

# Beyond motivation : an exploration of pre- and postmotivational determinants of cancer-related behaviors

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# BEYOND MOTIVATION

AN EXPLORATION OF PRE- AND POSTMOTIVATIONAL  
DETERMINANTS OF CANCER-RELATED BEHAVIORS

## **Colophon**

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# BEYOND MOTIVATION

AN EXPLORATION OF PRE- AND POSTMOTIVATIONAL  
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## PROEFSCHRIFT

ter verkrijging van de graad van doctor aan de Universiteit Maastricht,  
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door

**Liesbeth Anne Dorothé Marie van Osch**

**Promotores**

Prof. dr. H. de Vries

Prof. dr. L. Lechner (Open Universiteit Nederland)

**Copromotor**

Dr. A. Reubsaet

**Beoordelingcommissie**

Prof. dr. N.K. de Vries (voorzitter)

Dr. C. Bolman (Open Universiteit Nederland)

Prof. dr. ir. J. Brug (EMGO instituut, VU Medisch Centrum)

Prof. dr. G.J. Kok

Dr. S.P.J. Kremers

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# CHAPTER 1

General Introduction

## INTRODUCTION

More than one in three people will develop cancer during their lifetime, an alarming figure that is increasing to one in two (American Cancer Society, 2008; Canadian Cancer Society, 2008). Cancer constitutes the second most important cause of death in the Netherlands, responsible for approximately 30% of total mortality (CBS, 2009). Although in the Netherlands cardiovascular diseases have been the main cause of death for decennia, cancer has now taken over as the leading cause of death (CBS, 2009).

At least one-third of all cancer cases are preventable. Furthermore, information is available that would permit the early detection and effective treatment of a further one third of cancer cases (WHO, 2007). The primary prevention of cancer relies upon the modification of preventable risk factors. These preventable risk factors mostly pertain to lifestyle behaviors, most importantly smoking, dietary behavior, exposure to ultraviolet radiation (UVR), physical activity, and alcohol consumption. As the present thesis is the result of collaboration with the Prevention and Patient Support Division of the Dutch Cancer Society, various studies will be discussed with regard to cancer-related behaviors that have been prioritized by the Dutch Cancer Society in their mission statement for the upcoming years (KWF Kankerbestrijding, 2007a). The former three target behaviors (smoking, dietary behavior, and UVR exposure), as well as two behaviors related to secondary cancer prevention, or the early detection of cancer, will therefore be elaborated on.

### Primary cancer prevention

#### *Smoking*

Smoking can affect all bodily functions (USDHHS, 2004) and is considered the single largest preventable cause of cancer. In their influential study on quantitative estimates of avoidable cancer risks, Doll and Peto (1981) estimated that approximately 30% of cancer deaths are attributable to tobacco use, an estimate that has proven to be rather solid (Doll, 1998). In addition to its well-known causal relationship with lung cancer – 87% of lung cancer deaths are attributable to smoking – evidence indicates smoking as a causal factor in the development of several other types of cancer, most importantly cancers of the mouth, pharynx, larynx, esophagus, and bladder (American Cancer Society, 2008). Furthermore, strong associations exist between smoking and the development of cardiovascular diseases and other chronic illnesses, such as diabetes and chronic obstructive pulmonary disease (USDHHS, 2004).

The general recommendation with regard to smoking is clear: people should refrain from smoking. In the Netherlands, spearheads of tobacco control policy, as specified in the National Tobacco Control Programme (Ministerie van Volksgezondheid, Welzijn en Sport, 2006), pertain to the stimulation of smokers to quit smoking,

prevention of smoking uptake in young people, and the protection of non-smokers against tobacco smoke. Although there has been a steady downward trend in smoking rates since the 1970s, today still 28% of the Dutch adult population smokes (Stivoro, 2008).

### *Dietary behaviors*

Healthy dietary habits are considered a major contributor to the prevention of cancer. Overweight and obesity are serious risk factors for several types of cancer, such as cancers of the colon, breast, endometrium, kidney, and esophagus, as well as other chronic diseases such as cardiovascular diseases and diabetes (National Cancer Institute, 2008; WHO, 2008c). With obesity globally reaching epidemic proportions – more than 1 billion adults are overweight, of whom 300 million are clinically obese – it is a major contributor to the global burden of cancer and chronic diseases. The nature of the relationship between diet and cancer is complex and appears difficult to unravel. Scientists have only recently uncovered possible mechanisms involved in the link between diet, obesity and cancer. Whereas Doll and Peto (1981; Doll, 1998) applied rather wide margins in their early estimates, dietary behaviors have recently been estimated to account for about 30% of all cancers in Western countries and up to 20% in developing countries, making diet second to tobacco as a preventable cause of cancer (WHO, 2008b).

International recommendations with regard to dietary intake include the consumption of a minimum of 400 grams of fruit and vegetables per day – or 2 pieces of fruit and 200 grams of vegetables – and restricted intake of high-fat, sugary foods (<10% of total caloric intake; Gezondheidsraad, 2006a; WHO, 2003). Evidence suggests with high probability that both fruit and vegetable consumption have a protective effect with regard to cancer development, as indicated by decreased risks of cancers of the colorectum, stomach, and oral cavity (WHO, 2008b). Causal pathways between high-fat diets and cancer may be both direct and indirect. A direct link is established by evidence suggesting a possible association of foods high in saturated fat and an increased risk of breast cancer (Boyd et al., 2003), whereas the indirect link derives from the positive association between the consumption of energy-dense high-fat foods and weight gain (Poppitt & Prentice, 1996; WHO, 2003), which may ultimately lead to overweight and obesity, which in turn are risk factors for various types of cancer (World Cancer Research Fund, 2007).

Although approximately 60 to 80% of the Dutch adult population indicate that they intend to eat more fruit and less fat (Lechner et al., 1998; Van Assema et al., 2006; Verheijden et al., 2003), only 30% of Dutch adults consume sufficient amounts of fruit and approximately one in ten individuals comply with recommendations on saturated fat intake (Voedingscentrum, 1998). More recent figures regarding Dutch young adults are even more alarming, with only seven percent meeting the recommendation with regard to fruit and eight percent complying with the recommended saturated fat intake (Hulshof et al., 2004).

### *Ultraviolet radiation*

Continuous increases in the incidence of skin cancer worldwide call for immediate actions to reduce risk behaviors in this area (Diepgen & Mahler, 2002). In the Netherlands, skin cancer prevalence is expected to increase by a dramatic 80% in the next decade (De Vries, Van de Poll-Franse et al., 2005). In addition to non-modifiable biological risk factors, such as skin type and number of atypical nevi, exposure to ultraviolet (UV) radiation and number of sunburns, particularly in childhood, are the most important risk factors for the development of melanomatous and non-melanomatous skin cancer (Oliveria et al., 2006; Whiteman et al., 2001). Exposure to ultraviolet radiation is estimated to account for at least five percent of all cancer deaths (Doll, 1998). Aside from mortality, skin cancer poses a significant problem from both a psychological and financial perspective as a result of the relatively high incidence, treatment related morbidity, and associated health care costs (e.g., Chen et al., 2001; Housman et al., 2003).

The general recommendations with regard to UV-exposure pertain to regular application of sunscreen with an appropriate sun protection factor, seeking shade between 12 and 3 PM when UV-radiation is strongest, and covering up the skin with protective clothing and a hat or cap (KWF Kankerbestrijding, 2007b; WHO, 2008d). Due to their relatively high UV-exposure – it is estimated that up to 80% of lifetime exposure to UV-radiation occurs before age 18 – and their thinner, more sensitive skin, children require special protection. Children and, as a consequence of their behavioral dependency, parents and caregivers therefore form an important target group for interventions focusing on the primary prevention of skin cancer.

Although estimates of (in)adequate sun protection behavior are difficult to obtain as the recommended behaviors can mutually influence each other, 23% of Dutch parents do not use any method of protecting their children when they are outside in the sun. As a consequence, half of the Dutch children suffer from one or more sunburns every year (KWF Kankerbestrijding, 2008b). Furthermore, in an international comparative study, performed in the mid-nineties, 5 to 11-year old Dutch children reported the lowest sunscreen use and overall UV-protection compared to children in Australasian countries and European countries such as England, Denmark and Germany (Wetton, 1996).

### **Secondary cancer prevention**

Primary prevention offers the most cost-effective long-term strategy for cancer control (WHO, 2008a). Primary prevention programs rely upon the modification of preventable risk factors. However, not all cancer risk factors are amenable to primary prevention. General non-modifiable risk factors for cancer include age and genetic predispositions. Cancer-specific risk factors include gender and hormonal changes (breast cancer), ethnicity (prostate cancer), skin type and number of atypical nevi (skin cancer). Par-

ticularly in the absence of risk factors that are amenable to primary prevention, secondary prevention strategies are indicated.

Cancer screening and active and passive detection strategies are forms of secondary cancer prevention aimed at detecting cancer early, when it is most treatable. Research has been unequivocal in establishing greatly improved chances of successful treatment and survival in early diagnosed cancers (American Cancer Society, 2004). Health professionals and the general public can act upon early diagnosis of cancer by recognizing possible warning signs of cancer and taking prompt action. Increased awareness of possible warning signs of cancer can therefore have a great impact on the prognosis of the disease.

The two population screening programs that are currently available in the Netherlands are cervical cancer screening and breast cancer screening. Since the introduction of these nation-wide programs, mortality rates of both cancers have greatly decreased in the Netherlands (LETB, 2007; Levi et al., 2000). Notwithstanding the distinct benefits of screening, the current screening uptake figures of 66% for cervical cancer screening and 82% for breast cancer screening indicate that still, a significant proportion of Dutch women eligible for screening do not participate (Berkers & Isken, 2005; LETB, 2007).

The main active detection practices that have received ongoing consideration are self-examinations of the breasts, testes and skin. Although particularly monthly self-examination of the breasts has long been recommended by many cancer institutions and alliances, there is currently insufficient evidence for the effectiveness of regular self-examinations of the breasts, testes and skin in asymptomatic individuals (Kösters & Gøtzsche, 2003; Thomas et al., 2002; USPSTF, 1996, 2004). Authoritative organizations in cancer control therefore generally do not recommend for or against the performance of routine self-examinations as methods for the early detection of cancer (KWF Kankerbestrijding, 2008a; USPSTF, 1996).

Instead, heightened awareness and prompt reporting of suspicious bodily symptoms to a physician has been continuously recommended (Smith, Cokkinides et al., 2005; USPSTF, 2004). By paying adequate attention to bodily changes, possible cancer warning signs may be detected early and subsequent timely medical help-seeking may increase chances of diagnosis at an early stage of disease. Decreasing patient-induced delay in these passive detection behaviors can therefore be a major contributing factor to decreased cancer morbidity and mortality (Facione et al., 2002; Richards et al., 1999). Despite the unarguable benefits of early cancer detection, De Nooijer and colleagues (2002) demonstrated only moderate awareness of possible cancer symptoms among Dutch adults, whereas timely medical help-seeking ranged from 16 to 87%, depending on the investigated symptoms.

## **Explaining and predicting cancer-related behaviors**

The study of behaviors that influence health and the factors that determine why individuals do or do not adopt these behaviors, is key to the research areas of health education, health promotion, and health psychology. Health behavior change comprehends a variety of cognitive, social, and emotional factors, some of which are assumed to operate in unison. Theorists' endeavors to identify sets of factors that allow for an optimal explanation and prediction of health behavior have resulted in the proposition of several models and theories. These models to a certain extent overlap and show consensus with respect to the proposition of certain essential factors. However, several inherent limitations have instigated renewed perceptions of the workings of the behavior change process and attempts to capture these workings more profoundly. These attempts demarcate the transition from the more 'traditional' continuum models towards multi-phase models of health behavior change. For this thesis the Integrated Model for explaining motivational and behavioral Change (I-Change Model; De Vries et al., 2003b, 2005b) was used as a starting point to understand cancer-related health behaviors. This model integrates concepts from various other social cognitive models and distinguishes three main behavior change phases: pre-motivation, motivation and post-motivation. This thesis will address all three phases although most attention was given to the latter phase. We will start by providing an overview of some of the theories that inspired this model and are widely used for explaining and changing health behaviors.

Traditional continuum models of health behavior change are typically designed to predict behavior at single points in time and postulate a set of factors that are expected to determine the likelihood of behavior change. These factors are mostly combined into a linear prediction equation in which individual factor levels are taken into consideration. Based on this equation, individuals are placed along a continuum that reflects the likelihood of action. Strengthening of one or more of these determinants is assumed to increase the likelihood of behavior or behavior change. A classic example of a continuum theory is the Theory of Reasoned Action (TRA; Ajzen & Fishbein, 1980). According to the TRA, the likelihood of behavioral performance is a linear function of the strength of the motivation, or intention, to perform the behavior. Although an individual may move to action from any point on the intention continuum, the likelihood of action is assumed to be higher if he is further along the continuum (Sutton, 2005).

### *Motivational factors as focus of health behavior models*

The focus on motivation is characteristic of most continuum models. In addition to the TRA and its successor, the Theory of Planned Behavior (TPB; Ajzen, 1988, 1991), other influential models, such as the Social Cognitive Theory (SCT; Bandura, 1986) and Protection Motivation Theory (PMT; Rogers, 1983) posit intention – or similar concepts such as protection motivation in PMT and (proximal) goals in the SCT – as

the most proximal determinant of behavior. Although the models to some extent differ in terms of the proposed factors that influence intention formation, their operationalization and terminology, several commonalities with regard to constructs are demonstrable (Table 1.1).

When viewing five well-known continuum models of health behavior, there seems to be a general agreement on the importance of outcome expectancies (including social outcome expectancies and subjective norms), self-efficacy, and intention. In various meta-analyses on the SCT, PMT, and TRA/TPB, outcome expectancies and self-efficacy expectations rather consistently emerge as the most powerful predictors of intention, whereas behavior is generally best predicted by self-efficacy and intention (e.g., Armitage & Conner, 2001; Floyd et al., 2000; Godin & Kok, 1996; Milne et al., 2000; Sutton, 1998).

**Table 1.1** Overview of the main sociocognitive determinants in health behavior theories. <sup>a,b</sup>

	Risk perception	Outcome expectancies <sup>c</sup>	Self-efficacy (perceived behavioral control)	Intention (goals)
Theory of Reasoned Action		✓		✓
Theory of Planned Behavior		✓	✓	✓
Social Cognitive Theory		✓	✓	✓
Health Belief Model <sup>d</sup>	✓	✓		
Protection Motivation Theory	✓	✓	✓	✓

<sup>a</sup> The constructs may be named differently, depending on the theory.

<sup>b</sup> Adapted from Bandura (2004, S. 147) and Lippke & Ziegelmann (2008, S. 708).

<sup>c</sup> Includes social outcome expectancies.

<sup>d</sup> More recent formulations of the Health Belief Model have included self-efficacy as a key factor (see Rosenstock et al., 1988).

### *Beyond motivation: premotivational factors in health behavior change*

Meta-analyses suggest that these motivation-focused models provide parsimonious accounts of health behavior. In terms of the prediction of intentions and behavior, the TPB has been demonstrated to provide an improvement on the TRA, Health Belief Model (HBM; Janz & Becker, 1984; Rosenstock, 1974), SCT, and PMT (e.g., Conner & Norman, 1994; Quine et al., 1998). Although considerable variations between studies and behaviors are noted (e.g., Godin & Kok, 1996; Van den Putte, 1991), overall, the TPB's motivational variables (i.e., attitude, subjective norm, and perceived behavioral control) have been shown to account for 40 to 50% of the variance in

intentions. Notwithstanding this considerable explanatory and predictive value, these figures indicate that still, more than half of the variance in intentions is left unexplained. This observation pertains to one of the main criticisms of the TPB and other motivation-focused models, that they may perhaps be more correctly regarded as theories of proximal determinants of behavior (Conner & Sparks, 2005). Any other influences on behavior are thought to have their impact via the centrally positioned motivational components and intention. However, what these influences exactly entail and which components mediate their impact is not clear. The strong emphasis on motivational factors may therefore result in failure to appreciate the value of more distal or pre-motivational factors in the behavior change process.

A likely candidate for the extension of motivation-focused models has been put forward by the HBM and PMT. In these models, 'threat perception' or 'threat appraisal' has been postulated as a central determinant of intention and health behavior. The perceptions of risks are assumed to comprise an individual's estimation of susceptibility or vulnerability to a certain illness or threat, and its perceived severity. Although for both models, hypotheses with regard to the combination of susceptibility and severity have been suggested (i.e., multiplicative or additive functions; see Becker & Maiman, 1975; Kirscht et al., 1976; Rogers, 1975, 1983), most applications of the PMT and HBM only consider the main effects of both concepts.

Janz and Becker's (1984) review of prospective studies using the HBM indicated that susceptibility and severity were significant predictors of behavior in 82% and 65% of studies, respectively. Furthermore, Harrison and colleagues (1992) found significant correlations between susceptibility, severity and behavior across studies. However, these correlations as well as their predictive effects have often been found to be small (e.g., Gerrard et al., 1996; Seydel et al., 1990). Results of two meta-analyses of the components of PMT (Floyd et al., 2000; Milne et al., 2000) indicate that coping appraisal variables (i.e., perceived response efficacy, self-efficacy, response costs) more strongly predict motivation and behavior than threat appraisal variables (i.e., perceived severity and vulnerability). Furthermore, perceived severity typically emerges as the least powerful predictor of behavior in several PMT- and HBM-based studies (e.g., Harrison et al., 1992; Milne et al., 2000). The relatively weak behavioral predictions by risk perceptions as opposed to the moderately strong predictive value of self-efficacy and intentions are consistent with a hypothesis of mediation. Indeed, research and notions by, for instance, Schwarzer and colleagues (Schwarzer, 2008; Schwarzer et al., 2007), De Vries and colleagues (De Vries et al., 2003b, 2005b) and Abraham and colleagues (1999a) suggests that perceptions of risk may be more usefully construed as cognitive antecedents of motivation, rather than as direct predictors of behavior.

Furthermore, an important prerequisite for deliberation of behavior change is an individual's awareness of a health threat. In his Precaution Adoption Process Model (Weinstein, 1988; Weinstein & Sandman, 1992), Weinstein proposed that awareness of risk behavior is one of the key issues in motivating people to change their behavior.

People need to be aware and knowledgeable of a health issue and should feel personally engaged, i.e., they should consider the issue as personally relevant, before they are susceptible to behavior change. If people have never heard about a certain health issue and are ignorant of the risks associated with the issue, they will not be inclined to adapt their behavior. Furthermore, individuals who are aware of a health issue but do not feel personally engaged because of misperceiving their own behavior as adequate, are also unlikely candidates for behavior change (e.g., Brug et al., 1994; De Ridder & Lechner, 2004; Ronda et al., 2001). In this view, awareness and knowledge of a health threat as well as awareness of the adequacy of one's own health behavior is regarded as a prerequisite for deliberation of health behavior change (e.g., Bandura, 1990; Becker & Joseph, 1988; Weinstein, 1988).

It may therefore be prudent to regard awareness factors and risk perceptions as more distal influences in the health behavior change process. However, there is a definite need for more research in this area. Investigation of the optimal operationalization of risk perception, possible influences of other distal factors such as knowledge and awareness, and the nature of their behavioral influence (i.e., direct or mediated effects) would be informative.

*Beyond motivation: postmotivational factors in health behavior change*

The focus of the traditional health behavior models on motivational factors and intention also pertains to their second main criticism. Recent notions of intention – behavior discrepancies undermine the central proposition of behavioral intentions or motivation as the most powerful and proximal determinant of health behavior.

Prospective tests of the intention – behavior relationship demonstrate that intentions account for 28% of the variance in behavior (Sheeran, 2002), indicating that although intentions are 'good' predictors of behavior, they still leave a considerable amount of variance in behavior unexplained. When testing the predictive power of intention with regard to behavior *change*, Sutton and Sheeran (2003) found that intention accounted for an additional seven percent of variance in behavior, after past behavior had been taken into account. With a small-to-medium effect size (Cohen, 1992), this finding specifies a reliable association between intentions and behavior change; reliable, but not nearly perfect.

In their attempt to unravel the relative contribution of different patterns of motivation – behavior (in)consistency to the previously indicated discrepancy between intention and behavior, Orbell and Sheeran (1998) decomposed the intention – behavior relation into a 2 (intention: to act vs. not to act) x 2 (behavior: acted vs. did not act) matrix. Discrepancies between intention and behavior can be attributed to individuals with positive intentions who subsequently do not act ('inclined abstainers') and individuals with negative intentions who ultimately perform the behavior ('disinclined actors'). In this PMT-based study, 57% of the women that were inclined to undergo a cervical cancer screening test did not act according to their intention. Orbell and Sheeran found that inclined abstainers – rather than disinclined actors – are primarily

responsible for this 'gap' between intention and behavior. This conclusion was later confirmed in a review of health behaviors by Sheeran (2002) which demonstrated that only 53% of individuals with positive intentions to engage in a health behavior translate their intentions into actual behavior.

Traditional continuum models of behavior change do not provide insight into the processes by which a positive intention is translated into successful performance of a behavior. Advanced models, therefore, need to include factors that help to clarify and bridge this intention – behavior gap.

### *Multi-phase approach to behavior change*

In recent years, multi-phase or stage theories of health behavior change have received increasing attention in the area of health education and promotion. Multi-phase models differ from traditional continuum models in so far as they conceptualize health behavior change as encompassing several discrete phases. These models describe the factors that may influence behavior change in these different phases and assume that 1) people in different phases will behave in qualitatively different ways, and 2) different factors are important at different stages, implying that the type of interventions and information needed to move closer to action or adoption of a new behavior will vary from phase to phase (Sutton, 2000, 2005; Weinstein, 1988). Although the evidence base for multi-phase theories is somewhat inconsistent – several findings support qualitative differences between stages, whereas the validity of stage assumptions, particularly with regard to the frequently applied Transtheoretical Model (Prochaska et al., 1992), have been questioned – a recent meta-analysis suggests that tailoring health interventions to behavioral stages is more effective than generic, non-tailored information (Noar et al., 2007).

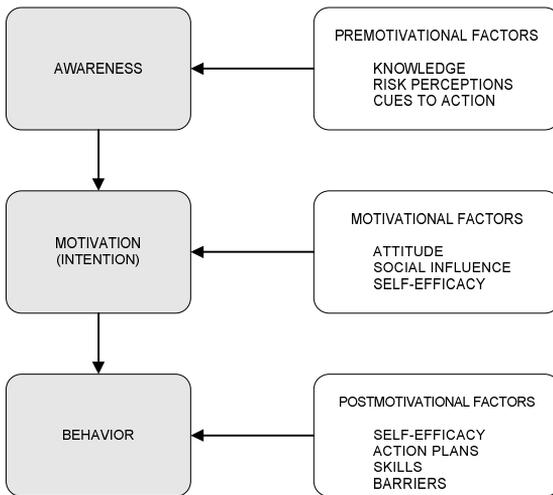
Current multi-phase models include the Transtheoretical Model (TTM; Prochaska et al., 1992), Precaution Adoption Process Model (PAPM; Weinstein, 1988), Model of Action Phases (MAP; Heckhausen & Gollwitzer, 1987), Health Action Process Approach (HAPA; Schwarzer, 1992), and I-Change Model (De Vries et al., 2003b, 2005b). The latter two models are, however, often considered to be 'hybrid' models in the sense that their structure is similar to that of continuum models and they can be analyzed either as a continuum (mediator) model or as a stage model (Schwarzer, 2008; but see Sutton, 2005, 2008 for a critical stance towards the stage version of HAPA). Key differences between these two models and for instance the TPB pertain to the inclusion of premotivational factors (e.g., risk perception) and postmotivational volitional factors (e.g., planning), in addition to the traditionally incorporated motivational factors in the behavior change process.

