be more often provided when the target person is still unwilling to change (Ochsner et al., 2015). Additionally, social control and support are highly interrelated (Newsom et al., 2018). Chapter 5 focusses on supportive behaviours exerted by the non-smoking partner, as the smoker is trying to quit and these positive behaviours are considered supportive.

Behaviours that can be perceived as unsupportive are currently considered less in research on smoking cessation (Scholz et al., 2016). Previously we described that partners try to change unhealthy behaviour of their partner using negative tactics (e.g., negative emotions or withdrawing affection; Butterfield & Lewis, 2002). Literature shows that negative behaviours (e.g., expressing doubt in ability to remain quit, criticize smoking) are predictive of an unsuccessful quit attempt (Palmer et al., 2000; Rice et al., 1996). To fully understand what couples are going through when experiencing a quit attempt, these negative behaviours should be examined as well, as they might counter the beneficial effects of supportive behaviours and influence the relationship in a negative way. Therefore, Chapter 5 takes into consideration both supportive behaviour and negative social control and their association with smoking and relationship satisfaction. Additionally, a difference in the reports of these behaviours within a couple is examined.

Next to partner support, other psychosocial variables play a role during a quit attempt, such as self-efficacy which was briefly mentioned before. Self-efficacy is the belief that one can successfully perform certain behaviour that is required to produce an outcome or reach a goal, and is an important contributor to goal achievement (Bandura, 1977). Self-efficacy is considered an important predictor of a successful quit attempt (e.g., Clyde et al., 2019; Ockene et al., 2000). Research has started to acknowledge the role of self-efficacy in couples’ behaviour change as well, however, it focusses on one’s own behaviour change only (i.e. couples with two smokers; Berli et al., 2018; Warner et al., 2018). For example, self-efficacy levels are intertwined in dual-smoking couples (Warner et al., 2018). In single-smoking couples there is only one target person who is trying to change his or her behaviour. In this case, non-smoking partners can express more or less confidence in the quit attempt of their partner, which is a form of other-efficacy (Lent & Lopez, 2002). Over and above patients own self-efficacy, high levels of other-efficacy were found predictive of survival (Rohrbaugh et al., 2004) and better health over time (Gere et al., 2014). However, the role of other-efficacy is unknown in smoking cessation research. Chapter 6 describes the first study to examine the role of other-efficacy in single-smoking couples in which the smoker is attempting to quit.
Partner behaviours from a daily dyadic perspective

Most research on smoking uses a cross-sectional or longitudinal design, which are sometimes complemented with biochemical verification. These research methods often ask about psychosocial variables retrospectively (e.g., in the past month). In the last years, researchers are realizing the value of more intensive methods that capture the dynamic fluctuations of behaviour. Partner behaviours, smoking and relationship satisfaction are dynamic processes that show meaningful fluctuations on a daily level. For example, support (Scholz et al., 2016) and self-efficacy (Berli et al., 2015) have been found to fluctuate daily during a quit attempt. To gain insight in how psychosocial factors are associated with smoking and the couples’ relationship, the course of these variables is best studied as it unfolds in daily life.

Box 1: Diary method

The research design to study daily life is known under various names, e.g., daily diary study, ecological momentary assessment (EMA), experience sampling method, intensive longitudinal methods or ambulatory assessment. Constructs are assessed repeatedly within individuals over time, to characterise a process for each individual as it occurs in their natural context (Bolger & Laurenceau, 2013).

A daily diary design (see Box 1) allows us to learn more about the course of partner behaviours and health behaviour change, giving insights into fluctuations and temporal relationships. As data is collected daily, behaviour can be studied in situ with low recall bias (Shiffman, 2009). An important feature of the daily diary design, is that different types of research questions can be answered as constructs are examined on different levels (Bolger et al., 2003). That is, fluctuations within a participant, so-called within-person variation (level 1), and differences between participants on their average levels (between-person variation, level 2, Bolger & Laurenceau, 2013) can be examined. For example, some non-smoking partners might be more supportive compared to other partners (between-person differences), but they can also be more supportive on some days compared to their usual day (within-person fluctuations). As most common research designs in psychology are cross-sectional or longitudinal in nature, the results usually inform us about same time associations between variables (e.g., smokers who receive more support in general smoke less; between-person variation). The use of repeated measures does allow us to study persons’ trajectories, but measurements points are often across a larger time span. In contrast, the diary method allows the examination of day-to-day changes within persons in which every person acts as his or her own control, allowing for different research questions. For example, how is receiving
more support than is typical for a specific smoker related to their smoking behaviour? Therefore, the daily diary provides insight into possibly relevant fluctuating processes that can be targeted in more tailored interventions. In Chapters 5 and 6 the diary method is applied and the results describe these different levels of variance.

The daily diary design can be even more informative when both partners of a couple report their experiences. A dyadic diary design considers both members of a couple and refers to a design in which both partners report on events that have occurred within the everyday context of their relationship (Laurenceau & Bolger, 2005). In this thesis, Chapter 5 analyses the diary data using a dyadic score model (Iida et al., 2018). These multi-level models take into account means and differences of partner behaviours within couples on a daily level and between couples.

### Box 2: Definition
Throughout this thesis, the term smokers is used for participants who entered the study as smokers, even when they successfully quit during the study. The term partner (singular) refers to the non-smoking partner, unless otherwise stated.
Outline of this thesis

In this thesis, five chapters will be presented that make use of dyadic data analysis as well as intensive longitudinal methods. The aim of this thesis is three-fold:

1: Conflicts and attitudes towards smoking in a single-smoking relationship

Chapter 2: Long-term single-smoking couples: attitudes, conflicts and relationship satisfaction

2: The effectiveness of partner support in the form of dyadic planning to quit

Chapter 3: A dyadic planning intervention to quit smoking in single-smoking couples: design of a randomized controlled trial

Chapter 4: A planning intervention to quit smoking in single-smoking couples: does partner involvement improve effectiveness?

3: Partner behaviours and cognitions that play a role during a quit attempt

Chapter 5: Daily support and negative control during a quit attempt in single-smoking couples

Chapter 6: Self- and other-efficacy are related to current smoking during a quit attempt: a daily diary study in single-smoking couples
References