This tripartite division reflects the stage transitions that are commonly shared by multi-phase theories and most strongly supported by evidence (see Schüz et al., 2009). Most models assume a transition from 1) not intending to having formed an explicit intention to act, and 2) intending to act to actual behavioral performance. Often, the transition from not intending to intending is further subdivided into a transi-

tion from unawareness of a health threat to awareness and a transition from awareness to intending to act, as assumed in the PAM and I-Change Model. This specification is also reflected in Schwarzer's statement (Schwarzer, 2008) that risk perceptions predominantly serve to set the stage for a contemplation process that may lead to intention formation. The resulting stage partition may then roughly be constituted of, but not limited to:

- 1) a premotivational stage, in which individuals should become sufficiently aware of a health threat,
- 2) a motivational stage, in which deliberation on motivational tendencies takes place (substage 2a), and which culminates in intention formation (substage 2b)
- 3) a postmotivational stage, which encompasses the striving towards intention realization and ends with successful acting.

A corresponding, preliminary staging algorithm that captures the role of various social cognitive factors in these separate stages has been put forward in the I-Change Model (De Vries et al., 2003b, 2005b). According to the I-Change Model, determinants of behavioral change are classified into premotivational, motivational, and postmotivational factors. In the premotivational phase, i.e., before deliberation and intention formation is started, individuals need to become aware of their risk behavior. Three sets of factors are incorporated that exert their influence in this phase. *Information factors* pertain to the quality of messages, channels, and sources used to convey health information. *Predisposing factors* include behavioral, biological, psychological, and social cultural factors that may influence the awareness of a risk behavior. *Awareness factors* are derived from the Health Belief Model and Precaution Adoption Process Model (Weinstein, 1988) and include an individual's knowledge, risk perception, and perceived cues that prompt people to become aware of a health threat (cues to action). Adequate awareness of a risk behavior demarcates the transition to the motivational phase, in which deliberation of behavioral performance takes place (see Figure 1.1). Centrally positioned are the three main *motivational factors* attitude, social influence, and self-efficacy. Weighing the advantages and disadvantages of a behavior and deliberation of perceived social norms, support, modeling and the individual's own perceived capability to carry out the behavior ultimately culminates in the formation of a behavioral intention. The likelihood that an intention is translated into actual behavior is influenced by *postmotivational factors*, such as the specification of detailed action plans when striving for intention realization. The ability to prepare and execute such goal-directed action plans is thought to increase the likelihood that intentions are translated into actual behavioral performance. Furthermore, self-efficacy is thought to remain an important factor in the translation of motivation into action. The proposition of knowledge and risk perceptions as indispensable factors in the earlier phases of behavior change mainly corresponds to assumptions of the PAM and HAPA. The importance of outcome expectancies, including social outcome expectancies, and self-efficacy in the motivational phase and volitional planning in the postmotivational phase is implicitly or explicitly shared by all multiphase models.



**Figure 1.1** Preliminary staging algorithm of behavioral change as suggested by the I-Change Model (De Vries et al., 2003b, 2005b).

By elaborating on the influences of pre- and postmotivational factors, most multiphase models steer clear of the previously discussed main criticisms of the more traditional models of health behavior. However, only recently research efforts have been directed towards the explicit investigation of premotivational factors in these models (e.g., De Vries et al., 2006b; Knops-Dullens et al., 2007; Lippke et al., 2005; Renner & Schwarzer, 2005; Segaar et al., 2006) and the application and empirical investigation of representations of postmotivational factors, (e.g., De Vries et al., 2006b; Hilberink et al., 2006; Hoving et al., 2006; Luszczynska & Schwarzer, 2003; Sniehotta et al., 2005a, 2005b, 2006b; Schwarzer et al., 2007). Particularly the planning strategies posited in the postmotivational or volitional phase have incited great efforts in the social and health psychology areas to bridge the gap between intentions and actions.

### Self-regulatory planning

After forming a goal intention, the use of self-regulatory planning strategies is often necessary as newly formed goal intentions frequently specify goals that cannot be achieved in a single step or that cannot be implemented immediately (Gollwitzer et al., 1990; Heckhausen, 1987). Planning can be defined as the process of generating a sequence of behaviors used to translate an individual's resources into actions aimed at goal achievement (Austin & Vancouver, 1996; Early et al., 1987), and is thought to enhance action control through the generation of ever more precise action instructions, or *action plans* (Abraham et al., 1998). Gollwitzer (1996) stated that planning can help

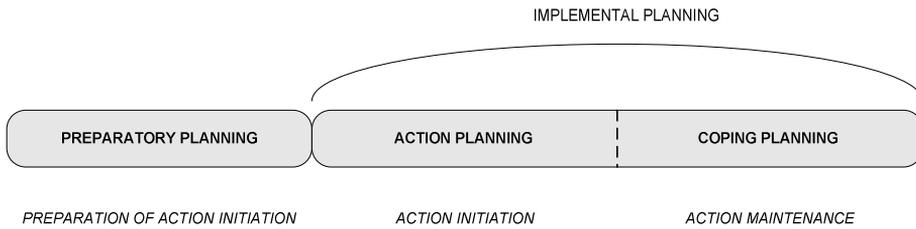
individuals to overcome intellectual as well as volitional problems of goal achievement. The intellectual benefits of planning involve developing a strategy to achieve a goal; its volitional benefits involve increased persistence, decreased distractibility, and a readiness to seize opportunities to act (Dieffendorff & Lord, 2003). This differentiation can be discerned in two mainstreams in literature concerned with the operationalization of action planning. These mainstreams pertain to a) the planning of a strategic course of preparatory actions, here indicated as *'preparatory planning'*, and b) the planning of the implementation of actions in specified situations, here indicated as *'implemental planning'*.

### *Preparatory planning*

The former type of action planning implies the planning of specific preparatory or instrumental acts in the service of goal achievement. This type of planning is based on principles of goal theories (see Austin & Vancouver, 1996). Goal theorists agree that many goals entail sequences of hierarchically organized actions, so that identifying and planning specific instrumental or preparatory actions may be vital in the translation of intentions into behavior (e.g. Bagozzi, 1992; Sheeran et al., 1999). Goal setting theory (e.g., Latham & Locke, 1990; Locke et al., 1981) for instance assumes that the setting of specific proximal goals or subgoals (e.g., daily consumption of fruit) benefits the achievement of a distal or longer-term goal (e.g., healthy living; Bandura & Schunk, 1981; Latham & Locke, 1990; Strecher et al., 1995). When faced with specific goals, people tend to formulate specific plans and task strategies on how the goal can be reached (Bandura & Simon, 1977; Latham & Baldes, 1975). These strategies are deliberate action plans that are motivated by goals and can independently affect task performance by predetermining a consecutive course of action (e.g., buying fruit, taking fruit along when you go to work, substituting snacks by fruit, etcetera) that is aimed at and leading towards goal achievement (i.e., daily fruit consumption; see Figure 1.2). In line with this reasoning, Bagozzi (1992) acknowledges that many intentions involve a commitment to a series of actions rather than a single act. He recognizes the role of planning in the translation of intentions into behavior and emphasizes the identification and coordination of such specific instrumental acts, or preparatory actions in the course of goal striving. Although several studies indicate the importance of planning and performance of preparatory actions in health behavior (e.g., Abraham et al., 1998, 1999b; Bagozzi & Edwards, 1998; De Vries et al., 2006b, 2008; Hilberink et al., 2006; Kellar & Abraham, 2005; Van Empelen & Kok, 2006, 2008), research in this area is still in relative infancy.

### *Implemental planning*

Whereas studies based on the I-Change Model mostly rely on preparatory planning (e.g., De Vries et al., 2008; Hilberink et al., 2006), HAPA-based research generally applies operationalizations of implemental planning. The focus on implemental planning originated from research by Leventhal, Singer, and Jones (1965) in which they demonstrated that fear appeals were most likely to instigate action when they were accompanied by specific instructions or action plans on how to act (i.e., what to do, and when and where to do it). The formation of implemental intents, as described in the early work of Gollwitzer and Heckhausen (Gollwitzer et al., 1990; Heckhausen, 1987) is strongly related to this concept of action plans. The strategy of committing oneself to when, where, and how to enact a desired goal is later elaborated in Gollwitzer's work on *implementation intentions* (1993, 1996, 1999). The strategy of implementation intention formation originally consists of the formulation of specific *if - then* statements that connect good opportunities to act with cognitive or behavioral activities that will be effective in accomplishing one's goals. Whereas goal intentions specify what one wants to achieve (i.e., 'I intend to achieve X'), implementation intentions specify the behavior that one will perform in the service of goal achievement and the situational context in which one will enact it (i.e., 'If situation Y occurs, then I will initiate goal-directed behavior Z!'). By anticipating a critical situation (i.e., when and where) and specifying how to act in this situation, the mental representation of this situation is assumed to become highly activated (Webb & Sheeran, 2008) and the control of behavior is delegated from the self to the specified situational cues that rather automatically elicit the specified action (Gollwitzer, 1999; Gollwitzer & Sheeran, 2006). Implementation intentions are thereby thought to overcome several problems that can undermine goal attainment, such as failure to get started, and getting derailed from the course of goal achievement (Gollwitzer & Sheeran, 2006). With regard to this latter problem, the application of a specific type of planning has been proposed that incorporates the anticipation of obstacles and difficult situations that may stand in the way of maintaining goal-directed behavior. Sniehotta and coworkers (2005b, 2006b) refer to this distraction-inhibiting strategy as *coping planning*, which may help to maintain behavioral performance in the face of barriers. By anticipating possible risk situations and predeciding what coping responses to use in these situations, a concrete coping procedure is at hand when the risk situation is encountered. Consequently, individuals can act on their intentions even in situations in which barriers and obstacles restrict intended actions or evoke counter-intentional behavior. Whereas implemental action planning is thought to exert its influence mainly in, but not limited to, the earlier phases of the behavioral change process (i.e., action initiation; Sniehotta et al., 2005b), coping plans are thought to be grounded in experience. The predictive power of coping planning is therefore assumed to develop over time, emphasizing the important role of coping planning in the later phases of behavior change (i.e., action maintenance; Sniehotta et al., 2005b; Ziegelmann et al., 2006; see Figure 1.2).



**Figure 1.2** Conceptual differentiation of multiple types of action planning as applied in this thesis.

Experimental studies on the impact of implemental planning have demonstrated powerful effects in the promotion of a wide range of health behaviors, such as exercise (Milne et al., 2002), fruit consumption (De Nooijer et al., 2006; Kellar & Abraham, 2005), and cancer screening attendance (Sheeran & Orbell, 2000). Furthermore, correlational studies, in which planning is measured psychometrically, demonstrate that implemental planning has additional predictive value of behavior over and above the influence of intention and self-efficacy (e.g., Luszczynska & Schwarzer, 2003; Norman & Conner, 2005b; Sniehotta et al., 2005a), indicating that planning may help bridge the gap between intention and behavior.

However, after a series of efficacious applications, with meta-analyses demonstrating medium effect sizes (Gollwitzer & Sheeran, 2006; Sheeran, 2002), recently, reports of unsuccessful attempts have been surfacing as well (e.g., Jackson et al., 2005; Jackson et al., 2006; Michie et al., 2004; Rutter et al., 2006). There may be a multitude of factors underlying the discrepancy in demonstrated efficacy of implemental planning. Variance in populations studied (e.g., clinical versus student populations or highly motivated versus relatively unmotivated samples), variance in behaviors studied (simple versus complex or single versus repeated behaviors), as well as discrepancies in the operationalization of implementation intentions (e.g., correct or incorrect application of if – then strategies, quality of plans) may for instance result in significant differences between studies. Furthermore, contrary to the almost continuous flux of studies testing the efficacy of implemental planning with regard to health promoting and health protective behaviors, there is a notable lack of studies investigating its influence on health risk behaviors, i.e., behaviors that should be reduced, ceased or prevented in order to benefit health (Gollwitzer & Sheeran, 2006). Testing the influence of planning in a variety of populations and behaviors and disentangling its efficacious features may therefore lead to optimization of future applications.

## **Aim of the thesis**

More recent multi-phase models of behavior change, as opposed to traditional continuum social cognition models, postulate the incorporation of volitional factors in the postmotivational phase of behavior change. Furthermore, several multi-phase models integrate more distal determinants, such as awareness of a risk behavior and perceived risk, and propose a framework for their working mechanisms in the earlier phases of health behavior change. Although the motivation phases of multi-phase models are generally well specified and thoroughly grounded on elaborate earlier work on motivational factors, premotivational and particularly postmotivational factors have been subject of relatively limited research efforts. The research projects described in the present thesis were therefore set out to investigate the influence of pre- and postmotivational factors in the health behavior change process.

With regard to the premotivational phase, we aimed to:

- 1) examine the relationships between premotivational and motivational factors, and
- 2) investigate the (independent) influences of premotivational factors on behavior.

With regard to the postmotivational phase, emphasis was placed on the influence of self-regulatory planning. Using studies of correlational as well as experimental design, we aimed to:

- 1) investigate the impact and predictive value of action planning with regard to health protective as well as health risk behaviors,
- 2) disentangle the nature of the relationship between intention, action planning, and behavior, and
- 3) optimize future planning interventions by a) comparing the behavioral influence of different types of action planning, and b) identifying characteristics and correlates of effective planning.

## **Outline of the thesis**

In the present thesis influences from all sets of factors (premotivational, motivational, and postmotivational) will be discussed (see Table 1.2). From the outset of the research project, the intention was to instigate further exploration of premotivational as well postmotivational factors, as these have been relatively underexposed in previous research. However, in keeping with the research on the intention – behavior gap that will be discussed, this simultaneous goal pursuit was partially derailed as limited time and cognitive resources led us to prioritize the pursuits. Consequently, the emphasis was gradually shifted towards the exploration of postmotivational planning concepts. As can be seen from Table 1.2, the influence of premotivational awareness factors will be discussed in two chapters, whereas six chapters explore postmotivational planning concepts.

The thesis elaborates on several research projects that have been performed as part of a research collaboration of the Department of Health Education and Health Promotion of Maastricht University and the Prevention and Patient Support Division of the Dutch Cancer Society. This collaboration entailed the evaluation of multiple mass media campaigns and other health education interventions organized by the Dutch Cancer Society. In addition to the core evaluation of these projects, several add-on interventions were implemented and evaluated, and new theoretical concepts and hypotheses were investigated, which constitute the essence of this thesis.

A mixture of cross-sectional and longitudinal studies of observational and experimental nature will be presented, collectively aiming to enhance the prediction and promotion of health behavior. Four research projects, implemented between June of 2004 and June of 2008 will be outlined, covering the health behaviors discussed in the preceding sections, i.e., smoking, sun protection behavior, dietary behavior, and passive cancer detection behavior.

**Table 1.2** Overview of socio-cognitive factors addressed in this thesis.<sup>a</sup>

	Premotivational			Motivational	Postmotivational
	<i>Predisposing</i>	<i>Information</i>	<i>Awareness</i>		
Chapter 2	X		X	X	
Chapter 3	X	X			
Chapter 4	X				X
Chapter 5	X			X	X
Chapter 6	X		X	X	X
Chapter 7	X			X	X
Chapter 8	X			X	X
Chapter 9	X			X	X

<sup>a</sup> Classification according to the I-Change Model (De Vries et al. 2003b, 2005b).

### *Project 1: Passive cancer detection behavior*

The first project was carried out in the fall of 2004 and entailed a large evaluation study of a nationally implemented mass media campaign of the Dutch Cancer Society on the early detection of cancer (Reubsaet et al., 2008; Van Osch et al., 2005a, 2005b). As passive detection behavior has not been subject of intensive study, a thorough understanding of relevant social cognitive determinants is indispensable in order to adapt and optimize future campaigns and interventions. Therefore, an analysis of determinants of two passive cancer detection behaviors was carried out among the target group of middle-aged and older people (> 50 years). This study (Study 1; Chapter 2) of correlational design investigated the associations of various premotivational factors, such as knowledge, awareness, and perceived risk, and motivational

factors, such as attitude and self-efficacy, with a) attentiveness to cancer warning signs, and b) timely medical help-seeking for cancer warning signs.

#### *Project 2: Smoking cessation*

The second project concerned the evaluation of a national smoking cessation contest ('Quit & Win') organized by the Dutch Cancer Society in May 2005. The first study of this project (Study 2, Chapter 3) employed a randomized controlled design with a baseline measurement and three follow-up measurements at one, seven and twelve months, and investigated the short- and long-term impact and appreciation of the cessation contest and its separate elements. In an add-on intervention the additional effects of implementation intention formation on smoking abstinence were investigated (Study 3; Chapter 4). In this intervention, aspiring non-smokers were asked to formulate three plans on how they intended to cope with personal risk situations for smoking relapse. With the aim of optimizing implementation intention formation in future applications, the quality of these plans was rated according to their instrumentality and specificity in Study 4 (Chapter 5). The individual contribution of these features on goal achievement (i.e., smoking abstinence) was examined.

#### *Project 3: Sun protection behavior*

The third project entailed a large evaluation study of a mass media campaign that was nationally implemented in the summer of 2005. This campaign of the Dutch Cancer Society consisted of a variety of components that were targeted at parents and children. Two measurements among these target groups took place in the spring and right after the summer of 2005. These longitudinal data on premotivational, motivational, and postmotivational factors were used for the investigation of socio-cognitive determinants of sun protection behavior (Study 5, Chapter 6). In this study, emphasis was placed on the behavioral influence of action planning. In addition to testing its independent predictive value, the nature of its impact in the intention – behavior relationship was investigated.

Furthermore, a randomized controlled trial testing the efficacy of implementation intentions was executed. Parents in the experimental group were asked to formulate implementation intentions with regard to their sun protective behavior, as applied to their children. The efficacy of this implementation intention manipulation on parental sunscreen use is described in Chapter 7 (Study 6).

#### *Project 4: Dietary behavior*

The fourth project comprised two analogous and simultaneously executed studies on fruit consumption and high-caloric snack consumption. For both studies, three online measurements were carried out in the spring of 2007. Beyond motivational factors, such as self-efficacy and intention, two types of self-regulatory planning were assessed. First, the influence of action planning in the promotion of a health protective behavior (i.e., fruit consumption) and in the restriction of a health risk behavior (i.e.,

snack consumption) was investigated and compared (Study 7, Chapter 8). Second, in order to optimize the content of future planning interventions, the value of two types of self-regulatory planning in the prediction of fruit consumption was compared; the influence of preparatory planning (i.e., the planning of strategies and preparatory actions towards goal achievement) was contrasted and complemented with implemental planning (i.e., planning when, where, and how to perform a goal behavior; Study 8, Chapter 9).

Table 1.3 provides a brief overview of the main characteristics of the four research projects and the resulting studies.

**Table 1.3** Overview and main characteristics of the projects and studies discussed in this thesis.

	Project 1	Project 2	Project 3	Project 4
Chapter	2	3, 4, 5	6, 7	8, 9
Health behavior	Cancer detection practices	Smoking cessation	Sun protection behavior	Dietary behavior: fruit, snack consumption
Design	Cross-sectional Correlational	Longitudinal Correlational (Study 4) Experimental (Study 2, 3)	Longitudinal Correlational (Study 5) Experimental (Study 6)	Longitudinal Correlational
Sample	Middle-aged and older people (N=459)	Adult, daily smokers (N=1566)	Parents and young children (N=436)	Adults (fruit: N=572; snack: N=585)
Method	Telephone questionnaires	Internet-delivered questionnaires	Internet-delivered questionnaires	Internet-delivered questionnaires



# CHAPTER 2

## Passive cancer detection and medical help seeking for cancer symptoms: (in)adequate behavior and psychosocial determinants

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## ABSTRACT

**Objectives:** This study explored the performance and psychosocial determinants of passive cancer detection behavior, i.e., attentiveness to cancer symptoms, and medical help seeking, and investigated potential dependency between these two behaviors.

**Methods:** A detailed telephone survey was conducted among 459 respondents, aged 55 years or older. The survey assessed passive detection behavior and appropriately timed medical help seeking regarding 14 cancer symptoms. Knowledge of cancer symptoms and various other psychosocial determinants were also measured.

**Results:** Knowledge of cancer symptoms and adequate passive detection behavior was low to moderate. Timely medical help seeking behavior was low to moderate for urgent symptoms but relatively high for prolonged symptoms. Overall, women had higher knowledge levels, paid more attention to cancer symptoms and performed more timely help seeking than men. Passive detection behavior was positively associated with premotivational awareness factors (knowledge and awareness), female gender and perceived advantages. Timely medical help seeking was positively related to cognitive motivational factors (perceived advantages, self-efficacy expectations, and intention), and negatively related to educational level and perceived susceptibility to cancer. Furthermore, a strong positive association was found between the performance of passive detection behavior and timely medical help seeking.

**Conclusions:** The sub-optimal levels of knowledge and performance of early cancer detection behaviors found in this study emphasize a need for educational efforts in the area of early cancer detection. The effectiveness of these efforts may benefit from considering the distinct sets of determinants of passive detection behavior and medical help seeking.

## INTRODUCTION

Delays in the self-detection of cancer symptoms and failure to timely present these symptoms to a medical specialist may decrease the chances of diagnosis at an early stage of disease. As research has been unequivocal in establishing improved chances of successful treatment and survival in early diagnosed cancers (American Cancer Society, 2004), patient-induced delay can be a major contributing factor to cancer morbidity and mortality (Brouha et al., 2005; Facione et al., 2002; Richards et al., 1999).

Several previous studies have investigated the reasons why people delay medical help seeking when they detect possible cancer symptoms. Feelings of fear, worry and embarrassment, fatalistic beliefs, and inadequate knowledge and recognition of cancer symptoms have been shown to be important impeding factors in the timely consultation of a medical specialist (De Nooijer et al., 2001; Facione et al., 1997; Sheikh & Ogden, 1998; Smith, Pope et al., 2005).

An important aspect that only few studies (De Nooijer et al., 2002, 2003; Mor et al., 1990; Oliveria et al., 1999) have, however, touched upon is the prerequisite of actual symptom detection in the process of medical help seeking. In order to timely seek medical help, people must become aware of the symptoms, either by means of active detection behavior such as self-examination, or as a result of general attentiveness to suspicious symptoms (i.e., passive detection behavior). Most studies in the field of self-detection of cancer have focused on active detection behaviors. Recent scientific evidence for the effectiveness of self-examinations is, however, either limited (Kösters & Gøtzsche, 2003; McCready et al., 2005) or inconclusive (USPFTS, 2004). Since heightened attentiveness and prompt reporting of suspicious symptoms to a medical specialist is presently recommended (Smith, Cokkinides et al., 2005; USPFTS, 2004), these behaviors merit further investigation and promotion.

In order to develop effective educational programs that target passive detection behavior and medical help seeking, an analysis of determinants of both behaviors is indispensable. So far, literature includes only one study to that effect (De Nooijer et al., 2003). The authors concluded that passive detection behavior was associated with female sex, higher education, knowledge of cancer symptoms, perceived advantages of the behavior, and self-efficacy to perform the behavior. Medical help seeking could be predicted from a different set of determinants, including knowledge, perceived advantages, moral obligation, anticipated regret, social norm, and self-efficacy. The authors further concluded that the influence of additional factors, other than cognitive ones, should be studied.

In addition to investigating the behavioral determinants of early detection behaviors, exploration of the potential relationship between these behaviors may be of great value in elucidating the temporal process of cancer detection. Although associations between 1) timely medical help seeking and early cancer diagnosis, and 2) early cancer diagnosis and improved chances of survival, have consistently been established (American Cancer Society, 2004; Brouha et al., 2005; Richards et al., 1999), the

potential preceding association between passive detection behavior and medical help seeking has lacked attention. So far, only one study has examined this association. Oliveria and coworkers (1999) found a negative association between skin awareness and delay in seeking medical attention in their study among cutaneous melanoma patients. As this study solely investigated skin awareness and had methodological limitations, in particular the mere reliance on retrospective measures, this association requires verification and generalization to other populations and other types of cancer.

The present study focuses on passive cancer detection behavior, i.e., attentiveness to possible cancer symptoms, and timely medical help seeking in a population of elderly individuals (> 55 years). Early detection of cancer is of particular importance to these individuals since, on account of their age, they are at an increased risk for developing various types of cancer (Parkin et al., 2005). The behavioral determinants investigated in this study were derived from several models of health behavior, including the Precaution Adoption Process Model (Weinstein & Sandman, 2002), Protection Motivation Theory (Rogers, 1983), Health Belief Model (Becker, 1974), Social Cognitive Theory (Bandura, 1986), Transtheoretical Model (Prochaska & Velicer, 1997), and the Theory of Planned Behavior (Ajzen, 1991). Concepts and ideas from these cognitive theories have been assimilated in the Integrated Model for exploring motivational and behavioral Change (the I-Change Model) (De Vries et al., 2003b, 2005b). The I-Change Model builds on an earlier model, referred to as the Attitude - Social influence - self-Efficacy Model (De Vries & Mudde, 1998). Both models have been applied to a variety of health behaviors, including several cancer detection and prevention behaviors (De Nooijer et al., 2003; De Vries et al., 2005a, 2005b; Lechner et al., 1997, 2004). The I-Change Model assumes that behavior and intentions can be predicted from a set of motivational factors (attitudes, social influences, and self-efficacy expectations), which are determined by various distal influences. These distal influences include premotivational awareness factors (e.g., knowledge, cues to action and risk perceptions) and several predisposing factors, such as behavioral factors (e.g., life styles), psychological factors (e.g., personality), biological factors (e.g., gender, genetic predisposition), social and cultural factors (e.g., policies), and information factors (the quality of messages, channels, and sources used in health education). The present study will use an extended version of the I-Change Model and focus on the importance of premotivational and motivational factors in the performance of early cancer detection behaviors.

The purpose of this study was threefold. First, the general knowledge of cancer symptoms and the performance of passive detection behavior and medical help seeking were investigated. Second, the importance of various psychosocial factors in both early detection behaviors was examined, and third, the relationship between passive detection behavior and medical help seeking was explored in order to test dependency between these two early detection behaviors.

## METHODS

### Respondents and procedures

Data was obtained from Dutch adults aged 55 or older by means of a telephone survey, using computer assisted telephone interviewing. The survey was preceded by a mailing, in which subjects were informed that they would be approached by telephone and asked to participate in a survey on people's considerations about cancer. Of those subjects approached ( $n = 1074$ ), 459 agreed to participate (43%).

Non-response analysis showed that respondents were younger (mean age: 68.8 vs. 75.8 years;  $P < 0.001$ ) and more often male (49% vs. 32%;  $P < 0.001$ ) than non-respondents.

### Questionnaire

The questionnaire was based on items used in a previous study on early cancer detection (De Nooijer et al., 2003) and literature review. The different concepts that were measured are described below. Answering options, examples of questions and Cronbach's alphas are presented in Table 2.1.

#### *Premotivational factors*

*Awareness* (Weinstein & Sandman, 2002) with regard to passive detection behavior was assessed by two items. The first item asked if respondents had ever heard that paying attention to cancer warning signs could lead to the early detection of cancer. If respondents answered positively, they were asked whether they had ever considered paying attention to cancer warnings signs.

*Personal engagement* assessed to what extent respondents were personally concerned with the behaviors.

*Perceived susceptibility* to cancer assessed perceptions of their absolute susceptibility to cancer, their susceptibility relative to other people in their environment, and the absolute susceptibility of men or women of their age.

*Perceived severity* of cancer assessed the perceived chances of dying from cancer, the certainty with which cancer ends in death and the perceived seriousness of cancer relative to other diseases.

*Knowledge of cancer symptoms* was assessed by a scale adapted from the Knowledge of Cancer Warning Signs Inventory (Berman & Wandersman, 1991) and consisted of 8 correct and 3 incorrect cancer warning signs. Respondents were asked to indicate whether they thought the symptoms were possible cancer symptoms. All answers were dichotomized into correct (score 1) and incorrect (score 0), after which a total knowledge score was calculated by adding these scores (range 0 - 11).

*Personal experience with cancer*, an internal and external cue to action, was assessed by asking whether the respondents themselves or people in their immediate environment presently had cancer or had had cancer in the past.

**Table 2.1** Description of the various constructs assessed.

Concept	Items*	Examples of questions, answering options and range	Mean (SD)	$\alpha^\dagger$
Awareness	2	Have you ever heard that paying attention to possible cancer symptoms can lead to early detection of cancer? <i>no (0) and yes (1)</i>	0.91 (0.28)	-
Personal engagement	2 / 2	What do you think is the chance that paying attention to cancer warning signs / timely medical help seeking will lead to early detection of cancer for you personally? <i>very low (1) to very high (5)</i>	3.75 (0.80)/ 3.91 (0.76)	0.71 / 0.75
Perceived susceptibility	3	Absolute own vulnerability: What do you think are your chances of getting cancer? <i>very low (1) to very high (5)</i>	3.10 (0.71)	0.64
Perceived severity	3	If you were to get cancer, what do you think are the chances of dying from it? <i>very low (1) to very high (5)</i>	3.34 (0.69)	0.46
Knowledge	11	Do you think the following symptom is a possible cancer symptom? <i>definitely yes (1) to definitely no (5)</i>	6.24 (2.41) <sup>‡</sup>	-
Perceived advantages	2 / 2	To what extent do you think paying attention to cancer symptoms / timely seeking medical help is useful? <i>not useful at all (1) to very useful (5)</i>	3.63 (0.52)/ 3.64 (0.52)	0.73 / 0.78
Perceived disadvantages	1 / 2	To what extent do you think paying attention to cancer symptoms is unpleasant? <i>not unpleasant at all (1) to very unpleasant (5)</i>	1.67 (0.99)/ 2.97 (1.07)	-
Anticipated regret	1 / 1	To what extent would you feel regret if you did not pay attention to cancer symptoms / if you did not timely seek medical help and cancer was to be diagnosed? <i>no regret (1) to much regret (5)</i>	3.49 (0.84)/ 3.57 (0.73)	-
Response efficacy	3 / 3	Paying attention to cancer symptoms / timely medical help seeking is important to detect cancer as early as possible. <i>completely disagree (-2) to completely agree (2)</i>	1.29 (0.55)/ 1.30 (0.52)	0.75 / 0.75
Self-efficacy (ability)	1 / 1	Do you think you are able to pay attention to cancer symptoms / to timely seek medical help for cancer symptoms? <i>certainly not (-2) to certainly yes (2)</i>	1.15 (0.83)/ 1.48 (0.70)	-
Self-efficacy (difficulty)	1 / 1	To what extent do you find it difficult to pay attention to possible cancer symptoms / to timely seek medical help for cancer symptoms? <i>very difficult (-2) to very easy (2)</i>	-0.19 (1.03)/ 0.27 (1.16)	-
Intention	1 / 1	Do you intend to pay attention to cancer symptoms / timely seek medical help in the future? <i>certainly not (-3) to certainly yes (3)</i>	1.54 (1.08)/ 1.32 (0.72)	-
Passive detection behavior	14	How often do you pay attention to the following symptom? <i>never (1) to always (5)</i>	3.35 (1.13)	0.93
Medical help seeking	14	After what period of time would you consult a physician if you were to detect the following symptom? <i>within one week (1) to never (6)</i>	2.07 (0.72)	0.90

\* Number of items for passive detection behavior and medical help seeking are separated by the /-symbol.

Numbers before the /-symbol apply to passive detection behavior.

† Cronbach's alpha was not calculated for the two awareness items, because the second item was skipped in case respondents answered negatively to the first item.

‡ Mean score and standard deviation refer to the total knowledge score (range 0-11).

*Motivational factors*

*Attitudes* towards both early detection behaviors were assessed using four concepts:

*Perceived advantages* assessed the perceived importance and usefulness of the two behaviors.

*Perceived disadvantages* were assessed by one item for attentiveness, measuring its unpleasantness, and two items for medical help seeking, measuring respondents' tenseness when seeking help and the belief that medical specialists would consider them troublesome in case of a consult on possible cancer symptoms. As reliability concerning medical help seeking was insufficient, the two items were entered separately in the analyses.

Furthermore, *anticipated regret* (an emotional disadvantage; Lechner et al., 2004) about failure to perform passive detection behavior and timely medical help seeking was assessed, and lastly, *response efficacy* (Rogers, 1983) was assessed by the perceived efficacy of the two behaviors in detecting cancer in an early stage, in increasing one's chances of survival, and in contributing to one's health.

*Self-efficacy expectations* were subdivided into two concepts, assessing the perceived ability to perform the behavior and the perceived difficulty of performing the behavior.

*Intention* towards performance of both behaviors was assessed by one item for each behavior.

*Passive detection behavior*, or the attentiveness to possible cancer warning signs, was assessed regarding 14 cancer symptoms (Table 2.2). Attentiveness was considered 'adequate' (score 1) if respondents reported to 'often' or 'always' pay attention to the concerning symptom. All other answers were regarded as inadequate (score 0). Total attentiveness scores were calculated by adding the scores for the separate symptoms (range 0 – 14).

**Table 2.2** Classification of cancer symptoms.

Urgent (help seeking < 1 week)	Prolonged (help seeking < 4 weeks)
Blood in stool	Swallowing problems
Blood in urine	Food does not move normally
Coughing up blood	Nagging hoarseness or cough
Thickening or lump in body	Changes in bowel habits
Appearance of new mole	Urinary problems
Changes in existing mole	Unusual weight loss
	Sores that do not heal
	Flaky patch or lump on skin

*Medical help seeking behavior*, or timely consultation of a medical specialist, was assessed regarding 14 cancer symptoms. Data was re-coded into 'appropriate' and 'inappropriate medical help seeking behavior' according to the time within which

respondents stated to consult their general practitioner (Table 2.2). For the urgent symptoms the appropriate behavior was to seek medical help within one week (score 1). All other answers signified delay and were coded as zero. For the prolonged symptoms, one point was assigned to help seeking within four weeks. Delays of more than four weeks were considered inappropriate (score 0). Total scores were calculated by adding the scores for the separate symptoms (range 0 –14).

Furthermore, *demographic variables* (gender, age, marital status, and educational level) were inquired after.

### **Statistical analyses**

Descriptive statistics were used to describe demographic distributions within the sample. Differences between demographic groups were tested by means of  $\chi^2$ -tests, independent samples *t*-tests and analysis of variances with Tukey multiple comparison tests. To test for differences between age groups, respondents were divided into two groups: 1) 55 to 64 years, and 2) 65 years and older. Multiple linear regression analyses were conducted to investigate the relationships between the various psychosocial determinants and a) attentiveness to cancer symptoms, and b) medical help seeking. In order to examine potential mediating influences, demographic, premotivational and motivational variables and intention were entered into the analyses in four blocks. A complementary regression analysis was carried out to examine the potential relationship between attentiveness to cancer symptoms and the performance of timely medical help seeking. All analyses were conducted using statistical software (SPSS version 12.0 for Windows; SPSS, Chicago, IL) and significance was set at  $p < 0.05$ .

## **RESULTS**

### **Sample characteristics**

The gender distribution was almost equal with 49% males and 51% females. The mean age was 68.6 years (SD = 9.4), with 39% of the respondents being 55 to 64 years of age and 61% being 65 years or older. The majority was living together with a partner or spouse (66%). Forty-eight percent of the respondents had a low level of education (primary or basic vocational school), 24% had medium-level education (secondary vocational school or high school) and 28% had a high level of education (higher vocational school or university). Sixteen percent of the respondents reported that they currently had cancer or had had cancer at some time in their lives. The vast majority (87%) knew someone in their immediate environment who currently had cancer or had had cancer in the past.

### Knowledge of cancer symptoms

The separate cancer and non-cancer symptoms were correctly recognized by a minimum of 43% of the respondents for nagging hoarseness or cough, to a maximum of 78% for thickenings or lumps in the body. The mean total score (6.2; SD 2.4; maximum score 11) reflected a low to moderate knowledge level. Overall, women recognized more cancer symptoms correctly than men ( $t = -2.199$ ;  $p = 0.028$ ).

### Passive detection behavior

Adequate attentiveness to the listed cancer symptoms was reported by a minimum of 32% of the respondents for the feeling that food does not move normally through the esophagus or stomach, to a maximum of 68% for blood in urine. The mean total score (7.4; SD 4.6; maximum score 14) shows that, on average, respondents only paid adequate attention to half of the cancer symptoms. Overall, women performed more adequate passive detection behavior than men ( $t = -3.295$ ;  $p = 0.001$ ).

### Timely medical help seeking

Overall, 23% to 95% of the respondents reported timely medical help seeking for the cancer symptoms. With a range from 23% for the appearance of new moles, to 75% for blood in stool and coughing up blood, timely help seeking was most inconsistent for the urgent symptoms. Respondents were more consistent in their behavior with regard to the more prolonged symptoms, for which timely medical help seeking was fairly high and varied from 79% for unusual weight loss to 95% for swallowing problems.

Overall, the mean total score (10.4; SD 3.1; maximum score 14) indicated that medical help seeking behavior in this sample was fair. Separate mean total scores for the two classifications of symptoms, however, yielded notable differences. Whereas timely medical help seeking was performed for just over half of the urgent cancer symptoms (mean total score 3.4; SD 1.9; maximum score 6), the mean total score for the prolonged symptoms (7.0; SD 1.8; maximum score 8) indicated a high level of timely help seeking. Overall, women reported more timely medical help seeking than men ( $t = -2.407$ ;  $p = 0.016$ ). Older respondents reported more adequate help seeking than respondents in the younger age group ( $t = -2.672$ ;  $p = 0.008$ ) and lower educated respondents reported more timely help seeking than respondents with a medium or higher education ( $F(2,436) = 6.084$ ;  $p = 0.002$ ).

### Determinants of passive detection behavior

Table 2.3 shows the results of the linear regression analysis correlating passive detection behavior to demographics (Step 1), premotivational factors (Step 2), motivational factors (Step 3), and intention (Step 4). Results from Step 1 demonstrate significant associations of gender and educational level with passive detection behavior. Females and higher educated respondents were more likely to perform adequate passive detection behavior. In Step 2, educational level was no longer significant. Female gender, awareness, personal engagement, and knowledge all correlated positively with passive detection behavior. Outcomes from Step 3 show that these

factors remained significant positive correlates when motivational factors were entered into the regression model. Perceived advantages were the only significant motivational factor. Intention, added in Step 4, was not a significant correlate, but its addition reduced the association with personal engagement to borderline significance. The final model showed significant associations of female gender, awareness, knowledge, and perceived advantages with passive detection behavior and explained 19% of the variance of passive detection behavior.

**Table 2.3** Results of linear regression of passive detection behavior on demographics (Step 1), premotivational factors (awareness, personal engagement, knowledge, perceived susceptibility and severity, and personal experience with cancer; Step 2), motivational factors (attitude and self-efficacy; Step 3), and intention (Step 4).

Variable	Step 1		Step 2		Step 3		Step 4	
	$\beta$	<i>p</i>	$\beta$	<i>p</i>	$\beta$	<i>p</i>	$\beta$	<i>p</i>
Age	-0.08	0.087	-0.02	0.729	-0.03	0.520	-0.04	0.421
Gender	0.19	<b>0.000</b>	0.17	<b>0.001</b>	0.17	<b>0.001</b>	0.17	<b>0.001</b>
Education	0.11	<b>0.025</b>	0.04	0.468	0.03	0.630	0.02	0.647
Awareness			0.12	<b>0.017</b>	0.11	<b>0.021</b>	0.11	<b>0.027</b>
Engagement			0.17	<b>0.001</b>	0.11	<b>0.044</b>	0.10	0.062
Knowledge			0.18	<b>0.000</b>	0.16	<b>0.001</b>	0.16	<b>0.001</b>
Susceptibility			0.06	0.248	0.04	0.447	0.04	0.399
Severity			-0.05	0.347	-0.04	0.476	-0.03	0.518
Personal experience			-0.05	0.288	-0.04	0.456	-0.04	0.444
Advantages					0.17	<b>0.002</b>	0.15	<b>0.006</b>
Disadvantage					-0.04	0.399	-0.03	0.526
Anticipated regret					0.00	0.998	-0.01	0.894
Response efficacy					0.05	0.361	0.04	0.479
Self-efficacy: ability					-0.03	0.606	-0.04	0.443
Self-efficacy: difficulty					0.06	0.263	0.06	0.224
Intention							0.08	0.126
<i>R</i> <sup>2</sup>		0.04		0.15		0.18		0.19

### Determinants of medical help seeking

Outcomes of the linear regression analysis correlating medical help seeking to demographics (Step 1), premotivational factors (Step 2), motivational factors (Step 3), and intention (Step 4) are presented in Table 2.4. Step 1 showed significant associations of age and educational level: older and lower educated respondents were more likely to perform timely medical help seeking. Adding premotivational factors in Step 2 rendered age and educational level insignificant. Personal engagement was positively related to medical help seeking whereas perceived susceptibility showed a negative association, indicating that respondents with a lower perceived susceptibility to cancer were more likely to timely seek medical help. Due to the addition of motivational

factors in Step 3, personal engagement was rendered insignificant whereas the negative association between educational level and medical help seeking regained significance. Perceived susceptibility remained an important negative correlate of medical help seeking. Of the motivational factors, perceived advantages and both self-efficacy factors were positively related to help seeking behavior. Adding intention in Step 4 did not alter these outcomes. Intention had a strong positive relation with medical help seeking. The total explained variance of medical help seeking was 26%.

**Table 2.4** Results of linear regression of medical help seeking on demographics (Step 1), premotivational factors (personal engagement, knowledge, perceived susceptibility and severity, and personal experience with cancer; Step 2), motivational factors (attitude and self-efficacy; Step 3), and intention (Step 4).

Variable	Step 1		Step 2		Step 3		Step 4	
	$\beta$	$p$	$\beta$	$p$	$\beta$	$p$	$\beta$	$p$
Age	0.10	<b>0.031</b>	0.08	0.117	0.05	0.322	0.04	0.372
Gender	0.06	0.249	0.07	0.174	0.08	0.120	0.06	0.195
Education	-0.14	<b>0.006</b>	-0.09	0.084	-0.13	<b>0.010</b>	-0.14	<b>0.004</b>
Engagement			0.16	<b>0.002</b>	0.03	0.584	0.03	0.498
Knowledge			0.02	0.764	-0.02	0.742	-0.02	0.608
Susceptibility			-0.21	<b>0.000</b>	-0.17	<b>0.001</b>	-0.17	<b>0.000</b>
Severity			0.07	0.162	0.04	0.453	0.06	0.273
Personal experience			0.00	0.964	0.02	0.717	0.02	0.701
Advantages					0.14	<b>0.004</b>	0.11	<b>0.032</b>
Disadvantage: tenseness					0.08	0.115	0.08	0.128
Disadvantage: bothersome					-0.01	0.831	0.00	0.950
Anticipated regret					0.10	<b>0.050</b>	0.06	0.220
Response efficacy					0.05	0.314	0.02	0.649
Self-efficacy: ability					0.17	<b>0.001</b>	0.12	<b>0.027</b>
Self-efficacy: difficulty					0.16	<b>0.002</b>	0.14	<b>0.006</b>
Intention							0.21	<b>0.000</b>
$R^2$		0.04		0.09		0.23		0.26

### Association between passive detection behavior and medical help seeking

In order to examine the association between passive detection behavior and medical help seeking, passive detection behavior was entered additionally into the regression model for medical help seeking together with demographic variables in Step 1. Passive detection behavior showed a strong positive association with timely medical help seeking ( $\beta = 0.21$ ;  $p < 0.001$ ). This association remained significant when premotivational factors, motivational factors, and intention were successively added to the regression model in Step 2 ( $\beta = 0.23$ ;  $p < 0.001$ ), Step 3 ( $\beta = 0.15$ ;  $p = 0.003$ ), and Step 4 ( $\beta = 0.14$ ;  $p = 0.006$ ). The positive associations of intention, self-efficacy concepts, and perceived advantages, as well as the negative associations of educa-

tional level and perceived susceptibility were maintained. Adding passive detection behavior to the regression model increased the total explained variance of medical help seeking to 28%.

## **DISCUSSION**

This study investigated the general knowledge of cancer symptoms and the performance and determinants of passive detection behavior and medical help seeking in an elderly population. Furthermore, potential dependency between the two early detection behaviors was examined.

This study showed that respondents had low to moderate knowledge of cancer symptoms and adequately paid attention to merely half of the listed symptoms. Moreover, timely medical help seeking for urgent cancer symptoms was insufficient. Overall, men had less knowledge and less often reported adequate passive detection behavior and medical help seeking than women, thereby confirming results from previous studies (Adlard & Hume, 2003; Bostick et al., 1993; De Nooijer et al., 2002). These findings indicate the likelihood of unnecessary delays in the detection of cancer symptoms and in the presentation of these symptoms to a medical professional, and emphasize the need for educational efforts in the field of early cancer detection.

The study further examined the utility of various social cognitive factors in explaining passive detection behavior and medical help seeking. Regression analyses revealed that passive detection behavior was mainly associated with premotivational factors, such as awareness of early cancer detection and knowledge of cancer symptoms. Perceived advantages of the behavior were the only motivational factor related to passive detection. These findings partly replicate and complement findings from De Nooijer et al. (2003). The results indicate that attentiveness to cancer symptoms may be largely regulated by premotivational awareness factors and grant a less important role for cognitive motivational factors. This may be explained by the notion that attentiveness to cancer symptoms is a passive and less goal-directed behavior. It is conceivable that, whilst adequate knowledge may enable individuals to pay attention to these symptoms, mere awareness may be sufficient to induce attentiveness. Conscious cognitive deliberations and formation of intentions may therefore not be required.

Timely medical help seeking on the other hand is an active and entirely goal-directed behavior. The actual consultation of a medical specialist requires consideration and planning of the actions that need to be taken and therefore calls for significant cognitive efforts. Medical help seeking may therefore be principally directed by deliberate thoughts and beliefs about the behavior and its performance. This cognition-based view of medical help seeking was reflected in this study by the prevailing associations with cognitive motivational factors, in particular perceived advantages and self-efficacy expectations, and the intention towards performing the behavior. These findings partly confirm results from earlier studies (De Nooijer et al., 2003;

Hunter et al., 2003), in which perceived advantages, self-efficacy, and perceived behavioral control were found to be correlated with the intention to seek help.

The present study demonstrated negative associations between medical help seeking and educational level and perceived susceptibility. The former finding is not uncommon and can be explained by an overall higher usage of primary health care services in lower educated people (Van der Meer & Mackenbach, 1998) and people of low socioeconomic status (Van Lindert et al., 2004). According to several socio-cognitive models (Janz & Becker, 1984; Rogers, 1983; Weinstein & Sandman, 2002), perceived susceptibility is a motivational force behind health behaviors. People who perceive their susceptibility to cancer as high would be more inclined to perform health-protective behaviors, i.e., timely seek medical help. However, several studies have shown opposite effects (Calvocoressi et al., 2004, 2005), comparable to the negative association found in the present study. Risk perception literature has provided two explanations for these findings. The first explanation pertains to the bi-directional relation between perception and behavior and implies that cross-sectional correlations may reflect the impact of behavior on perceived susceptibility, rather than vice versa (Aiken et al., 1995; Weinstein & Nicolich, 1993). Those subjects who engage in more health protective behavior may therefore perceive themselves as less susceptible to health problems. The second explanation concerns the distinct influence of emotional distress on the performance of health promoting behavior versus disease detection behavior (Leventhal & Cameron, 1987). Since health promoting actions, such as lifestyle changes, do not threaten one's health and yield potential for reductions in health risks, emotional distress does not tend to interfere with the performance of these actions and is even likely to facilitate them. However, disease detection actions, such as screening and self-examination, are associated with an increased health risk, namely the possibility of detecting a disease. The increased emotional responses aroused by this risk may interfere with the performance of disease detection actions (Lindberg & Wellisch, 2001). In the context of extreme threats like cancer, high perceived risks have been related to strong emotional responses and high levels of distress (Wagner et al., 2005), which may actually inhibit disease detecting actions and, in this case, medical help seeking (Kash et al., 1992; Lerman et al., 1993).

Our findings concerning the positive relationship between both early detection behaviors replicate and strengthen the results from the study by Oliveria et al. (1999). The latter study solely focused on a retrospective measure of skin attentiveness and did not take any awareness or cognitive factors, other than knowledge, into account. The present study, however, allowed for the influence of various premotivational and motivational factors and demonstrated that the relationship between passive detection behavior and medical help seeking remained strongly significant when all these factors were controlled for. This finding gives rise to the supposition that attentiveness to cancer symptoms may positively influence timely medical help seeking, and consequently reduce delays in cancer diagnosis.

Although several factors were associated with the performance of passive detection behavior and medical help seeking, the total variances explained were only

moderate, a result that was also found in other studies (De Nooijer et al., 2003; Hunter et al., 2003). This finding may be partially explained by differences in the measurement of determinants and behaviors. Most determinants assessed beliefs and perceptions regarding general attentiveness and medical help seeking, whereas the performance of both behaviors was specifically measured for the 14 separate cancer symptoms. This discrepancy may have reduced the shared variance of determinants and behaviors. Separate assessment of all specific determinants for the 14 symptoms was, however, unfeasible in the present study. Furthermore, the inclusion of other relevant factors, for instance emotional responses, may increase the explained variance. Additional research is needed to identify these factors.

The present study is subject to limitations. First, due to the reciprocal relation between perceptions and behavior, as mentioned above, the cross-sectional design limits the causal inferences that can be made. Exploration of the investigated determinants in a longitudinal study is therefore recommended. Second, as the relatively low incidence of cancer symptoms restricts the possibilities for measuring actual help seeking behavior, medical help seeking was assessed using hypothetical situations, asking respondents within what time they would consult their general practitioner if they were to detect a specific symptom. With this phrasing, actual help seeking behavior was approximated as closely as possible, and similarity to the concept of intention was avoided. Additional correlation analyses, showing relatively low Pearson's correlations ( $r < 0.28$ ) between the items measuring intention and help seeking behavior, were supportive of the differentiation between these concepts.

### *Practical implications*

The suboptimal levels of knowledge of cancer symptoms, passive detection behavior, and medical help seeking found in this study suggest that there is much progress to be gained in the area of early self-detection of cancer, particularly among men. As both behaviors were clearly associated with distinct sets of determinants, implications for future health education efforts are twofold. In addition to emphasizing the advantages of attentiveness to cancer symptoms, educational approaches on passive detection behavior should focus on premotivational factors and particularly aim at increasing the public's knowledge of cancer symptoms and raising awareness of passive detection behavior. Medical help seeking behavior, on the other hand, would potentially benefit from cognitive health education that addresses perceived difficulties and barriers in the help seeking process and emphasizes the advantages of timely seeking medical help for cancer symptoms. As passive detection behavior was found to be positively related to timely medical help seeking, promoting both early detection behaviors may contribute to shortened patient delays and, ultimately, to reductions in cancer morbidity and mortality.

# CHAPTER 3

## Optimizing the efficacy of smoking cessation contests: an exploration of determinants of successful quitting

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## ABSTRACT

**Objectives:** The present study describes the short- and long-term efficacy and program evaluation of a Quit & Win smoking cessation campaign, organized in the Netherlands. To be able to fine-tune smoking cessation contests to the needs of the target population, utilization, appreciation, and efficacy of various contest elements were investigated.

**Methods:** Data from 1551 Quit & Win participants and 244 control respondents were collected by web-based surveys at baseline (pre-contest), and one and twelve months after the contest. Demographic and contest predictors of successful quitting were determined by logistic regression analyses.

**Results:** Quit & Win proved to be an effective as well as highly appreciated program among participants. Conservative one-month (35%) and continuous 12-month abstinence (12%) rates were significantly higher in Quit & Win participants than in the control group (one-month: 11%; continuous: 3%). Use of a supportive e-mail message service predicted short- and long-term abstinence. A buddy support system was the most used and highly appreciated cessation aid, and its use significantly predicted short-term abstinence. Radio commercials and internet advertisements were the most effective recruitment channels.

**Conclusions:** Although non-exhaustive, implementation of the results and recommendations discussed in this study could lead to an increased use, appreciation, and efficacy of future smoking cessation campaigns.

## INTRODUCTION

Quit & Win campaigns are internationally organized smoking cessation contests that have gained increasing popularity in recent years (Sandström et al., 2006). Quit & Win competitions aim to mobilize large amounts of smokers to make a joint attempt to stop smoking for a specific period of time. Cash and other prizes are offered to participants who succeed in remaining abstinent for at least one month. Quit & Win offers smokers a specific date and reason to quit and thereby provides opportunities for action that strengthen the connection between the intention and the actual decision to quit smoking (Lai et al., 2000; Lando et al., 1991).

The Quit & Win contest is a method to encourage smoking cessation on a large scale and has generated a beneficial cost-effect ratio at the population level (Tillgren et al., 1992). Although positive effects of Quit & Win campaigns on smoking abstinence have been established in several single studies (Hahn et al., 2004, 2005; Korhonen et al., 2000; Lai et al., 2000; Sun et al., 2000), reviews regarding their efficacy have been inconclusive (Hey & Perera, 2005a, 2005b). Combining large media campaigns, such as Quit & Win, with interpersonal intervention strategies has been shown to benefit campaign efficacy (Gezondheidsraad, 2006b). It is therefore important to optimize future Quit & Win campaigns by developing new, promising techniques and further elaborating effective, existing contest elements.

In order to identify strong and weak points of a health promoting intervention, a thorough investigation of the utilization, appreciation, and efficacy of program elements, should be implemented (Glasgow, 2002). In contrast with multiple studies assessing the efficacy of Quit & Win campaigns as a whole, in-depth analyses of program element efficacy have not, or only sporadically, been investigated. Most studies that incorporated program evaluation items, have used a limited number of questions (Hahn et al., 2004; Gomez Zamudio et al., 2004; Sun et al., 2000), or focused on personal determinants of successful quitting, such as gender or educational level (Bains et al., 2000; Korhonen et al., 1997). None of these studies have emphasized the evaluation of specific program elements.

With the aim of fine-tuning Quit & Win contests to the needs of the target population and optimizing the effectiveness of future campaigns, the present study describes the general utilization, appreciation, and efficacy of a Dutch Quit & Win contest, as well as the evaluation of various add-on campaign elements.

## METHODS

### Campaign

The Dutch Quit & Win contest took place in May 2005 and was organized and coordinated by the Dutch Cancer Society. The main objective was to encourage participants to abstain from smoking for at least one month. Recruitment of participants was pro-

moted on a national as well as regional level. Regionally, several municipal health centers suspended campaign posters and distributed brochures to the public, and placed advertisements in regional newspapers. On a national level, several radio stations and newspapers drew attention to the contest. Participants were obliged to meet four criteria: 1) a minimum age of 18, 2) living in the Netherlands, 3) having smoked for at least one year, and 4) daily smoking. Upon entry, participants were offered various additional cessation supports. All contest participants who provided an e-mail address received supportive e-mail messages from the Quit & Win organizational team (Lenert et al., 2004; Ota & Takahashi, 2005). In total, five supportive e-mail messages were sent to the participants. One message was sent before the quit date to give participants information on how they could prepare the quit attempt, and four messages containing practical information on how to sustain the quit attempt were sent during the following contest weeks. Furthermore, participants were offered the opportunity to receive computer-tailored cessation advice (Dijkstra et al., 1998), support from a telephonic coach (Stead et al., 2006; Stivoro, 2001), and they could enroll in an e-mail counseling program, all of which were provided by the Dutch Foundation on Smoking and Health (Stivoro). Participants were also asked to name a buddy, whom they could call upon for support during their cessation attempt. After one month, prize winners were randomly selected from a pool of successful quitters. Winners of prizes (first prize: € 1.000 and 11 regional prizes of € 450) were obliged to undergo a urine cotinine test to verify their abstinence from smoking.

## **Participants**

The total number of Quit & Win registrants was 3694. E-mail addresses were available for 2887 registrants and these persons were approached by e-mail to participate in an online survey. Baseline measurement (T0) took place in the week prior to the start of the contest. Program evaluative data were collected immediately after the contest month (T1) and 12 months after the start of the contest (T2).

At T0, 1551 Quit & Win participants (54%) agreed to participate and completely filled out a short questionnaire.

In order to obtain a comparable control group, a random sample of 7500 smokers was approached by e-mail. They were asked to fill out the same questionnaire, supplemented by three questions regarding the Quit & Win criteria, and one question that assessed the respondents' intention to quit smoking. Only those control respondents who met the Quit & Win criteria and explicitly indicated the intention to quit smoking within one month were eligible for participation in the study. Of the 1147 subjects who filled out the questionnaire, 244 (21.3%) met these criteria and were enrolled in the control group.

At T1, 1129 respondents filled out the questionnaire (63%): 183 control respondents (75%) and 946 (61%) of Quit & Win participants. At the T2 follow-up, 810 respondents participated (45%): 125 in the control group (51%) and 685 in the Quit & Win group (44%).

## Questionnaires

The baseline and follow-up questionnaires for the contest were based on Quit & Win evaluation guidelines (National Public Health Institute, 2004). The following concepts were assessed.

*Demographics (T0).* Demographic questions inquired after age, gender, educational level, ethnicity, and marital status of the participants.

*Smoking behavior (T0).* Smoking behavior was assessed by four questions: the number of years participants had been smoking, number of cigarettes smoked daily, time at which the first daily cigarette is smoked, and number of previous quit attempts.

*Channel (T0).* One question assessed by which channel respondents had learned of the campaign (radio, advertisement, folder, poster, by acquaintance, by health specialist, or another channel).

*Reasons for participation (T0).* Two questions assessed respondents' most important reason (improvement of health status, chance of winning a prize, independency of cigarettes, costs of smoking, to set an example for children, having a buddy, use of cessation aids, or another reason) and goal (to quit smoking forever, or to quit smoking for one month) to participate in Quit & Win.

*Cessation aids (T1).* Three questions regarding cessation aids measured 1) the utilization of the cessation aids offered during the intervention month (buddy support, Quit & Win e-mail messages, e-mail counseling program, Quit & Win website, computer-tailored cessation advice, telephone coach), 2) which of these aids helped respondents most to remain abstinent, and 3) what other cessation methods were used in the contest month (nicotine replacement therapy, Allen Carr method, pharmacotherapy, help of general practitioner, acupuncture, soft laser therapy, smoking cessation course, hypnosis, other aids). Overall evaluation of the Quit & Win cessation aids was assessed on a scale from 1 to 10 and by questions concerning their perceived usefulness (1 = not useful to 4 = very useful), practicability (1 = not practicable to 4 = very practicable) and pleasantness (1 = not pleasant to 4 = very pleasant).

*Prize (T1).* Opinions concerning the prize-rate were asked (1 = too high, 2 = too low, 3 = appropriate) and respondents were asked whether the chance to win a prize had helped them to maintain their quit attempt (1 = helped very much, 2 = helped much, 3 = helped a little, 4 = did not help).

*Overall evaluation (T1).* Participants were asked to evaluate the overall campaign on a scale from 1 to 10.

*Suggestions for improvement (T1).* In an open-ended question, respondents were asked to give suggestions for improvement of the campaign.

*Smoking abstinence (T1, T2).* One-month abstinence was measured by complete abstinence during the entire contest month. Continuous abstinence was measured by complete abstinence in the twelve months after the start of the contest.

### **Statistical analyses**

Descriptive statistics were used to describe program-evaluative concepts and demographic distributions and smoking behavior within the study sample. Baseline differences between the control and experimental groups were tested by means of  $X^2$ -tests for categorical variables and independent-samples  $t$ -tests for continuous variables. Group differences in outcome measures and determinants of successful smoking cessation were investigated by logistic regression analyses. Baseline variables were included as covariates to increase statistical power by reducing unexplained variance (Robinson & Jewell, 1991). All analyses were conducted using statistical software (SPSS version 13.0 for Windows; SPSS, Chicago, IL) and significance was set at  $P < 0.05$ .

## **RESULTS**

### **Demographics and smoking behavior of the respondents**

Respondents' ages varied from 18 to 81 years, with a mean age of 36.9 years. Females were slightly over represented (60.4%). The majority of respondents had a partner (70.9%) and was of Dutch ethnicity (96.2%), 29.7% had a low level of education (primary or basic vocational school), 44.5% had medium-level education (secondary vocational school or high school) and 25.7% had a high level of education (higher vocational school or university). Comparison between the study groups showed that respondents from the control group were older ( $t = 5.58, p < 0.001$ ) and lower educated ( $X^2 = 18.81, p < 0.05$ ) than respondents from the Quit & Win group.

On average, respondents had smoked for 19.6 years. The mean number of cigarettes smoked per day was 18.5 and the majority of respondents (69.9%) smoked their first cigarette within 30 minutes after awakening. Most respondents (44.3%) had previously made one or two quit attempts, whereas 8.6% had never attempted to quit. Comparison between the groups showed that respondents from the control group had been smoking longer ( $t = 4.05, p < 0.001$ ), had made less previous quit attempts ( $X^2 = 13.73, p < 0.01$ ), and smoked their first daily cigarette earlier than respondents from the Quit & Win group ( $X^2 = 6.99, p < 0.05$ ).

### **Attrition analyses**

Logistic regression analysis indicated that attrition from T0 to T2 was predicted by gender and one-month abstinence status of respondents. Men (OR = 0.71; 95% CI = 0.57-0.89;  $p < 0.01$ ) and participants who did not succeed in remaining abstinent for one month (OR = 0.38; 95% CI = 0.30-0.48;  $p < 0.001$ ) were more likely to be lost to follow-up.

### Quit and abstinence rates

Table 3.1 shows the one-month and continuous abstinence-rates of Quit & Win participants and respondents in the control group. Two estimates are presented: the proportion of abstainers among the respondents (respondent-only), and the proportion of abstainers among the overall sample, considering all non-respondents at T1 and T2 as smokers (intention to treat). On both the short and long term measurements, Quit & Win participants were significantly more likely to have remained abstinent.

**Table 3.1** One-month and continuous (12 months) abstinence rates.

	Control	Quit & Win	OR (95% CI)	<i>p</i> -value
<b>One-month abstinence (%)</b>				
Respondents-only	15.3	57.7	7.83 (4.89 – 12.54)	< 0.001
Intention to treat	10.9	35.4	4.70 (3.02 – 7.31)	< 0.001
<b>Continuous abstinence (%)</b>				
Respondents-only	5.6	27.1	3.03 (1.98 – 4.63)	< 0.001
Intention to treat	2.9	11.9	2.46 (1.64 – 3.68)	< 0.001

### Program evaluation

#### *Channel*

The majority of the Quit & Win participants indicated that they had been made aware of the campaign by radio (52.3%). Respondents were also frequently informed by friends (26.2%) and advertisements in newspapers (19.9%). Most participants who were not informed by any of the listed channels responded in an open-ended question that information on the internet brought the contest to their attention.

#### *Participation*

Improvement of individual health status was reported most frequently (37.9%) as the main reason to participate, followed by the wish to break the nicotine dependence (28.0%) and the chance to win a prize (17.1%). Frequently specified other reasons were: pregnancy, current illness, and the fact that smoking is unhealthy for people in the social environment. The vast majority reported that their main aim was to abstain from smoking for good (92.5%).

### Use of cessation support

#### *Quit & Win cessation support*

The majority of respondents indicated that they had used support of a buddy (69.5%). Quit & Win e-mail messages (46.3%) and the e-mail counseling program (36.9%) were also frequently used. Computer-tailored cessation advice was used by 18.8% of respondents, whereas relatively few respondents indicated that they had used support

from a telephonic coach (1.7%). Seventeen percent indicated that they did not use any of the offered cessation aids.

Buddy support was most frequently mentioned as the most helpful aid in the cessation process (36.2%), followed by the supportive Quit & Win e-mail messages (11.5%) and the e-mail counseling program (11.4%).

#### *Other cessation support*

Approximately one third (33.1%) of all participants indicated that they had used other cessation methods than those offered in the contest, of which nicotine replacement therapy (16.7%) and the Allen Carr method (7.8%) were most frequently reported. Use of pharmacotherapy (bupropion; 3.7%) and help of a general practitioner (2.0%) were also reported.

### **Evaluation of Quit & Win cessation support**

#### *Buddy (N = 606)*

Support of a buddy was experienced as useful or very useful by 70% of the respondents, and 72.6% found the buddy support pleasant or very pleasant. On average, buddy support was evaluated with a 7.6.

#### *E-mail counseling program (N = 321)*

Most respondents who had used the e-mail counseling program indicated that they found the program useful or very useful (65.3%), practicable or very practicable (70.2%), and pleasant or very pleasant (83.9%). On average, the e-mail counseling program was valued with a 7.2.

#### *Computer tailored cessation advice (N = 161)*

Most respondents thought that the tailored cessation advice was useful or very useful (57.5%) and practicable or very practicable (54.3%). Of all participants, 74.4% found it pleasant or very pleasant to receive advice specified to their personal situation. On average, the advice was valued with a 7.0.

#### *Quit & Win e-mail messages (N = 431)*

Of those participants who used the e-mail messages of the Quit & Win team, most thought these messages to be a little useful or useful (72.4%) and 76.9% perceived them as a little practicable or practicable. Receiving these supportive messages was experienced as pleasant or very pleasant by most respondents (61.2%). They were valued with an average rating of 6.3.

#### *Telephone coach (N = 15)*

Of the participants that indicated to have used support from a telephone coach, 78.6% found the support useful or very useful, as well as practicable or very practicable. Almost all respondents experienced the contact as pleasant or very pleasant (92.9%).

Support from the telephone coach was overall valued with a 7.9. These results should, however, be interpreted carefully, as few people (N = 15) used this cessation support.

### **Overall evaluation of the Quit & Win campaign**

#### *Prize*

After the intervention month, 57.2% of the participants indicated that the chance of winning a prize had helped to remain abstinent. Most respondents (83.0%) thought the amount of the cash prize was appropriate; 11.2% thought it was too low, and 5.8% thought it was too high.

#### *Overall evaluation*

The overall Quit and Win campaign was valued with a 7.6 by the respondents, indicating that respondents were pleased with the content of the campaign. A large majority (91.8%) indicated that the support and cessation aids offered by Quit & Win had helped them to remain abstinent during the contest month.

#### *Suggestions for improvement*

Several suggestions were mentioned to improve the campaign. First, respondents suggested that the supportive Quit & Win e-mail messages should be sent more frequently. In addition, the content of these e-mails could be sterner, more explicit and more personalized. Participants would also like to continue receiving e-mails after the contest month so that more maintenance support would be experienced and chances of relapse could be reduced.

The opportunity to gain cash prizes was for most respondents an extra motivation to quit. Therefore, participants would like more prizes to increase the chance of winning, as well as small prizes for all people who remained abstinent for a month. Furthermore, participants suggested the use of a forum or discussion board on the Quit & Win website, where they could share their experiences and difficult moments during their cessation attempts.

### **Predictors of quit attempts and one-month abstinence**

Demographic variables, smoking behavior, and use of campaign cessation aids were entered into logistic regression models in order to predict short- and long-term abstinence status. Only intention to treat measures were used for these analyses.

#### *Demographic and smoking variables*

One-month abstinence was significantly predicted by level of education, the time at which the first cigarette is smoked, and number of previous quit attempts (see Table 3.2). Participants with a higher education, those who had made less previous quit attempts, and those who smoked their first cigarette later on the day, were more likely to

maintain their quit attempt for the entire contest month. Further analyses on one-month abstinence (Table 3.3) were corrected for educational level, time of first daily cigarette, and number of quit attempts.

Continuous abstinence was significantly predicted by marital status and number of previous quit attempts. Participants who had a partner and participants who had made less previous quit attempts were more likely to remain continuously abstinent (Table 3.2). Further analyses on continuous abstinence (Table 3.3) were corrected for both variables.

**Table 3.2** Demographic and smoking variables as determinants of one-month and continuous (12-months) smoking abstinence.

Variables	One-month abstinence		Continuous abstinence	
	OR (95% CI)	<i>p</i> -value	OR (95% CI)	<i>p</i> -value
Gender	1.019 (0.817 – 1.271)	0.868	1.091 (0.792-1.502)	0.594
Age	1.010 (0.991 – 1.030)	0.293	1.018 (0.991-1.046)	0.200
Education level	1.199 (1.032 – 1.393)	<b>0.017</b>	1.109 (0.895-1.374)	0.346
Ethnicity	0.832 (0.487 – 1.422)	0.502	1.170 (0.513-2.666)	0.709
Marital status	1.204 (0.943 – 1.536)	0.136	2.188 (1.456-3.290)	<b>0.000</b>
Years smoked	1.005 (0.985 – 1.025)	0.648	1.008 (0.980-1.036)	0.591
Cigarettes p/d	0.996 (0.981 – 1.012)	0.629	0.997 (0.975-1.019)	0.771
Time of first cigarette	1.279 (1.083 – 1.511)	<b>0.004</b>	1.167 (0.917-1.484)	0.209
Previous quit attempts	0.793 (0.701 – 0.897)	<b>0.000</b>	0.578 (0.480-0.696)	<b>0.000</b>

### *Use of cessation aids*

One-month abstinence was significantly predicted by use of buddy support and Quit & Win e-mail messages. Abstainers used these types of support more often than non-abstainers (see Table 3.3).

Although buddy support was no longer significant, use of supportive Quit & Win e-mail messages remained a significant predictor in the analyses on continuous abstinence. A remarkable finding was the negative association of use of the e-mail counseling program and continuous abstinence. Those respondents that used this program were more likely to lapse or relapse in the twelve months after the intervention. This finding may be explained by results from in-depth analyses that showed that respondents who made use of the e-mail counseling program tended to be more strongly nicotine-dependent than those who did not use the program, as indicated by having smoked for more years ( $t = 3.706$ ;  $p < 0.001$ ).

When use of cessation aids, other than the aids provided by Quit & Win, was entered into the analyses, this did not change the outcomes as described in Table 3.3. Use of nicotine replacement therapy (NRT) was, however, negatively associated with

continuous abstinence (OR = 0.591; 95% CI = 0.351-0.993;  $p = 0.047$ ), a finding that may also be explained by the nicotine-dependence status of NRT users. In-depth analyses showed that NRT users smoked more cigarettes per day ( $t = -2.716$ ;  $p = 0.007$ ) and tended to have smoked for more years ( $t = -1.894$ ;  $p = 0.058$ ) than non-users.

**Table 3.3** Cessation aids as determinants of one-month and continuous smoking abstinence.

Cessation aids	One-month abstinence		Continuous abstinence	
	OR (95% CI)	<i>p</i> -value	OR (95% CI)	<i>p</i> -value
Buddy	1.407 (1.035 – 1.913)	<b>0.029</b>	1.110 (0.753-1.637)	0.599
E-mail counseling	0.806 (0.595 – 1.093)	0.165	0.611 (0.414-0.901)	<b>0.013</b>
Tailored advice	1.254 (0.863 – 1.820)	0.235	1.157 (0.736-1.820)	0.527
Telephone coach	1.368 (0.441 – 4.249)	0.588	1.121 (0.293-4.291)	0.868
Quit & Win website	0.947 (0.655 – 1.369)	0.772	0.832 (0.525-1.320)	0.435
Quit & Win e-mail	1.429 (1.063 – 1.921)	<b>0.018</b>	1.498 (1.039-2.160)	<b>0.030</b>

## DISCUSSION

The present study is one of the first to thoroughly investigate multiple program characteristics of Quit & Win campaigns. Beyond establishing its efficacy, it sought to retrieve information regarding participants' views on the campaign and yield recommendations for future campaigns.

Considering the achieved short- and long-term abstinence rates and the overall appreciation of the campaign, Quit & Win was an effective as well as a much appreciated initiative. In order to optimize future campaigns, it is advisable to adapt or omit relatively weak elements of the campaign and to extend those aspects that were highly used, effective, and appreciated. In this context, several results are worth noting.

First, one-month as well as continuous abstinence could be predicted by use of the e-mail support system. Those participants that indicated to have used the supportive information in these e-mails were more likely to successfully quit smoking. Although the e-mail messages were effective and relatively well-used, the overall appreciation of these messages was rather low. Participants' suggestions for improvement of the messages indicated that the content of the messages could be sterner, more explicit, and more personalized. In this way, the participant may feel more involved and individually addressed, making the messages more personally relevant and appealing. Furthermore, participants indicated that the frequency with which the e-mail messages were sent could be increased, and distribution of the messages should be continued after the contest month in order to prevent relapse.

Second, although substantial variation in contest elements takes place across participating countries, the appointment of a buddy is often a key component of Quit & Win campaigns (Sandström et al., 2006). The present study shows that this component earns its place as the buddy support system was the most often used as well as highly appreciated cessation aid and significantly predicted one month smoking abstinence. Buddy support, or in a larger context social support, may therefore be a main factor in determining the campaign's success. The importance of social support was also reflected in the finding that participants who had a partner were more likely to remain continuously abstinent and the participants' suggestion to employ a forum or discussion board on the Quit & Win website where participants can seek and provide support to each other. Our results regarding buddy support and partner status confirm several other studies that have found relatively high buddy utilization rates (Pirie et al., 1997) and denote buddy support, and particular partner support, as an important predictor of successful quitting (Korhonen et al., 1997; Kviz et al., 1994; Mermelstein et al., 1986; Pirie et al., 1997; West et al., 1998), thereby pleading for continuation or extension of this support aid in future campaigns.

As the efficacy of other program components have only sporadically been investigated, comparison of our results to previous findings in this respect is difficult. In studies by Gomez-Zamudio and colleagues (2004) and Hahn and colleagues (2004), none of the available add-on support aids significantly predicted abstinence. However, these studies mostly investigated different types of support than those that were currently examined. Online and telephone support were the only cessation aids comparable to our study, and we also found no predictive effect of telephone and e-mail counseling in the present study, thereby corroborating previous findings.

The findings concerning the effectiveness of cessation aids should be interpreted with caution. It cannot be excluded that the results may be biased due to selection effects, indicating that people who are more motivated to quit smoking may be more likely to use the proffered cessation aids. The increased abstinence may therefore be a result of increased motivation, and not per se of utilization of cessation aids. Although these types of selection effects cannot be eliminated completely, they may be reduced by providing easier access to cessation aids and proffering them in a more pro-active manner. Future studies and campaigns should take this into account.

Other interesting findings pertain to the evaluation of the prizes and the efficacy of recruitment channels. The large majority of respondents found the cash prizes appropriate and did not think they should be in- or decreased. However, frequently reported suggestions for improvement of the campaign were 1) to increase the number of prizes, and thereby increase participants' chances of winning, and 2) to award small encouragement prizes or incentives to all participants who succeed in abstaining from smoking in the contest month. Although evidence for the efficacy of incentives in increasing long-term smoking abstinence has been indecisive (Bains et al., 1998; Hey & Perera, 2005b), financial and other incentives have been associated with increased short-term abstinence and recruitment rates (Koffman et al., 1998; Martinson et al.,

2000; Ulrich et al., 2005; Volpp et al., 2006), thereby expectedly yielding higher absolute numbers of successful quitters. It may therefore be worthwhile to take these suggestions into consideration when developing future cessation contests.

Radio commercials were the most effective recruitment channel, by far outweighing the more traditional advertising in newspapers and the effort- and time-consuming distribution of brochures and posters. For those respondents who were not informed of the contest through one of the listed channels, banners and information on internet sites were the most effective recruitment method. In order to optimize recruitment in future campaigns, use of more advanced information channels, such as radio broadcasting, internet, and possibly television, is therefore recommended.

The relatively low participation rate in our study, the substantial attrition suffered from baseline to follow-up and the finding that attrition was not random are limitations to this study that should be acknowledged. Although considerable drop out seems characteristic to a wide array of eHealth interventions (Eysenbach, 2005), it may limit generalizability of the present results. Another word of caution with regard to generalizability pertains to the cultural specificity of the results. As the content of Quit & Win campaigns may vary between countries, results with regard to use of support aids may, to some extent, be specific to the Dutch contest and the Dutch cultural situation. Future studies should therefore look into differences and similarities in utilization and efficacy of support aids between countries.

Furthermore, differences in baseline characteristics between the control group and the experimental Quit & Win group indicate that the study groups were not entirely comparable, which may have influenced the results. These group differences are not uncommon (Bains et al., 2000) and may follow from self-selective sampling in smoking cessation competitions and contests such as Quit & Win (Hey & Perera, 2005a). In order to keep the results as accurate as possible, all analyses were corrected for baseline characteristics.

In conclusion, the findings of this study indicate that the Quit & Win campaign, besides achieving high abstinence rates, is generally highly appreciated by participants. Seeing that one million smokers are expected to have participated world-wide in the latest contest in 2006 (Quit & Win, 2006), Quit & Win is rapidly growing in popularity and provides a strong platform for cessation support, a platform that should be utilized to its full potential. Although non-exhaustive, implementation of the results and recommendations discussed in this study could lead to an increased use, appreciation, and efficacy of future campaigns.



# CHAPTER 4

## Relapse prevention in a national smoking cessation contest: effects of coping planning

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## ABSTRACT

**Objectives:** The aim of the present study was to investigate the efficacy of a brief coping planning intervention to prevent smoking relapse in the context of a national smoking cessation contest ('Quit & Win').

**Methods:** A controlled trial with three measurements was used to evaluate the efficacy of the coping planning intervention. Three online surveys were conducted among 1566 participants in Quit & Win. Contest participants were alternately assigned to a control and planning group, the latter of which completed a planning intervention that included the formation of three coping plans on how to refrain from smoking in personal risk situations.

**Results:** The coping planning intervention increased conservative seven-month continuous abstinence rates from 10.5% to 13.4%, indicating that, if implemented correctly, coping planning can significantly reduce long-term smoking relapse. **Conclusions:** In addition to growing evidence for the efficacy of self-regulatory planning in the promotion of health behavior, the results of the present study indicate that planning can also be effective in the prevention of unwanted behavior. The results may stimulate research and application of coping planning in its current form.

## INTRODUCTION

In the Netherlands, 28% of the adult population are smokers (Stivoro, 2006), and every year an estimated one million cessation attempts are made (Stivoro, 1998). For all quit attempts, relapse into smoking is, however, by far the most likely outcome (Ockene et al., 2000; Piasecki, 2006). In order to prevent quitters from relapsing, existing cessation programs need to be complemented with specific long-term relapse prevention components.

New initiatives in the field of smoking cessation are the internationally organized Quit & Win campaigns (Hahn et al., 2004; Korhonen & Puska, 2000). These smoking cessation contests aim at generating collective quit attempts among the adult smoking population by setting a general quit date and awarding considerable prizes among quitters who have abstained from smoking for at least one month. As large numbers of smokers can be recruited and quit attempt rates are relatively high, the population impact of these contests can be significant (Korhonen & Puska, 2000; National Public Health Institute, 2004). Quit & Win contests have, however, primarily centered on smoking cessation and the distribution of short-term support strategies, whereas relatively little has been done to prevent participants from relapsing after the intervention month. The addition of a specific relapse prevention component may therefore strengthen the Quit & Win protocol and increase long-term abstinence.

Long-term smoking cessation is undermined by a multitude of risk situations in which the quitter must cope with the urge to smoke and in which the mere intention to refrain from smoking may not be sufficient to prevent relapse (Marlatt & Gordon, 1980; Shiffman et al., 1996). In these situations, which are primarily characterized by social, affective or habitual features (Velicer et al., 1990), the efficacy of the employed coping behavior determines whether or not the quitter relapses into smoking (Larimer et al., 1999; Marlatt & Gordon, 1985). The quitters' efforts to resist the urge to smoke in these risk situations pertain to the concept of self-regulation. Self-regulation broadly refers to processes of goal setting and goal striving and concerns individuals' efforts to act in an intentional way and override impulsive, habitual behavior (Baumeister et al., 1994). Core techniques in self-regulation research are the identification of critical situations and the specification of goal-directed responses (Gollwitzer, 1999; Leventhal et al., 1965; Sheeran et al., 2005a; Sniehotta et al., 2005b; Ziegelmann et al., 2006). Applied to the area of smoking relapse prevention, this would imply that a quitter should anticipate a personal risk situation and specify how he or she intends to cope with the distractions and temptations in that situation in order to refrain from smoking (Shiffman et al., 1985)

Many studies in this field proceed from the work of Marlatt and Gordon (1985) and have used fairly intensive cognitive-behavioral approaches, such as individual or group counseling and skills-training sessions, to teach smokers how to identify and cope with personal risk situations (Hajek et al., 2005; Lancaster et al., 2006; Lancaster & Stead, 2005). In recent studies, similar techniques have been applied in less exten-

sive protocols to change health behaviors. Participants are simply asked to formulate or write down specific plans that specify the critical situation and the goal-directed response that they intend to undertake to perform or, in the case of smoking, prevent a certain behavior. Gollwitzer's self-regulatory concept of *implementation intentions* (Gollwitzer, 1993, 1996, 1999) is built upon the argumentation that by forming a mental linkage between a critical situation and a relevant goal-directed response, the implementation of the response is placed under the control of situational cues and is thereby removed from conscious and effortful control. The specification of where, when and how one intends to perform a certain behavior causes the behavior to be enacted relatively effortlessly as soon as the critical situation is encountered.

Although implementation intentions and related planning techniques have been applied and shown effective in the promotion of various health behaviors, such as physical activity (Milne et al., 2002; Sniehotta et al., 2006b; Ziegelmann et al., 2006), healthy dietary intake (Armitage, 2004; Verplanken & Faes, 1999), medical adherence (Liu & Park, 2004; Sheeran & Orbell, 1999), and cancer detection practices (Sheeran & Orbell, 2000), there is a lack of research in preventing unwanted responses, particularly in the field of smoking (Prestwich et al., 2006). So far, the only study investigating the efficacy of this type of goal setting in the prevention of smoking did not find significant effects (Higgins & Conner, 2003).

Furthermore, studies into planning and goal setting techniques have generally focused on initiating behavior change (e.g., Schüz et al., 2006; Sheeran, 2003; Sniehotta et al., 2006a) and mostly applied brief follow-up intervals with maximum lengths of three to four months (e.g., Higgins & Conner, 2003; Prestwich et al., 2003a; Sheeran & Orbell, 2000). In order to evaluate their usefulness in maintaining behavior changes, investigations of longer-term effects are mandatory.

The present study tested the efficacy of a brief planning intervention, embedded in a national Quit & Win smoking cessation contest, organized in the Netherlands. The intervention was based on self-regulatory techniques and consisted of the formation of three *coping plans*, which were tailored to anticipated risk situations and specified individuals' coping responses to refrain from smoking in these situations. We hypothesized that the addition of this planning intervention would reinforce the effects of the cessation contest on smoking abstinence.

## **METHODS**

### **Quit & Win contest**

The national Quit & Win contest took place in May 2005 and was organized by the Dutch Cancer Society. Quit & Win participants were obliged to meet the three criteria of 1) daily smoking, 2) having smoked for at least one year, and 3) being at least 18 years of age. At May 1, contest participants entered a one-month cessation period during which they were offered various types of cessation support, such as computer-

tailored cessation advice and support from a telephonic counselor (Van Osch et al., 2009). Furthermore, participants were asked to name a buddy who acted as a witness and had to certify that the participant conformed to the contest rules. After the intervention month, prize winners were randomly selected among successful quitters. Biochemical validation of abstinence of the prize winners was obtained by a urine cotinine test.

### **Procedure**

The total number of Quit & Win registrants was 3694. E-mail addresses were available for 2887 registrants, and these registrants were approached to participate in an online survey. Of these, 1566 (54.2%) agreed to participate in the study and accessed the survey website. Respondents were then assigned to one of two study groups, based on odd and even registration numbers: the control group (N = 802) filled out a short questionnaire, which assessed demographic variables (gender, age, educational level, ethnicity, and marital status) and several questions regarding their smoking behavior (number of years smoked, number of cigarettes smoked per day, time of day at which the first cigarette is smoked, and number of previous quit attempts). Respondents in the planning group (N = 764) completed the same questionnaire and were additionally asked to formulate three coping plans.

### **Coping planning intervention**

For the formation of coping plans we elaborated on two self-regulatory techniques that have been applied in the area of goal setting: 1) identifying and anticipating critical situations in which a certain behavior must be performed (e.g., exercising) or prevented (e.g., smoking) (Gollwitzer, 1999), and 2) planning specific responses or actions to overcome obstacles and cope with difficulties in these situations (Sniehotta et al., 2005b). After a brief explanation of the planning intervention, respondents in the planning group were presented with 14 risk situations, in which smoking relapse often occurs (see Table 4.1) (Velicer et al., 1990). In correspondence with recommendations by Gollwitzer and Sheeran (2006), respondents were then asked to choose the three situations in which they would find it most difficult to refrain from smoking, e.g., *'If someone offers me a cigarette'*. For each situation they were asked to formulate a specific plan that they would undertake to refrain from smoking, e.g., *'then I will tell the person that I have quit smoking and ask him or her not to offer me any more cigarettes'*. After respondents formulated their plan, the complete strategy (e.g., *'If someone offers me a cigarette, then I will tell the person that I have quit smoking and ask him or her not to offer me any more cigarettes'*) was repeated on the screen in order to facilitate memorizing.

Two researchers independently evaluated all formulated plans and coded them as 'correct' or 'incorrect' (for a more detailed description of the coding process, see Van Osch et al., *in press-a*). Plans were coded as 'correct' if they referred to responses that

a) would facilitate smoking abstinence, and b) were viable in the concerning situation (Gollwitzer & Sheeran, 2006). The interrater reliability for the evaluation of correctness was very high (Cohen's kappa = 0.84) (Landis & Koch, 1977).

**Table 4.1** Risk situations for smoking relapse.

Social	Emotional	Routine
If I am going out with friends	If I am under a lot of stress	If I get up in the morning
If I am at a party or a bar	If I am feeling depressed	If I am having coffee or tea
If I am around other people and feel uncomfortable	If I am feeling angry or frustrated	If I am having a break
If someone offers me a cigarette	If I am desiring a cigarette	If I just finished dinner
If I see someone smoking and enjoying it	If I notice that I have gained weight	

### Main outcome measures

Respondents were asked to participate in two follow-up measurements one month (T1) and seven months after baseline measurement (T2). The most important outcome measures were quit rates at T1, point prevalence abstinence at both T1 and T2, one-month abstinence at T1, and continuous abstinence at T2. Point prevalence abstinence rates included all respondents who indicated that they had not smoked for at least seven days at the time of measurement. One-month abstainers included respondents that reported complete abstinence for the entire contest month. Continuous abstainers included only those respondents who reported complete abstinence in the follow-up period of seven months.

In case respondents' reports regarding their smoking status at T2 were incongruous with reports at T1 ( $N = 7$ ), respondents were given the most unfavorable classification at T2 (De Vries et al., 2003a; 2006a).

### Statistical analyses

Descriptive statistics were used to describe demographic distributions and smoking behavior within the study groups. Baseline differences between the study groups were tested by means of independent-samples t-test for continuous variables and Chi-square tests for categorical variables. Group differences in outcome measures were tested by logistic regression analyses. Two types of analyses were used to evaluate the effects of the interventions: 1) non-conservative respondents-only analysis, and 2) conservative intention to treat analysis, in which all non-respondents at T1 and T2 were considered smokers. Baseline variables were always included as covariates to increase statistical power by reducing unexplained variance (Robinson & Jewell, 1991). All analyses were conducted using statistical software (SPSS version 13.0 for Windows; SPSS, Chicago, IL) and significance was set at  $P < 0.05$ .

## RESULTS

### Attrition analyses

Of the 1566 baseline respondents, 944 participated in the follow-up measurement (T1) (60.3%): 493 from the control group (61.5%), and 451 from the planning group (59.0%). Logistic regression analyses showed that women (OR = 1.54;  $p < 0.001$ ), older participants (OR = 1.03;  $p < 0.01$ ), and higher educated participants (OR = 1.19;  $p < 0.05$ ) were more likely to participate in the T1 measurement.

Of the 944 respondents at T1, 571 filled out the T2 questionnaire (60.5% of T1; 36.5% of baseline): 289 from the control group (58.6% of T1; 36.0% of baseline), and 282 from the planning group (62.5% of T1; 36.9% of baseline). Logistic regression analyses showed that older participants (OR = 1.03;  $p < 0.05$ ) and abstainers (point prevalence abstinence at T1; OR = 1.81;  $p < 0.001$ ) were more likely to respond at the T2 follow-up.

### Sample characteristics

#### *Demographics*

With respondents' ages varying from 18 to 81 years, the mean age in the study sample was 36.2 years (SD = 11.5). Females were slightly over represented (60.8%). The majority of respondents had a partner (70.2%) and was of autochthonous (Dutch) ethnicity (96.0%), 24.7% had a low level of education (primary or basic vocational school), 44.4% had medium-level education (secondary vocational school or high school) and 30.9% had a high level of education (higher vocational school or university).

#### *Smoking behavior*

On average, respondents had smoked for 19.1 years (SD = 11.2). The mean number of cigarettes smoked per day was 18.5 (SD = 8.5) and the majority of respondents (68.3%) smoked their first cigarette within 30 minutes after awakening. Most respondents (43.1%) had previously made one or two quit attempts, whereas 8.8% had never attempted to quit.

The two study groups did not differ in their smoking behavior or any of the demographic variables, indicating that randomization was successful.

#### *Short-term abstinence*

Table 4.2 shows quit and abstinence rates for the two study groups at T1. None of the outcome measures at T1 significantly differed between the control and planning groups, indicating that the coping planning intervention had no significant effect on quit attempts or short-term smoking abstinence.

**Table 4.2** Quit and abstinence rates for the two study groups at one month follow up (T1).

	Control	Planning	OR (95% CI)
Quit attempt % (N)			
Respondents-only	89.7 (442)	91.4 (412)	1.14 (0.72-1.80)
Intention to treat	55.1 (442)	53.9 (412)	0.96 (0.78-1.18)
Point prevalence abstinence % (N)			
Respondents-only	65.0 (320)	68.8 (308)	1.19 (0.90-1.59)
Intention to treat	39.9 (320)	40.3 (308)	1.04 (0.84-1.28)
One-month abstinence % (N)			
Respondents-only	57.7 (284)	62.1 (278)	1.20 (0.91-1.58)
Intention to treat	35.4 (284)	36.4 (278)	1.04 (0.84-1.28)

\*  $p < 0.05$ **Table 4.3** Abstinence rates for the two study groups at seven months follow up (T2).

	Control	Planning	OR (95% CI)
Point prevalence abstinence % (N)			
Respondents-only	46.4 (134)	51.8 (146)	1.30 (0.91-1.85)
Intention to treat	16.6 (134)	19.0 (146)	1.21 (0.92-1.58)
Continuous abstinence % (N)			
Respondents-only	29.4 (85)	36.5 (103)	1.50 (1.02-2.20)*
Intention to treat	10.5 (85)	13.4 (103)	1.35 (0.98-1.86)
Continuous abstinence: Per-protocol % (N)			
Respondents-only	29.4 (85)	36.4 (80)	1.51 (1.00-2.27)*
Intention to treat	10.5 (85)	13.6 (80)	1.41 (1.00-1.98)*

\*  $p < 0.05$ 

### *Long-term abstinence*

Table 4.3 shows quit and abstinence rates for the two study groups at T2. Point prevalence abstinence rates did not significantly differ between the control and planning groups. The analyses of continuous abstinence, however, demonstrated a significant effect of the coping planning intervention, as the non-conservative estimate in the planning group (36.5%) was significantly higher than in the control group (29.4%; OR = 1.50;  $p < 0.05$ ). In the intention to treat analysis, a strong trend towards significance (OR = 1.35;  $p = 0.068$ ) was found for the effect of coping plans. In the control group, 10.5% of respondents had been abstinent for seven months, whereas this percentage was increased to 13.4% in the planning group.

*In-depth analyses*

Per-protocol analyses were performed in order to investigate the optimal effects of the coping planning intervention. These analyses included only those subjects, assigned to the planning group, who followed through the planning protocol by formulating three correct coping plans ('completers'). This resulted in the exclusion of 103 respondents (22.8%) from analyses at T1, and 62 respondents (22.0%) at T2. The in-depth analyses revealed a positive effect of the coping planning intervention on continuous abstinence at T2. Both the non-conservative (OR = 1.51;  $p < 0.05$ ) and the intention to treat estimates (OR = 1.41;  $p < 0.05$ ) of continuous abstinence were significantly higher in the planning group (36.4% and 13.6%) than in the control group (29.4% and 10.5%; see Table 4.3).

**DISCUSSION**

The efficacy of interventions using implementation intentions and coping planning in the promotion of various health behaviors has been well established (Gollwitzer & Sheeran, 2006). The present study is, however, the first to produce evidence for the efficacy of coping planning in the prevention of relapse in smoking. Although no significant short-term effects were found, the results showed that participants who completed the coping planning intervention were more likely to be continuous abstinent seven months post-intervention than respondents in the control group.

The continuous abstinence rate of 29.4%, achieved by control participants in the Quit & Win contest, was increased with a significant 7% as a result of the planning intervention. Intention to treat analyses largely replicated this finding and demonstrated a 3% increase in continuous abstinence (from 10.5% to 13.4%), indicative of a borderline significant effect of the planning intervention. Furthermore, when non-completers were excluded from analysis, respondents-only as well as intention to treat analyses demonstrated significant effects of coping plans on continuous abstinence. With odds ratios of approximately 1.40 in the intention to treat analyses and 1.50 in the respondents-only analyses of continuous abstinence, these results are promising. A previous review of relapse prevention interventions demonstrated generally lower odds ratios and only few of the interventions were effective in increasing continuous abstinence rates (Lancaster et al., 2006). Moreover, most relapse prevention interventions have used fairly intensive cognitive-behavioral approaches and/or pharmacotherapy (Hajek et al., 2005; Lancaster et al., 2006), whereas the self-regulation intervention used in the present study is of minimal intensity, highly time-efficient and easy-to-administer.

There are two potential explanations for the finding that coping plans were effective in increasing continuous abstinence but not one-month abstinence. First, during the Quit & Win intervention month, participants were offered several types of cessation aids and frequently received supportive messages from the Quit & Win organizational team. It is possible that the planning intervention did not have an additional value over

and above the strong effects of the Quit & Win contest. The planning intervention may therefore have only come into full potential after the contest month, when no additional support and contest elements were present.

The second explanation pertains to the distinction between *action planning* and *coping planning* (Sniehotta et al., 2005b). Action planning (Leventhal et al., 1965), or, as Gollwitzer (Gollwitzer, 1999) called this, implementation intentions, is mainly a task-facilitating strategy that specifies *when*, *where*, and *how* one intends to act. By linking goal-directed responses to situational cues people are more likely to perform the intended behavior (Gollwitzer, 1999; Sheeran et al., 2005a). Coping planning is based on the mental anticipation of difficult situations that pose barriers to performing an intended action, and preparation of coping strategies to overcome these barriers, and is therefore primarily a distraction-inhibiting strategy (Sniehotta et al., 2005b). Sniehotta and coworkers (2005b) and Ziegelmann and coworkers (2006) have argued that action planning primarily promotes the initiation of action, whereas coping planning is grounded upon personal experience with the intended behavior and therefore plays a major role in maintaining the behavior. In the present study, the predetermination of the quit date can be viewed as a type of action planning that instigates the initiation of the intended behavior, quitting or not smoking. However, it may not be until several weeks or months that the non-smoking behavior becomes routine-like (Sutton, 1994) and self-regulatory efforts are needed to inhibit unwanted influences that distract the quitter from maintaining this behavior (Sniehotta et al., 2005b; Ziegelmann et al., 2006). It is therefore plausible that the formulated coping plans play a more important role in this maintenance phase than in the earlier initiation phase, causing the delayed occurrence of their effects.

Although the present results are promising, the finding that one in four to five respondents did not adequately follow through the planning protocol suggests that there is room and need for improvement of the intervention. Although many intervention studies have been performed with regard to the formation of action and coping plans, to our knowledge, non-completion is generally not taken into account. In view of optimizing planning intervention procedures, it would, however, be interesting to explore the reasons for non-completion and develop approaches to minimize it. Further research is therefore recommended.

The present study is subject to some limitations. First, results are based on self-reported smoking behavior. Previous studies, however, show that the difference between self-reported abstinence rates and those verified with biochemical measures is negligible (Patrick et al., 1994; Velicer et al., 1992). Furthermore, we have tried to discourage false reporting of abstinence by appointing buddies that had to certify that participants conformed to the contest rules and by informing all participants of the possibility that a urine cotinine test would be performed in case they would be selected as a prize winner.

Second, although substantial dropout is often inherent in e-health interventions, particularly in those conducted through the internet (Eysenbach, 2005), the

relatively high attrition suffered across the two follow-up measurements may restrict validity of the results and may have caused biases in reported abstinence rates. Furthermore, attrition analyses showed that abstainers were more likely to participate in follow-up measurements. In order to minimize potential bias, we have presented intention to treat estimates of abstinence. These conservative estimates may, however, underestimate actual abstinence rates and trivialize the effects of the planning intervention (Tillgren et al., 2000; Tomson et al., 2005).

## **CONCLUSION**

This study is the first to incorporate self-regulatory planning techniques in a nationwide media-led smoking cessation campaign and investigate their efficacy as a tool to prevent long-term smoking relapse. In consideration of the facts that respondents simultaneously participated in the relatively intensive Quit & Win contest and the effects of coping plans were observable seven months post-intervention, the results of this study are encouraging. More research is needed to replicate these findings and to optimize the planning intervention protocol in such a way that it is practical and comprehensible for all participants. Its time-efficient, inexpensive and easy-to-implement qualities can make coping planning an important tool for future educational programs on smoking, and possibly other addictive behaviors.



# CHAPTER 5

From theory to practice: an explorative study into the instrumentality and specificity of implementation intentions

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## ABSTRACT

**Objectives:** The present study explores the behavioral impact of instrumentality and specificity of implementation intentions.

**Methods:** At baseline, 764 participants in a smoking cessation contest were asked to formulate three implementation intentions on how they planned to cope with difficult situations. Two independent researchers evaluated all formulated plans and rated them according to their instrumentality (instrumental – non-instrumental) and specificity (non-specific – medium – highly specific). Point prevalence and continuous abstinence rates were measured seven months after baseline.

**Results:** One in four participants (23%) made at least one non-instrumental implementation intention. On average, participants made medium to highly specific plans. The mere instrumentality of plans did not significantly affect smoking abstinence. Plan specificity positively predicted point prevalence abstinence; medium to highly specific planning resulted in higher abstinence rates than less specific planning. Smoking abstinence rates did not differ between respondents with medium and highly specific planning. Women, higher educated participants, and experienced quitters were more likely to formulate instrumental implementation intentions. Women and highly motivated participants were more specific in their planning.

**Conclusions:** By encouraging participants to furnish goal-directed actions with sufficient detail the efficacy of implementation intention formation can be increased. Implications for future studies and interventions are discussed.

## INTRODUCTION

Ever since Gollwitzer (1993) proposed his concept of implementation intentions there has been a continuous flux of publications on its efficacy in the field of health behavior research. The concept of implementation intentions pertains to the formation of specific if – then plans that connect good opportunities to act (i.e., when and where) with to-be-performed behavioral responses (i.e., how). By anticipating a critical situation and specifying how to act in this situation, the mental representation of this situation is assumed to become highly activated (Gollwitzer, 1999; Webb & Sheeran, 2007) and the control of behavior is delegated from the self to the specified situational cues that rather automatically and effortlessly elicit the specified action, thereby increasing the likelihood that an intended behavior is actually performed (Gollwitzer & Sheeran, 2006).

Implementation intentions have been found very effective in the promotion of a wide array of health behaviors, ranging from physical activity to fruit consumption and as far as cancer screening uptake. After a series of efficacious applications, with meta-analyses demonstrating medium effect sizes (Gollwitzer & Sheeran, 2006; Sheeran, 2002), recently, reports of unsuccessful attempts have been surfacing as well (e.g., Jackson et al., 2005, 2006; Michie et al., 2004; Rutter et al., 2006).

There may be a multitude of factors underlying the discrepancy in demonstrated efficacy. Variance in populations studied (e.g., clinical versus student populations or highly motivated versus relatively unmotivated samples), variance in behaviors studied (simple versus complex or single versus repeated behaviors), as well as discrepancies in the operationalization of implementation intentions (e.g., correct or incorrect application of if – then strategies) may for instance result in significant differences between studies. In addition, the quality of formulated plans may also be of influence. Discrepancies in, for instance, the instrumentality of plans and their level of specificity may influence their efficacy.

The implicit assumption – although prudently stated in Sheeran and Gollwitzer's mutual work (2006) – has been that implementation intentions that are described with a higher amount of specificity are more likely to lead to performance of the intended behavior than plans that are relatively broad and non-specific. This assumption rests on the idea that by describing the situation and the to-be-performed action in sufficient detail, the critical situation will be better recognizable and deliberation of what action to take would not be required once the critical situation is encountered (Gollwitzer, 1993, 1999). Although plausible, this assumption has not been thoroughly investigated. It may well be that over-specification of a critical situation makes it more difficult to recognize. An overly complicated mental image of a situation may make it less facile to match with actual situations and people may not be able to transfer their proposed action to situations which are not exactly in coherence with the situation described in their implementation intention. Furthermore, an overly specified situation may not present itself frequently, rendering the possibilities for carrying out the in-

tended response scarce. Over-specification of the goal action may lead to difficulties when one or more components of the intended action are not present or cannot be performed. It may be that the more pre-conditions an action requires, the more difficulty people experience complying with these conditions and the less likely it will be that the action will be performed.

All in all, whereas detailing plans may enhance recognition of target situations and automatization of the to-be-performed actions, over-specification of plans may not allow flexibility (Jackson et al., 2005). It may therefore be useful to determine an optimal level of specificity in order to further foster implementation intention efficacy.

Furthermore, despite the quantity of studies on the efficacy of implementation intentions, almost none of them report on respondents' compliance with task demands. A study by Michie and colleagues (Michie et al., 2004) is one of the few that did and found that only 63% of participants formulated an implementation intention, indicating that more than one-third did not comply with the task instructions. Aside from simply refusing to fill out implementation intentions or writing down nonsense plans, respondents may experience difficulty comprehending the explanation or purpose of the planning task and may be unable to formulate correct or instrumental plans, i.e., plans that facilitate the ultimate goal behavior. These types of voluntary or involuntary non-compliance are generally not taken into account when estimating planning efficacy but may constitute a substantial threat to overall intervention efficacy.

To date, only few studies have addressed the quality of implementation intentions. In their study on physical activity in orthopedic patients, Ziegelmann, Lippke and Schwarzer (2006) compared an interviewer-assisted planning intervention and a standard-care self-administered planning intervention. They found that participants in the interviewer-assisted condition formulated more detailed (i.e., complete) plans. Plan completeness was associated with higher physical activity at six months post-test. De Vet, Oenema and Brug (2008) used a similar approach, in which specific formulations of each of five plan components was scored, and also found that individuals who formulated high-quality implementation intentions, i.e., who formulated more specific and complete plans, reported more frequent physical activity at two weeks post-test.

Instrumentality and specificity are essential quality aspects of implementation intentions. A plan such as "If the weather is good, then I will go jogging in the park" may comprise of all structural components of an implementation intention, it still lacks specificity, as it applies to numerous situations. The plan "If I am at a party and someone offers me a cigarette, then I will probably give in to the temptation" may also objectively comprise of all necessary components, it still does not suffice the purpose of smoking abstinence.

With the aim of optimizing the efficacy and applicability of implementation intentions, this study investigates these two aspects of the quality of implementation intentions: their instrumentality and level of specificity. Implementation intentions are thought to overcome failure to get started with a certain behavior (e.g., exercise initiation) as well as to avoid getting derailed from the course to goal achievement

(e.g., maintaining smoking abstinence when faced with distractions). In the literature a distinction in terminology between these two purposes is often made; 'action planning' is often used to designate the applications with the purpose of action initiation, whereas applications with the purpose of maintaining goal striving are often referred to as 'coping planning' (e.g., Sniehotta et al., 2006b; Ziegelmann et al., 2006). Although both types of planning define when, where and how an intended goal-directed action is to be taken, the latter explicitly pertains to the anticipation of obstacles and difficult situations on the road to goal achievement. By anticipating these situations and specifying adequate coping strategies, the intended response is thought to be prioritized over the habitual response and the intended behavior is maintained.

In the present study, implementation intentions were formulated as coping plans and described what actions smoking abstainers would undertake to refrain from smoking in selected personal risk situations. First, we hypothesized that respondents who formulate instrumental implementation intentions are more likely to benefit from the intervention, i.e., remain abstinent, than those who formulate non-instrumental plans (hypothesis 1). Second, the assumption was tested that implementation intentions in which the goal directed action is described with a higher degree of specificity will more likely result in goal behavior than implementation intentions low in specificity (hypothesis 2). In order to adapt future interventions to the needs of the target group, we additionally investigated potential demographic differences between respondents who made instrumental versus non-instrumental and specific versus non-specific plans.

## **METHODS**

### **Respondents and procedures**

Data was obtained from Dutch adult smokers who participated in a national smoking cessation contest ('Quit & Win') in May 2005 (Van Osch et al., 2008a). The objective of the cessation contest was to quit smoking at a preset quit date (May 1). The total number of Quit & Win registrants was 3694. All contest participants that had provided their e-mail address at registration (N = 2887) were approached by e-mail and asked if they would like to participate in our study. They were explained that all data would be treated confidentially and that (non-) participation would not affect contest outcomes.

A total of 1566 smokers (54.2%) were willing to participate in our online survey. Based on odd and even registration numbers, they were then assigned to either the control group (N = 802) or the experimental planning group (N = 764). The two study groups did not differ in their smoking behavior or on any demographic variables, indicating that randomization was successful. The planning intervention was effective and increased conservative measures of seven-month continuous abstinence with three percent - from 10.5% to 13.4% - compared to the control group. The overall efficacy of the planning manipulation is more elaborately described elsewhere (Van

Osch et al., 2008a). The present study only focuses on the experimental planning group. Respondents filled out a short questionnaire, assessing demographic variables (gender, age, educational level, and marital status) and several questions regarding their smoking behavior (number of years smoked, number of cigarettes smoked per day, time of day at which the first cigarette is smoked, and number of previous quit attempts). Furthermore, participants' intention to remain abstinent for at least one year was measured (1 = definitely not intend to 6 = strongly intend). At the end of the questionnaire, they were asked to formulate three coping plans in the form of implementation intentions. Six months after the contest (approximately seven months after baseline measurement), participants filled out the follow-up questionnaire (N = 282; 37%), which mainly consisted of abstinence measures.

Point prevalence as well as continuous abstinence rates, as measured by conservative intention to treat analyses, were used. Participants that did not complete the follow-up measurement were considered smokers. Point prevalence abstinence was estimated as seven-day abstinence at the time of measurement. Continuous abstainers included only those participants who reported complete abstinence in the preceding seven months.

### **Planning intervention**

Participants were presented with the following introduction and instruction to the planning manipulation:

*When you quit smoking certain situations may provoke the temptation to smoke. There are several ways to cope with these difficult situations and remain abstinent. It is up to you to make plans on how you intend to cope with these difficult situations.*

*Many people find it hard to actually implement these intentions. Research has shown that intentions are implemented more often when people formulate a detailed plan that specifies when, where, and how the intended behavior will be performed. In the case of smoking cessation, such a plan could, for instance, be formulated as follows: "If I feel the urge for a cigarette (= difficult situation), then I will eat a piece of fruit instead (= intended behavior)"*

*We would like you to formulate three of these plans in order to remain abstinent in difficult situations.*

After this introduction participants were presented with 14 risk situations, in which smoking relapse often occurs (see Table 5.1) (Velicer et al., 1990). In correspondence with recommendations by Gollwitzer and Sheeran (2006), respondents were then asked to choose the three situations in which they would find it most difficult to refrain from smoking, e.g., 'If someone offers me a cigarette'. For each situation they were asked to formulate a specific plan that they would undertake to refrain from smoking, e.g., 'then I will tell the person that I have quit smoking and ask him or her not to offer me any more cigarettes'. After respondents formulated their plan, the complete strategy (e.g., 'If someone offers me a cigarette, then I will tell the person that I have quit smoking and ask him or her not to offer me any more cigarettes') was repeated on the screen in order to facilitate memorizing.

**Table 5.1** Risk situations for smoking relapse.

Social	Emotional	Routine
If I am going out with friends	If I am under a lot of stress	If I get up in the morning
If I am at a party or a bar	If I am feeling depressed	If I am having coffee or tea
If I am around other people and feel uncomfortable	If I am feeling angry or frustrated	If I am having a break
If someone offers me a cigarette	If I am desiring a cigarette	If I just finished dinner
If I see someone smoking and enjoying it	If I notice that I have gained weight	

### Instrumentality and specificity rating

Two researchers independently evaluated all formulated plans and coded them as (1) 'instrumental' or (0) 'non-instrumental'. Plans were coded as 'instrumental' if they a) would facilitate smoking abstinence, and b) were viable in the concerning situation. It should be acknowledged that subjective estimates of a) and b) may differ between individuals; a plan that may be effective for one person may seem irrelevant or ineffective to another. The researchers were therefore instructed to only code plans as 'non-instrumental' if it was abundantly clear that the goal-directed response would not facilitate abstinence (e.g., 'If I am desiring a cigarette, then I will give in to the temptation') or could not be performed in the concerning situation. The interrater reliability for the evaluation of instrumentality was high (Cohen's kappa = 0.84; Landis & Koch, 1977). In cases in which no consensus was reached, two additional investigators were consulted to determine the final instrumentality score. Individual instrumentality scores that were used for analysis consisted of the total number of instrumental plans, ranging from zero to three.

Specificity was rated on a three-point scale, ranging from (0) 'non-specific' to (1) 'medium specific' and (2) 'highly specific'. If a plan was coded as 'non-instrumental' it was no longer considered for specificity rating. Plans were coded as 'non-specific' if the action was described vaguely and could apply to a diversity of behaviors, e.g., 'If I have the urge to smoke, then I will go and do something'. Plans were coded as 'medium specific' if the action was described with a certain amount of detail and direction, but was still rather general and could still apply to several actions, e.g., 'If I have the urge to smoke, then I will try to relax'. Plans were coded as 'highly specific' if the action was described with a sufficient amount of precision and direction, so that deliberation would not be required once the critical situation would be encountered (Gollwitzer & Sheeran, 2006), e.g., 'If I have the urge to smoke, then I will drink a cup of coffee'. The interrater reliability for the evaluation of specificity was substantial (Cohen's kappa = 0.71). Again, in cases in which no consensus was reached, two additional investigators were consulted to determine the final specificity score. A mean specificity score was calculated across the plans and this score was used for analysis.

## **Statistical analyses**

Descriptive statistics were used to describe baseline characteristics of the sample. Logistic regression analyses were performed with point prevalence and continuous abstinence as respective dependent variables, plan instrumentality or plan specificity as predictors, and all baseline characteristics as covariates. Linear regression analyses were performed to examine demographic factors, smoking history variables, and intention as potential predictors of instrumentality and specificity scores.

## **RESULTS**

### **Sample description**

#### *Demographics*

Women were somewhat overrepresented in the study sample (62%). Participants' mean age was 36 years (SD = 0.49) and most of them had a partner (69%). A quarter of participants (24%) had a low educational level, 44% had a medium level of education, and 32% were highly educated. They had been smoking for an average of 19 years (SD = 11.34) and smoked 19 cigarettes per day (SD = 8.55). Two-third of respondents smoked their first daily cigarette within 30 minutes after awakening (67%) and most of them (44%) had made 1 or 2 quit attempts prior to participation. Participants' intention to remain abstinent for at least one year was very high (mean score = 6.44; SD = 0.84).

#### *Instrumentality and specificity*

Most respondents made three instrumental coping plans (77%). Approximately 15% made two instrumental plans, whereas 5% and 3% of participants made one or no instrumental plan, respectively. With a mean score of 1.50 (SD = 0.49) participants made plans that were fairly high in specificity. Table 5.2 provides an overview of instrumentality and specificity scores.

#### **Attrition analysis**

Logistic regression analysis showed that women (OR = 1.51;  $p < 0.05$ ), older participants (OR = 1.03;  $p < 0.05$ ), and respondents who made more specific plans (OR = 1.70;  $p < 0.05$ ) were more likely to respond at the follow-up measurement.

#### **Plan instrumentality and smoking abstinence (Hypothesis 1)**

Logistic regression analyses indicated that plan instrumentality was not a significant predictor of point prevalence abstinence (OR = 1.03; 95% CI = 0.77 – 1.39;  $p > 0.05$ ), nor of continuous abstinence (OR = 1.07; 95% CI = 0.78 – 1.47;  $p > 0.05$ ). The mere instrumentality of plans therefore did not significantly affect smoking abstinence.

A per-protocol analysis was performed, in which all respondents that made no, one or two instrumental plans (23%) were combined into a 'non-completers' group

(N = 176), and those who formulated three instrumental plans and thereby correctly completed the planning protocol were categorized as 'completers' (N = 588). Intention to treat analysis, in which all non-respondents were regarded as smokers, indicated that 13.7% of the non-completers were point prevalent abstinent at follow-up, versus 15.3% of completers. Furthermore, 12.5% of non-completers reported continuous abstinence, compared to 13.6% of completers. Logistic regression analyses showed that these differences in point prevalence (PPA) as well as continuous abstinence (CA) rates were not significant (PPA: OR = 1.26, 95% CI = 0.75 – 2.12,  $p > 0.05$ ; CA: OR = 1.24, 95% CI = 0.72 – 2.13,  $p > 0.05$ ), again indicating that instrumentality of plans did not significantly affect smoking abstinence.

Subsequently, in-depth analyses were performed, in which separate abstinence rates were calculated for all four instrumentality groups (see Table 5.2). These analyses demonstrated that the very small group of respondents that made no instrumental plans (N = 21) reported unusually high abstinence rates (CA: 23.8%, PPA: 28.6%). Scrutiny of these respondents' plans indicated that the majority of them did not formulate intelligible implementation intentions or wrote down nonsense plans.

An explorative regression analysis, including only those respondents who made at least one instrumental plan resulted in small trends, indicating that respondents who made more instrumental plans were more likely to remain abstinent (CA: OR = 1.43, 95% CI = 0.89 – 2.29,  $p = 0.13$ ; PPA: OR = 1.42, 95% CI = 0.91 – 2.23,  $p = 0.12$ ).

**Table 5.2** Instrumentality and specificity scores, related to both abstinence measures.

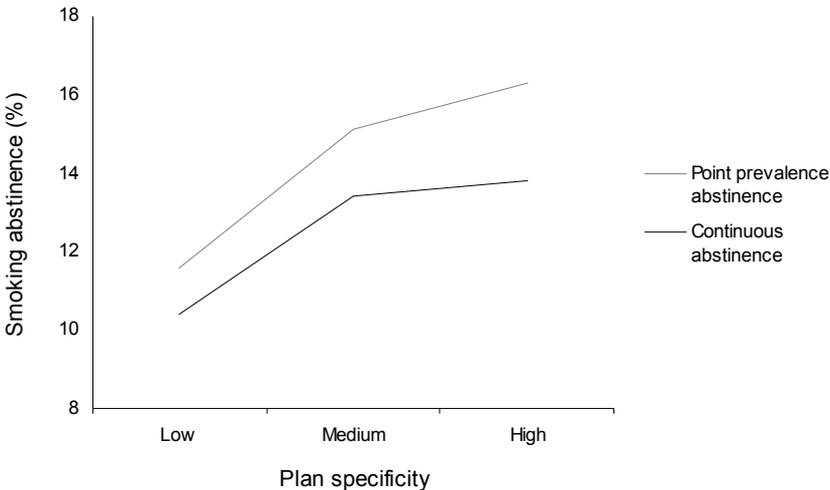
		Continuous abstinence	Point prevalence abstinence
<b>Instrumentality: mean (SD)</b>			
No instrumental plan (N=21)	2.8%	23.8%	28.6%
One instrumental plan (N=39)	5.1%	5.1%	7.7%
Two instrumental plans (N=116)	15.2%	12.9%	13.8%
All three plans instrumental (N=586)	76.9%	13.3%	15.4%
<b>Specificity: mean (SD)</b>			
Low specificity (N=164)	22.1%	10.4%	11.6%
Medium specificity (N=337)	45.5%	13.4%	15.1%
High specificity (N=240)	32.4%	13.8%	16.3%
<b>Number of specific plans: mean (SD)<sup>a</sup></b>			
No specific plan (N=12)	1.6%	0%	0%
One specific plan (N=57)	7.7%	5.3%	7.0%
Two specific plans (N=177)	23.9%	13.0%	14.7%
Three specific plans (N=495)	66.8%	13.9%	16.0%

<sup>a</sup> Medium and highly specific plans are considered specific.

### Plan specificity and smoking abstinence (Hypothesis 2)

Logistic regression analyses demonstrated that plan specificity positively predicted point prevalence abstinence (OR = 1.60; 95% CI = 1.00 – 2.56;  $p < 0.05$ ), indicating that the formation of more specific plans resulted in higher abstinence rates. With regard to continuous abstinence this effect reached borderline significance (OR = 1.58; 95% CI = 0.97 – 2.59;  $p = 0.06$ ).

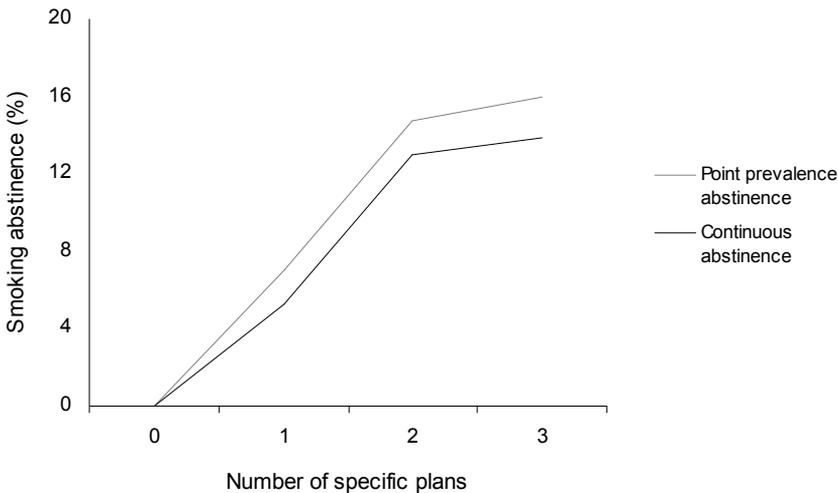
For the calculation of abstinence rates (see Table 5.2), respondents were subdivided into three categories (low: mean score  $\leq 1$ , N = 164; medium:  $1 < \text{mean score} < 2$ , N = 337; high: mean score = 2, N = 240). Respondents who made plans low in specificity had the lowest abstinence scores (PPA = 11.6%, CA = 10.4%), when compared to respondents who made medium specific (PPA = 15.1%, CA = 13.4%) or highly specific (PPA = 16.3%, CA = 13.8%) plans. When these categorical specificity scores were entered into a logistic regression analysis, it was demonstrated that there were significant and marginally significant differences in abstinence rates between low and medium specific planning (PPA: OR = 1.89, 95% CI = 0.93 – 3.85,  $p = 0.08$ ; CA: OR = 2.27, 95% CI = 1.06 – 4.84,  $p < 0.05$ ) and between low and highly specific planning (PPA: OR = 1.89, 95% CI = 1.12 – 3.16,  $p < 0.05$ ; CA: OR = 1.80, 95% CI = 1.04 – 3.11,  $p < 0.05$ ). Abstinence rates, however, did not differ between respondents who made medium specific plans and those who made highly specific plans (PPA: OR = 0.61; 95% CI = 0.08 – 4.52;  $p > 0.05$ ; CA: OR = 1.11; 95% CI = 0.14 – 8.66;  $p > 0.05$ ). These findings with regard to plan specificity are graphically reproduced in Figure 5.1.



**Figure 5.1** Point prevalence and continuous abstinence rates, based on intention to treat, of respondents who made plans that are low, medium or high in specificity.

### Number of specific plans and smoking abstinence

We further investigated whether the number of specific plans affected smoking abstinence. As medium and highly specific plans did not significantly differ in their efficacy, participants' total number of medium and highly specific plans was calculated for this purpose, ranging from zero (only non-specific plans were formulated) to three (all formulated plans were medium or highly specific; see Table 5.2). Logistic regression analyses demonstrated that number of specific plans positively predicted point prevalence abstinence (OR = 1.48, 95% CI = 1.03 – 2.12,  $p < 0.05$ ) as well as continuous abstinence (OR = 1.54, 95% CI = 1.05 – 2.25,  $p < 0.05$ ). Chi-square testing indicated that the increase in abstinence between participants who made zero or one specific plan was non-significant (PPA:  $\chi^2 = 0.89$ ,  $p > 0.05$ ; CA:  $\chi^2 = 0.66$ ,  $p > 0.05$ ). This finding should, however, be interpreted with caution as numbers used in this analysis were low ( $N = 69$ ). Logistic regression analysis demonstrated significant and marginally significant increases in abstinence for the formation of two specific plans, when compared to one specific plan (PPA: OR = 2.78, 95% CI = 0.83 – 9.30,  $p = 0.09$ ; CA: OR = 4.16, 95% CI = 1.02 – 16.89,  $p < 0.05$ ), but not for the comparison between two and three specific plans (PPA: OR = 1.12, 95% CI = 0.67 – 1.88,  $p > 0.05$ ; CA: OR = 1.13, 95% CI = 0.66 – 1.93,  $p > 0.05$ ). These findings are graphically reproduced in Figure 5.2.



**Figure 5.2** Point prevalence and continuous abstinence rates, based on intention to treat, of respondents with increasing numbers of medium and highly specific plans.

### **Correlates of instrumentality and specificity**

Additional analyses using linear regression analysis revealed that gender, educational level and number of previous quit attempts were significant predictors of instrumentality scores. Women ( $\beta = 0.17$ ;  $p < 0.001$ ), higher educated participants ( $\beta = 0.08$ ;  $p < 0.05$ ), and participants that were more experienced with regard to quitting, i.e., those who had made more previous quit attempts ( $\beta = 0.10$ ,  $p < 0.01$ ), were more likely to form instrumental plans.

Gender and intention were significant predictors of plan specificity; women ( $\beta = 0.11$ ;  $p < 0.01$ ) and high-intenders ( $\beta = 0.09$ ;  $p < 0.05$ ) formulated more specific implementation intentions than men and low-intenders.

## **DISCUSSION**

With the aim of optimizing the applicability and efficacy of implementation intentions, the present study explored the instrumentality and specificity of implementation intentions. The present results allow for several conclusions and implications for future research and interventions.

With regard to specificity of implementation intentions, the hypothesis of a gradual increase in behavioral efficacy was supported by the present findings. Participants that formulated plans with a higher level of specificity were more likely to be point prevalent abstinent after 7 months. A trend towards significance was found for continuous abstinence. The present study is the first to demonstrate the importance of specific implementation intention formation with regard to cessation of a health risk behavior. The present results are in line with the studies by Ziegelmann et al. (2006) and De Vet et al. (2008) on the adoption of health protective behavior (physical activity), which also found that more detailed planning resulted in higher behavioral performance.

Further analyses showed that, although participants who formulated implementation intentions that were low in specificity had significantly lower abstinence rates at the seven-month follow-up than those who made medium or highly specific plans, the latter two groups did not differ from each other with regard to point prevalence or continuous abstinence. One explanation for this finding may be that developing goal-directed actions with highly detailed characteristics does not result in an additional effect once a certain threshold - in this case medium specific planning - is attained. As Gollwitzer and Sheeran and coworkers (Gollwitzer, 1993; Sheeran et al., 2005a) have suggested, specifying the goal-directed action to a certain extent reduces the amount of deliberation required once the critical situation is encountered. The action can then be performed relatively effortlessly and automatically. Results from this study indicate that a medium level of specificity may suffice this purpose. Over-specification of goal actions may not necessarily produce better effects and may lead to difficulties when one or more components of the intended goal action are not

present or cannot be performed. It may be that if the pre-conditions required for the action cannot be met, contemplation on other actions will be necessary, thereby rendering automatization of the action less likely.

Furthermore, it was found that the formation of multiple specific implementation intentions exceeded single or no specific plans in their efficacy. Although the currently used design, in which all participants were asked to formulate three implementation intentions, does not allow rigorous examination of number of plans in general (apart from their instrumentality and specificity), our findings support findings of the study by De Vet and colleagues (2008) in suggesting that multiple plans may increase behavioral efficacy. Optimal numbers of implementation intentions have, however, yet to be thoroughly examined (see Elliott & Armitage, 2006).

With regard to our hypothesis concerning improved effectiveness of instrumental implementation intentions, we encountered some remarkable results. Almost one in four participants did not correctly follow through the planning protocol; they made at least one non-instrumental implementation intention. The mere instrumentality of plans did, however, not result in increased efficacy of implementation intentions. In-depth analyses showed that the very small group of respondents that made no instrumental plans reported very high abstinence rates, a finding that may partially account for the lack of findings with regard to instrumentality. Most of the respondents in this very small subgroup ( $N = 21$ ) wrote down nonsense plans. These respondents may tentatively be thought to represent a group of individuals that are not involved in plan formation, either because they do not see the need for it or because they are not sufficiently involved in the study. It is possible that these individuals share characteristics that are associated with high levels of self-regulation, such as high conscientiousness. De Vet and colleagues (2008) found that highly conscientious individuals formulated plans that were relatively low in quality. This may be explained by the fact that these highly planful, self-disciplined and organized individuals may not experience additional beneficial effects of planning interventions (e.g., Webb et al., 2007). Highly conscientious individuals have been found to set more autonomous goals (Hollenbeck et al., 1989) and are more strongly committed to these goals than less conscientious individuals (Barrick et al., 1993), thereby rendering goal attainment, and in this study smoking abstinence, more likely. Inadequate commitment to the study is another tentative explanation for the unusually high abstinence rates in the small group of individuals that failed to form instrumental implementation intentions. Deceptive responses cannot be entirely prevented in smoking cessation contests in which abstinence is awarded with substantial monetary incentives (see Cahill & Perera, 2008). The nonsense plans that some participants wrote down may raise doubt about the integrity of their participation and their reporting of abstinence status. This explanation should, however, be considered cautiously.

When respondents who failed to formulate instrumental plans were excluded from the analysis, small trends were demonstrable, indicating that instrumental plan-

ning may be associated with higher abstinence rates. However, as the current findings are not conclusive, this research area should be studied further.

The quarter of participants who did not correctly follow through the planning protocol may be either not willing or not able to formulate instrumental implementation intentions. With regard to the first group, it may be beneficial to provide participants with a more detailed explanation of the benefits of planning, whereas the latter group may benefit more from a more detailed instruction on how to formulate implementation intentions. In the present study it was, however, not possible to investigate the origin of non-instrumental plans. The intervention was carried out online and the electronic format that was used for implementation intention formation compelled participants to fill in a plan in order to proceed to the next question. Therefore, no refusals with regard to plan formation were recorded, making it very difficult to distinguish inability from unwillingness when examining the formulated plans. Future research would benefit from taking this distinction into account, as a thorough understanding of the causes of inadequate plan formation may lead to fine-tuning and optimization of implementation intention interventions.

Men, lower educated participants and participants who had made less previous quit attempts were more likely to fail at formulating instrumental implementation intentions. Those participants who had made less previous quit attempts may be less experienced in anticipating personal risk situations for relapse and specifying actions to promote abstinence as they have not often dealt with these situations. It may be helpful to explicitly encourage individuals to vividly imagine a risk situation prior to formulating their plans. In this way the risk situation may be perceived as more realistic and one's actions can be based on cognitive, rather than, or in conjunction with, physical experience. Lower educated participants may have difficulty comprehending the purpose and method of implementation intention formation. Again, these participants may benefit from a more instrumental and less complicated instruction. The finding that men were less likely to formulate instrumental and specific plans than women may pertain to reports of previous studies that men use less strategies in their cessation attempt (USDHHS, 2001), and more generally to findings that indicate that overall, men are less likely to engage in coping strategies than women (Tamres et al., 2002). In the study by Tamres and colleagues, there was also a trend for women to engage in more planning than men. Future studies may take this potentially decreased willingness or ability to plan into consideration and particularly encourage men to correctly complete the planning protocol. Furthermore, intention was significantly associated with plan specificity, indicating that highly motivated individuals are more detailed in their planning of goal-directed responses. This superior planning may (partially) account for the moderating influence of goal intentions with regard to implementation intention efficacy that has been demonstrated in various studies (Orbell et al., 1997; Sheeran et al., 2005b; Van Osch et al., 2008b).

In addition to the previously mentioned implications of methodology used in the current study, several issues need further mentioning. First, as respondents in this

study derived from a highly motivated sample of smokers who registered for participation in a smoking cessation contest, caution is warranted with regard to comparison to other study populations that are more variable in motivation. Replication of the present results in other samples is therefore necessary. Second, the implementation intentions formulated in the present study were 'aided' plans. Participants could choose personal risk situations from a pre-specified list and were required to describe the actions to be performed in those particular situations. Although the situations that were specified are well-known and common risk situations with regard to relapse (Velicer et al., 1990), this approach may have restricted the personalization of critical situations. Scrutiny of the influence of level of specificity with regard to critical situations, preferably in combination with specificity of goal-directed actions, is therefore recommended for future research. However, as about one in four participants already had difficulty complying with the current protocol, the feasibility of adequate *unaided* planning should be reckoned with. Asking participants to specify both the situations and the goal directed actions would likely have resulted in even less instrumental planning. This trade-off between feasibility and personalization should be born in mind when applying future planning interventions. Third, although substantial dropout is often inherent in e-health interventions, particularly in those conducted through the internet (Eysenbach, 2005), the relatively high and somewhat selective attrition suffered in this study may restrict validity of the results and may have caused biases in reported abstinence rates. In order to minimize potential bias, all analyses were controlled for baseline characteristics and only intention to treat estimates of abstinence were presented.

In conclusion, the current findings suggest that, in order to optimize efficacy, implementation intentions should be formulated with a sufficient amount of specificity. Future studies in this area may turn these findings to good account by encouraging participants to furnish the goal directed actions with sufficient detail, thereby increasing the likelihood of successful goal striving.



# CHAPTER 6

Predicting parental sunscreen use: disentangling the role of action planning in the intention – behavior relationship

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## ABSTRACT

**Objectives:** This study aimed to examine the antecedents of parental sunscreen use and to investigate the nature of the influence of self-regulatory planning in the relationship between intention and behavior.

**Methods:** Structural equation modeling was used to examine antecedents of parental sunscreen use ( $N = 436$ ) in a longitudinal design. The influence of action planning was assessed in several path models, investigating potential mediation and moderation of the intention – behavior relationship.

**Results:** Premotivational and motivational variables accounted for 55.1% of the variance in intention to use sunscreen. Intention emerged as the most powerful predictor of behavior, followed by action planning and self-efficacy expectations, together explaining 35.4% of parental sunscreen use after five months. Strong support was found for both mediating and moderating influences of action planning on the intention – behavior relationship. Action planning also partially mediated the impact of self-efficacy on behavior.

**Conclusions:** The results support theoretical considerations to add post-intentional cognitions to current health behavior models. Although action planning is an important component in the transition from intention to behavior, the impact of intention and of other premotivational and motivational variables should not be overlooked when developing health educational interventions.

## INTRODUCTION

Continuous increases in the incidence of skin cancer worldwide call for immediate actions to reduce risk behaviors in this area (De Vries, Van der Rhee et al., 2006; Diepgen & Mahler, 2002). Childhood UV exposure and the number of times a child is sun burnt are important risk factors for the development of skin cancer later in life (Oliveria et al., 2006; Whiteman et al., 2001). Children, and as a consequence of their behavioral dependency, parents and caregivers of young children therefore form an important target group for interventions focusing on the primary prevention of skin cancer. Previous research has shown that parental sun protection practices are often inadequate (Bourke & Graham-Brown, 1995; Johnson et al., 2001; Severi et al., 2002) and interventions have yielded little or no beneficial behavioral effects (Saraiya et al., 2004).

Most of these interventions target motivational determinants of sun protection behavior, such as attitudes and self-efficacy expectations, on the assumption that changing these determinants will eventuate in health behavior change. Theoretical underpinnings of these interventions are mostly found in social-cognitive models, such as the Social Learning Theory (Bandura, 1986) and the Theory of Planned Behavior (Ajzen, 1991), which propose that changing these more distal behavioral determinants will result in an increased intention to perform health behavior. Subsequently, intentions are considered the most proximal and single most powerful predictor of behavior.

However, it has become very clear that changing one's intentions towards a health behavior does not guarantee behavior change. At best, intentions account for 20% to 40% of variance in behavior and behavior change (Conner & Armitage, 1998; Godin & Kok, 1996; Sutton, 1998; Sutton & Sheeran, 2003), indicating that other, postmotivational processes are essential in the translation of intentions into behavior. In this range of thought, several theorists have propounded a multi-phase behavior change process in which a distinction is made between a motivational phase, which culminates in intention formation, and a volitional phase, in which the intention is to be translated into action (Heckhausen & Gollwitzer, 1987; Kuhl, 1985; Schwarzer, 1992).

Research efforts to narrow the intention – behavior gap have centered on aspects of self-regulation and have resulted in the advancement of planning cognitions as an important volitional factor affecting behavior change. Action planning encompasses setting goals and subgoals, and planning specific actions in the striving for these goals. Leventhal and colleagues (Leventhal et al., 1967, 1984) were among the first to acknowledge the importance of action plans in the transition from motivation to action. Recently, a substantial amount of studies has been conducted in this area and several mechanisms have been proposed to optimize the operationalization of planning in health behavior research. Locke and Latham (1990, 2002) for instance argue that the setting of specific *proximal goals* or subgoals, as opposed to the expression of a rather comprehensive goal intention, increases performance in the striving for the ultimate *distal goal*. They furthermore assume that, when people are faced with

specific goals (e.g., adequate sun protection behavior), they tend to formulate plans and strategies on how the goal can be best achieved (e.g., Bandura & Simon, 1977; Latham & Baldes, 1975). Research by Gollwitzer (1993, 1996, 1999) has demonstrated that predeciding how to implement goal-directed actions in a given situation promotes the actual initiation of these actions. His concept of *implementation intentions* is built upon this mental act of linking goal-directed behaviors to anticipated situations, a principle that is also reflected in the action planning cognition described by Sniehotta and colleagues (Sniehotta et al., 2005a, 2005b, 2006b).

The proposition that planning can have a significant positive impact on health behavior is evidenced by an accumulating body of research (De Vries et al., 2006b; Luszczynska & Schwarzer, 2003; Orbell & Sheeran, 2000; Sheeran et al., 2005a; Sniehotta et al., 2006b). However, relatively little is known about how this impact comes about, in other words, how the main factors in the volitional phase (intention and planning) cooperate to achieve behavior change. Some studies, for instance, demonstrate full mediation of the intention – behavior relationship by planning (Luszczynska & Schwarzer, 2003; Orbell & Sheeran, 2000; Sniehotta et al., 2005a), whereas others indicate no or only partial mediation (Brickell et al., 2006; Jones et al., 2001; Norman & Conner, 2005b; Rise et al., 2003; Van Hooft et al., 2005; White et al., 1994). Besides mediation, study results with regard to moderating effects of planning call for clarification. Although several studies provide evidence in support of a moderating influence of planning in the intention – behavior relationship (Jones et al., 2001; Norman & Conner, 2005b) and, vice versa, of a moderating influence of intention in the planning – behavior relationship (Sheeran et al., 2005b), others fail to substantiate the moderation hypothesis (Brickell et al., 2006; White et al., 1994). In order to effectively incorporate planning in health education interventions, it is vital to resolve the issues regarding its mediating and/or moderating effects.

The present study therefore aims to disentangle the role of action planning in the context of parental sun protection behavior. To our knowledge, only two studies have been conducted that investigated the impact of planning on sun protection behavior. In a study by De Vries and colleagues (2006b) planning to use sunscreen in specific situations was found to be the most powerful determinant of actual sunscreen use in adolescents. Jones and colleagues (2001) modeled cognitive prerequisites of sunscreen use and concluded that a measure of prior planning contributed as much to the prediction of sunscreen use as intention. They also found evidence for both a mediating and moderating influence of planning in the relation between intention and behavior. However, the cross-sectional designs of both studies and the retrospective measurement of planning in the latter study limit the interpretability of these results and warrant replication of the study results using a prospective approach. Furthermore, both studies investigated personal sun protection behavior. Literature does not provide any studies examining the role of planning in sun protection practices with regard to children, i.e., parental or caregiver sun protection behavior.

The present study sought to analyze cognitive antecedents of parental sun protection behavior, and, in this context, extricate the influence of action planning in a longitudinal design. Structural equation modeling (SEM) was used to investigate the pattern of associations between premotivational, motivational, and postmotivational factors and parental sunscreen use. For this purpose, various cognitive constructs, such as knowledge, risk perception, attitudes, social influences, self-efficacy, intention, and action planning were included in a comprehensive path model. With regard to action planning, two hypotheses were investigated.

First, we hypothesized that action planning mediates the relationship between intention and behavior. We expected that highly motivated people are more likely to plan specific actions that are likely to produce the desired outcome, sunscreen use, and that this planning instigates the striving for performance of this behavior (Bagozzi & Edwards, 1999; Locke & Latham, 1990).

Second, we hypothesized that the planning of specific actions facilitates the translation of intentions into behavior and therefore expected a positive interaction between intention and action planning (Jones et al., 2001; Norman & Conner, 2005b). This interaction also implies a moderating effect of intention on the planning – behavior relationship, in that action planning is particularly effective in highly motivated people (Sheeran et al., 2005b). Although previous studies have tested mediating and moderating influences of action planning in the intention – behavior relationship, this is the first study examining both influences simultaneously by using structural modeling techniques.

### **Research model**

The tested basic model was based on cognitive constructs that were derived from the Health Belief Model (Janz & Becker, 1984), Protection Motivation Theory (Rogers, 1983), and the Theory of Planned Behavior (Ajzen, 1991) and have been assimilated in the Integrated Model for Behavioral Change (the I-Change Model) (De Vries et al., 2003b, 2005b).

Skin type of the child, and gender, age and educational level of the parent were included in the model as predisposing factors, which were presumed to influence the premotivational concepts of knowledge and perceived susceptibility and severity. As literature does not provide consensus regarding the combination of perceived susceptibility and severity into a single measure of perceived threat or risk, we chose to enter them separately. Research evidence for direct relationships between perceived risk and motivation or behaviors has generally been weak (Harrison et al., 1992; Milne et al., 2000). In the I-Change Model, knowledge and perceived risk are therefore considered premotivational factors that precede the motivational factors attitude, social influence and self-efficacy, which have consistently been found to predict intention formation in sun protection behavior (Myers & Horswill, 2006; Turner & Mermelstein, 2005). Furthermore, as intentions often do not fully mediate the association between self-efficacy and behavior (De Vries et al., 1988), a direct influence of self-efficacy expectations on sun protection behavior was incorporated in the model.

The basic path model was extended by the addition of action planning as a mediating variable between intention and behavior, and as a moderator of the intention-behavior link. The action planning concept under investigation was based on goal-setting theory (Locke & Latham, 1990; Locke et al., 1981) and involves the planning of specific (preparatory) actions (e.g., Abraham et al., 1998, 1999b; Bagozzi, 1992; Hilberink et al., 2006) that facilitate the performance of the ultimate goal behavior of adequate sun protection behavior.

## **METHODS**

### **Procedure**

The study sample consisted of parents of children in the age of six to nine years. Parents' e-mail addresses were registered in the database of a private research company. In the spring (April) of 2005, a total of 3150 parents were approached by e-mail and asked to participate in an online survey on sun protection. Of those approached, 1327 (42.1%) responded by registering on the survey website, but 291 respondents did not meet the inclusion criterion (child between six and nine years old) and were excluded from participation, leaving 1036 parent-child dyads available for the baseline measurement (T1). Follow-up (T2) took place at the end of the summer period, approximately five months after the baseline measurement. Of the 1036 baseline respondents, 111 (10.7%) had indicated that they did not want to participate in the follow-up measurement. Of the remaining 925 parents, 495 (53.5%) filled out the follow-up questionnaire. In 59 cases, demographic data of either the child or parent at baseline did not fully correspond to data at the follow-up measurement, indicating that both questionnaires were filled out by a different child or parent. These respondents were excluded from the study, leaving 436 parent-child dyads available for analysis.

### **Questionnaire**

In the baseline questionnaire (T1) *demographic variables* such as age, sex and educational level of the parent were inquired after. Furthermore, *skin type* of the child was assessed by the use of Fitzpatrick's distinction of skin types (Fitzpatrick, 1988), ranging from 'skin burns very rapidly and does not (or barely) tan' (type 1) to 'skin never burns and tans very well' (type 6). All cognitive concepts, measured at T1, and behavior, measured at T2, are described in Table 6.1.

### **Statistical analyses**

Structural Equation Modeling with Mplus 4.1 (Muthen & Muthen, 1998-2006), using Maximum Likelihood (ML) estimation was used to test hypothesized associations between the various cognitive constructs. Overall model fit was assessed by examining the Comparative Fit Index (CFI), the Tucker-Lewis-Index (TLI) and the Root-Mean-Square Error of Approximation (RMSEA). High CFI and TLI (> 0.90, preferably > 0.95) and low RMSEA (< 0.06) indicate a satisfactory model fit (Hu & Bentler, 1999; Kline,

1998). As the  $X^2$  index of the model is sample-size dependent and very sensitive to violations of the assumption of multivariate normality, this index was not considered as a basic criterion for model acceptance or rejection.

Background variables (child's skin type, age, sex, and educational level of the parent), knowledge, perceived susceptibility, perceived severity, self-efficacy expectations, intention, and sunscreen use were included as observed variables. Attitude, social influences, and action planning<sup>1</sup> were latent constructs, measured by the indicators defined in the description of the questionnaire (see Table 6.1).

Potential moderation of the intention - behavior and action planning - behavior relationships was tested by including an *action planning x intention* interaction effect in the model and examining its impact on behavior.

## RESULTS

### Sample characteristics

#### *Demographics*

The majority of participating parents were female (77%) and most parents were living together with a partner or spouse (84%). The mean age of parents was 36.4 years (SD = 5.17). Thirty-five percent of the parents had a low level of education (primary or basic vocational school), 47% had medium-level education (secondary vocational school or high school) and 18% had a high level of education (higher vocational school or university). All children were between 6 and 9 years of age, with a mean age of 7.3 years (SD = 1.08). Seven percent of the children had skin type 1, 21% had skin type 2, 56% skin type 3, 13% skin type 4, 3% skin type 5, and 1% had skin type 6.

#### *Sun protection intention behavior*

With a mean score of 5.12 (SD = 1.40), parents' intention to protect their child from the sun by using sunscreen was fairly high. Twenty-eight percent of parents had weak intentions (maybe, probably not, not, definitely not) to use sunscreen, whereas 72% probably intended, intended, or definitely intended to use sunscreen. At follow-up, however, parental sun protection behavior was found to be suboptimal, with only 11% of parents reporting to have always used sunscreen when their child was outside on a sunny day. Twenty-two percent mostly used sunscreen, 18% often used sunscreen, 30% sometimes and 19% of the parents never used sunscreen on their child when the child was outside.

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<sup>1</sup> The action planning construct was conceptualized as an effect indicator model measured in terms of a reflective scale (Bollen & Lennox, 1991), implying that the planning of specific actions reflects, rather than determines, the tendency to plan. This conceptualization was empirically tested by performance of a vanishing tetrad test in Statistical Analysis System (SAS) (Bollen & Ting, 2000; Ting, 1995). The tetrad test was non-significant ( $X^2 = 1.09$ ,  $df = 1$ ;  $p = 0.30$ ), indicating that the data are consistent with the specified effect indicator model.

**Table 6.1** Description of the measurement of cognitive concepts and parental sunscreen use.

Concept	Number of items	Item description, answering options and range
Knowledge	7	<p>If you use a sunscreen SPF 10, your child can stay in the sun 10 times longer than without any protection.</p> <p>The more often a child is sun burnt at a young age, the higher the risk of developing skin cancer later in life.</p> <p>Protection from the sun is only important for children with a light complexion.</p> <p>Protection from the sun is particularly important for children &lt; 15 years.</p> <p>One cannot get sun burnt in the shade.</p> <p>One must be sun burnt before one can get tanned.</p> <p>Once you have a tan, you do not need to protect yourself from the sun. (all answers: 0 = incorrect, 1 = correct)</p>
Perceived susceptibility	1	<p>If I do not adequately protect my child from the sun, his or her risk of developing skin cancer in the future is ... very low (1) to very high (5)</p>
Perceived severity	1	<p>If my child would develop skin cancer in the future, I would find this ... not serious (1) to very serious (5)</p>
Attitude	5 ( $\alpha = 0.75$ )	<p>Using sunscreen SPF 20+ is a pleasant way to protect my child from the sun. (1 = not pleasant to 4 = very pleasant)</p> <p>Using sunscreen SPF 20+ is important for my child's health. (1 = not important to 4 = very important)</p> <p>Using sunscreen SPF 20+ is annoying during my child's playing. (1 = very annoying to 4 = not annoying)</p> <p>Using sunscreen SPF 20+ is inconvenient, because I tend to forget it. (1 = very inconvenient to 5 = not inconvenient)</p> <p>Using sunscreen SPF 20+ is unnecessary. (1 = very unnecessary to 4 = not unnecessary)</p>
Social influence	3 ( $\alpha = 0.73$ )	<p><i>Social modeling:</i> How often do important people in your environment use sunscreen SPF 20+ to protect their children from the sun? (1 = hardly ever to 4 = always)</p> <p><i>Social norms:</i> How important do important people in your environment find it to use sunscreen SPF 20+ on their children to protect them from the sun? (1 = definitely not important to 4 = definitely important)</p> <p><i>Social support:</i> How often do important people in your environment support you to use sunscreen SPF 20+ on your child to protect it from the sun? (1 = hardly ever to 4 = always)</p>
Self-efficacy	1	<p>Do you think you will be able to adequately use sunscreen SPF 20+ on your child to protect it from the sun? (1 = definitely not to 7 = definitely yes)</p>
Intention	1	<p>Do you intend to adequately use sunscreen SPF 20+ on your child to protect it from the sun? (1 = definitely not to 7 = definitely yes)</p>
Action planning	4 ( $\alpha = 0.86$ )	<p>Do you plan to buy sunscreen SPF 20+?</p> <p>Do you plan to bring sunscreen SPF 20+ with you when you and your child are outside on a sunny day?</p> <p>Do you plan to keep track of time in order to apply sunscreen SPF 20+ regularly (every two hours)?</p> <p>Do you plan to ask other people in your environment to help you remember to apply sunscreen SPF 20+? (1 = definitely not to 7 = definitely yes)</p>
Sunscreen use	1	<p>How often did you protect your child from the sun by applying sunscreen SPF 20+ when the child was outside on a sunny day during the past summer? (1 = never to 5 = always)</p>

### Attrition analysis

Logistic regression analyses showed that attrition from T1 to T2 was predicted by parental knowledge (OR = 1.12;  $p < 0.05$ ) and social modeling (OR = 0.82;  $p < 0.05$ ). Respondents with a higher knowledge and respondents who perceived less social modeling of sunscreen use in their environment were less likely to participate in the T2 measurement.

### Correlates of sunscreen use

All cognitions were positively correlated with sunscreen use at T2 (Table 6.2), with the more distal cognitions (knowledge, susceptibility, severity) consistently showing less strong associations with sunscreen use than the more proximal factors (action planning, intention, self-efficacy, social influence, and attitude).

### Measurement model

In order to estimate structural relations it is a prerequisite that the indicators adequately represent the latent variables. Confirmatory factor analysis with three latent variables and 12 indicators was performed to test compliance with this requirement. Results showed satisfactory fit of the measurement model: CFI = 0.98, TLI = 0.97, RMSEA = 0.052. Factor loadings ranged from 0.47 to 0.93, all indicating significant loading.

**Table 6.2** Pearson correlations between parental sunscreen use and study variables.

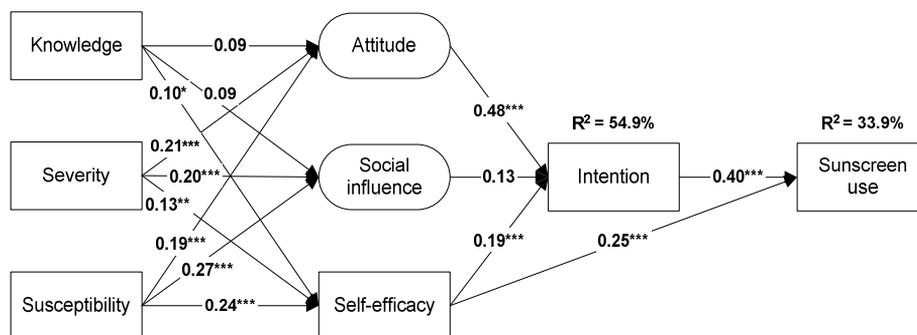
	1	2	3	4	5	6	7	8	9
1. Sunscreen use		.49***	.55***	.49***	.38***	.47***	.12*	.11*	.14**
2. Action planning			.71***	.58***	.54***	.61***	.23***	.30***	.21***
3. Intention				.62***	.51***	.66***	.11*	.25***	.20***
4. Self-efficacy					.52***	.65***	.16**	.29***	.19***
5. Social influence						.56***	.11*	.23***	.17**
6. Attitude							.16*	.35***	.26***
7. Knowledge								.22***	.11*
8. Susceptibility									.21***
9. Severity									

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

### Basic model: Predictors of parental sun protection behavior

The hypothesized basic model (Figure 6.1) fitted the data well: CFI = 0.95, TLI = 0.93, RMSEA = 0.045. Attitude and social influence were predicted by perceived severity and perceived susceptibility, whereas self-efficacy was predicted by perceived severity and susceptibility, as well as knowledge. Attitude and self-efficacy significantly influenced the intention to perform sun protection behavior. The relation between social

influence and intention was not significant. Intention was the strongest predictor of sun protection behavior at T2. The direct path from self-efficacy to behavior was also significant. The basic model explained 54.9% of the variance in intention, and 33.9% of the variance in parental sunscreen use.



**Figure 6.1** Basic structural equation model with standardized regression coefficients representing associations between premotivational and motivational variables and parental sunscreen use. Rectangles represent observed variables; circles represent latent variables.

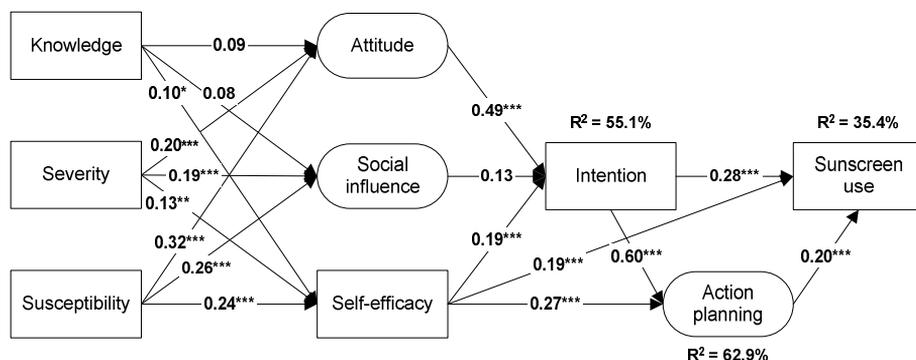
\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

### Mediation analyses

In order to examine the influence of action planning on sun protection behavior, the basic model was extended with the latent planning variable. Mediation was tested by adding direct paths from intention to planning and from planning to behavior (see Figure 6.2). The fit of the mediation model (MED model) was satisfactory: CFI = 0.94, TLI = 0.92, RMSEA = 0.050. Generated modification indices, however, indicated that the inclusion of a direct path from self-efficacy to action planning could improve model fit. Log-likelihood difference chi-square tests demonstrated that incorporating this pathway (MEDa model) yielded a significant improvement over the previous model ( $\Delta - 2 LL_{(MED - MEDa)} = 37.44$ ;  $df = 1$ ;  $p < 0.001$ ). The resulting model fitted the data well: CFI = 0.95, TLI = 0.94, RMSEA = 0.046. As can be seen in Figure 6.2, intention had the strongest impact on action planning. Self-efficacy also affected action planning, and together, intention and self-efficacy explained 62.9% of the variance in planning. Action planning significantly predicted sun protection behavior, indicating that parental sunscreen use was better predicted due to the inclusion of planning in the model. Although the strength of the pathways from self-efficacy to behavior and from intention to behavior declined as a result of the inclusion of action planning, these paths remained significant. Associations between premotivational and motivational factors did not change as a result of the incorporation of planning into the model. The model

accounted for 55.1% of the variance in intention, 62.9% of variance in planning, and 35.4% of the variance in parental sunscreen use.

Baron and Kenny's adaptation of the Sobel test (Baron & Kenny, 1986; Sobel, 1982) was used to test significance of mediation of action planning in the intention – behavior relationship and in the self-efficacy – behavior relationship. Application of this test for the intention – behavior pathway resulted in a z-value of 2.61 ( $p < 0.01$ ), which indicates significance of mediation in the intention – behavior relationship by planning. For the self-efficacy – behavior pathway, this resulted in a z-value of 2.38, also indicative of significant mediation ( $p < 0.05$ ). These results indicate that action planning partially mediated the intention – behavior and self-efficacy – behavior relationships.



**Figure 6.2** Structural equation model with standardized regression coefficients representing mediating influences of action planning (MEDa model). Dashed lines represent mediation. Rectangles represent observed variables; circles represent latent variables.

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

### Moderation analysis

As planning can both be a mediating and moderating variable, the mediation model was extended by adding an *action planning*  $\times$  *intention* interaction effect. All other pathways were left unchanged. We tested whether the inclusion of this interaction effect would result in a better model for explaining the role of action planning in the volitional phase.

The interaction effect between planning and intention was found to be significant ( $p < 0.01$ ). The Satorra-Bentler scaled chi-square difference test (Satorra & Bentler, 2001) was used to compare the mediation model (MEDa) to the mediation model with added interaction effect (MEDa+INT). In this test, the usual normal-theory chi-square statistic is divided by a scaling correction to better approximate chi-square under non-normality, as is the case when estimating an interaction effect. Calculation

of the corrected difference in -2 log likelihood ( $\Delta -2 LL_{(MEDa - MEDa+INT)} = 8.36$ ;  $df = 1$ ;  $p < 0.01$ ) indicated that extending the mediation model with the action planning x intention interaction effect significantly improved model fit. Inclusion of the interaction effect increased the explained variance of parental sunscreen use from 35.4% to 37.2%.

### **Multigroup analyses**

Multigroup analyses were performed to examine the action planning x intention interaction effect. Moderation of the intention – behavior relationship by action planning was assessed by estimating this relationship separately for respondents with high and low planning. All significant pathways, representing direct influences on behavior were included in the analysis. A mean-split classification (Mean = 5.22; SD = 1.32) was done to assign respondents to either the high (N = 173) or low (N = 263) planning group. In the low planning group the regression parameter of intention on sun protection behavior was 0.23 (SE = 0.06;  $p < 0.001$ ), whereas in the high planning group this parameter was higher and equaled 0.36 (SE = 0.08;  $p < 0.001$ ). This indicates that respondents who reported high action planning were more likely to translate their intentions into actual behavior than respondents who reported low action planning.

Vice versa, moderation of the planning – behavior relationship by intention was investigated. Again, all significant direct pathways to behavior were included in the analysis and a mean-split classification (Mean = 5.12; SD = 1.40) was performed to assign respondents to either the high (N = 183) or low (N = 253) intention group. In the low intention group the regression parameter of action planning on sun protection behavior was 0.24 (SE = 0.05;  $p < 0.001$ ), whereas in the high intention group this parameter was higher: 0.45 (SE = 0.14;  $p < 0.01$ ). Respondents who strongly intended to perform sun protection behavior were more likely to translate their action plans into actual behavior.

Additional Sobel tests were performed to examine whether planning retained its mediating influence on the intention – behavior and the self-efficacy – behavior relationships in both the high and low intention groups. The resulting z-values for the intention – behavior relationship (low intention:  $z = 2.85$ ,  $p < 0.01$ ; high intention:  $z = 3.04$ ,  $p < 0.01$ ) as well as the self-efficacy – behavior relationship (low intention:  $z = 2.57$ ,  $p = 0.01$ ; high intention:  $z = 2.71$ ,  $p < 0.01$ ) indicated that this was the case: action planning partially mediated both relationships in the high and low intention groups.

## **DISCUSSION**

The results obtained in this study lend support for most of the hypothesized associations between premotivational and motivational determinants and parental sunscreen use. Premotivational awareness factors, such as knowledge and perceived risk, are generally regarded as a prerequisite for deliberation of health behavior (Weinstein & Sandman, 2002). Findings from the present study largely concur with this notion as

perceived risk was significantly associated with attitude, social influence, and self-efficacy. People with higher skin cancer risk perceptions tended to have a more positive attitude towards sunscreen use (see also Jackson & Aiken, 2000; Jones et al., 2001; Schwarzer, 1992), perceived more positive social influence in their environment (Jackson & Aiken, 2000; Scherer & Cho, 2003), and were more confident that they would be able to use sunscreen (Jackson & Aiken, 2000; Turner & Mermelstein, 2005). Furthermore, knowledge was positively related to self-efficacy expectations, indicating that acquaintance with the detrimental effects of the sun and potential methods of protection may positively influence people's self-efficacy expectations, a finding that is also in line with theoretical reflections (Bandura, 1986; De Vries et al., 2005b). These findings subscribe to the conception that knowledge and risk perceptions are unlikely to have a strong, proximal or direct impact on behavior, and suggest that their influence is most apparent in earlier stages of behavior change. However, it should be stated that, as premotivational and motivational factors were measured cross-sectionally, no inferences can be made with regard to causality. The nature of these associations should therefore be further explored in future research.

The intention to use sunscreen was highly related to attitudes and self-efficacy, but not to social influence. This indicates that parents, in their decision to use sunscreen on their children, were mainly guided by perceived advantages and disadvantages of the behavior and their perceived capability to carry out the behavior, a finding that is in line with previous results (Turner & Mermelstein, 2005).

Both intention and self-efficacy directly influenced parental sunscreen use, thereby underlining the prominent role in the prediction of health behavior that they have been attributed throughout literature (Ajzen, 1991; Bandura, 1986; De Vries et al., 1988). Intention was the most powerful predictor of behavior and retained this status when action planning was introduced into the model.

Action planning was reliably associated with parents' intentions and self-efficacy expectations. The finding that people with strong intentions towards a certain behavior report more planning is in line with most previous research (Jones et al., 2001; Sniehotta et al., 2005a) and common sense: those who do not or only faintly intend to perform a target behavior are not likely to make specific plans to reach that behavior. The positive relationship between self-efficacy and planning has also been documented in several earlier studies (Jones et al., 2001; Luszczynska & Schwarzer, 2003; Sniehotta et al., 2005a) and is consistent with the well-established status of self-efficacy as a positive predictor of intentions and behavior.

With regard to the role of action planning in the transition from intention to behavior, we found support for both formulated scenarios. First, action planning partially mediated the relationship between intention and parental sunscreen use. This mediating influence was found in both high and low intention groups. These findings strengthen results from earlier studies (Brickell et al., 2006; Jones et al., 2001; Norman & Conner, 2005b; Rise et al., 2003; Van Hoof et al., 2005), and indicate that, although the formation of plans may promote behavior and to a certain extent reduce the influence of motivation, intention remains an important, if not the most important,

predictor of behavior (Norman & Conner, 2005b; Rise et al., 2003). These results do not correspond with findings suggesting full mediation of the intention – behavior relationship by planning (Luszczynska & Schwarzer, 2003; Sheeran & Orbell, 2000; Sniehotta et al., 2005a). Lack of uniformity in the operationalization of planning and methodological issues may, however, hinder the comparability of relevant study results. More research is therefore warranted to clarify potential mechanisms or methodologies that could have given rise to the mixed results regarding the mediation hypothesis.

It is noteworthy that action planning was also found to partially mediate the relationship between self-efficacy and behavior, an influence that was retained in low as well as high intention groups. This finding emphasizes the significance of both motivational and volitional processes in health behavior change. It can be argued that the remaining pathway from self-efficacy to sunscreen use indicates that action planning in itself may not always be sufficient to invigorate behavior. The importance of self-efficacy expectations in this process should therefore not be overlooked.

Second, the significant interaction between action planning and intention indicated that planning moderated the intention – behavior relationship in such a way that this relationship was stronger in people reporting high levels of action planning. This finding confirms earlier reports on moderating influences of planning (Jones et al., 2001; Norman & Conner, 2005b) and is in line with results from experimental studies, demonstrating strong behavioral effects of the formation of specific plans, such as implementation intentions and coping plans (Armitage, 2004; Milne et al., 2002; Sheeran & Orbell, 2000; Sniehotta et al., 2006b; Ziegelmann et al., 2006).

Furthermore, the action planning x intention interaction effect also implied that intention moderated the action planning – behavior relationship. Planning predicted parental sunscreen use better in people who expressed a strong intention towards this behavior than in people with low or moderate intentions. This finding substantiates theoretical reflections by Gollwitzer and colleagues (Gollwitzer, 1999; Gollwitzer & Brandstätter, 1997) and confirms results from earlier studies (Orbell et al., 1997; Sheeran et al., 2005b), indicating that planning is more effective when plans originate from a strong motivation than when they lack such motivational support.

A last interesting finding of the present study was that combining the mediation and moderation scenarios by adding the action planning x intention interaction effect to the mediation model resulted in optimal model fit. These findings support arguments to complement current social cognition models, such as the I-Change Model and the Theory of Planned Behavior, with planning as both a mediating and moderating volitional predictor of health behavior. It is, however, noteworthy, that the inclusion of action planning added only a relatively small proportion of explained variance to the model, which indicates that volitional factors other than action planning are likely to be of significance in the translation of intentions into behavior. Research into personality traits, such as features of action control (Kuhl, 1985), self-monitoring (Snyder, 1974), and conscientiousness or self-discipline (McCrae & Costa, 1996; Paunonen, 2003), and potential moderating influences of for instance goal commit-

ment (Hollenbeck & Klein, 1987; Locke, 1968) may help to establish an integral representation of effective factors in the volitional phase.

Some limitations to the present study should be addressed. First, although a longitudinal approach was used to predict parental sun protection behavior, all distal and proximal behavioral determinants were measured at the same point in time, as a result of which the associations between these variables cannot be interpreted as causal relationships. In order to study mediating mechanisms it is recommended to temporally locate all potential mediating variables between predictors and outcome measures. It would therefore be desirable to replicate the present study using a design involving three or more measurement occasions. Second, some of the cognitive determinants investigated in the present study were single-item measures, in particular self-efficacy and intention. Although single-item assessment of intention is relatively common in health behavior research (Ajzen, 1991), it may not do justice to the complex nature of psychosocial constructs and may restrict their reliability and content validity. Third, attrition analyses showed that non-response at T2 was not entirely random: parents with higher knowledge and parents who perceived less social modeling were less likely to participate in the follow-up measurement. This selective attrition may have biased our results and may therefore limit their generalization. However, as neither knowledge nor social influences significantly impacted intention or behavior in the current study, we expect this bias to be minimal.

Notwithstanding these limitations, the present study provides valuable implications for theory and practice. Whereas the demonstrated mediating and moderating influences of planning confirm the significance of volitional factors in the prediction of health behavior, the moderating effect of intention on the planning – behavior relationship emphasizes the essentiality of the prior process of intention formation. Premotivational and motivational factors, such as knowledge, risk perception, attitude, and, in particular, self-efficacy, were shown to be of great value in this process and should therefore not be overlooked when developing educational interventions to promote parental sun protection behavior. The present study advocates the inclusion of action planning in interventions as well as in existing health behavior theories, yet goes to prove that it is not the sole resolution for closure of the intention – behavior gap.



# CHAPTER 7

The formation of specific action plans can enhance sun protection behavior in motivated parents

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## ABSTRACT

**Objectives:** To determine whether formulating specific plans of sunscreen use can influence parental sun protection behavior (i.e., applying sunscreen to their child).

**Methods:** In the spring of 2005, an electronic survey on sun protection behavior was performed among 436 parents in the Netherlands. Participants were randomly allocated to a 'questionnaire-only' control group or an experimental group, in which they were asked to formulate *implementation intentions*, i.e., specific action plans detailing when, where and how they would use sunscreen to protect their child from the sun in the upcoming summer. Parental sunscreen use was assessed at a five-month follow-up.

**Results:** Although the intervention had no overall effect, a significant *group x intention* interaction effect existed ( $p = 0.02$ ). Implementation intentions were effective in the subgroup of highly motivated participants, increasing adequate parental sunscreen use by 13.5%. Implementation intentions did not increase parents' intentions towards sunscreen use, indicating that their behavioral effect was not due to heightened motivation.

**Conclusions:** This is the first study to report on the efficacy of implementation intentions in the area of sun protection behavior and skin cancer prevention. The results add further support to the growing body of evidence that implementation intention formation can be an important strategy to facilitate behavioral enactment, particularly in motivated respondents.

## INTRODUCTION

Continuous increases in the incidence of skin cancer worldwide call for immediate actions to reduce risk behaviors in this area (Diepgen & Mahler, 2002). In the Netherlands, skin cancer prevalence is expected to increase by a dramatic 80% in the next decade (De Vries, Van de Poll-Franse et al., 2005).

Besides biological risk factors, such as skin type and number of (atypical) nevi, childhood exposure to ultraviolet (UV) radiation and the number of times a child is sun burnt are important risk factors for the development of skin cancer later in life (Oliveria et al., 2006; Whiteman et al., 2001). Children, and as a consequence of their behavioral dependency, parents and caregivers of young children therefore form an important target group for interventions focusing on the primary prevention of skin cancer. Parents need to be aware of the risks that are associated with unprotected exposure to UV radiation and the measures that they can undertake to protect their children from the sun. These measures include the regular application of sunscreen with an SPF of 20 or higher, seeking shade in the middle of the day when the UV radiation is strongest, and covering up the skin with protective clothing and a hat or cap.

Earlier studies have shown that parental sun protection practices are often inadequate (Bourke & Graham-Brown, 1995; Johnson et al., 2001; Severi et al., 2002), and although some interventions have demonstrated efficacy in increasing these practices (e.g., Bolognia et al., 1991; Buller et al., 2000; Glanz et al., 1998), a recent review concludes that the overall evidence for the effectiveness of parent-based interventions is insufficient (Saraiya et al., 2004). Furthermore, as many of the implemented interventions have been relatively time- and effort-consuming (e.g., home-based educational programs) or expensive (e.g., the provision of sunscreen), there is a need for innovative, easy to implement approaches in the area of parental sun protection behavior.

Most of previously implemented interventions are based on the assumption that health behavior change can be achieved by targeting and changing motivational determinants, such as attitudes and self-efficacy expectations. Theoretical underpinnings of these interventions are mostly found in social-cognitive models, such as the Social Learning Theory (Bandura, 1986) and the Theory of Planned Behavior (Ajzen, 1991), which propose that changing these motivational determinants will result in an increased intention to perform health behavior. Subsequently, intentions are considered the most proximal and single most powerful predictor of behavior.

However, it has become very clear that behavior change cannot be guaranteed by changing one's intentions. At best, goal intentions account for 20% to 40% of variance in behavior and behavior change (Conner & Armitage, 1998; Godin & Kok, 1996; Sutton, 1998; Sutton & Sheeran, 2003), indicating that other, volitional processes may be vital in the translation of intentions into behavior. Research efforts to narrow this intention – behavior gap have centered on aspects of self-regulation and

have resulted in the advancement of planning cognitions as an important volitional factor affecting behavior change. Research by Gollwitzer and Brandstätter (Brandstätter et al., 2001; Gollwitzer & Brandstätter, 1997) has demonstrated that predefining how to implement goal-directed actions in a given situation promotes the actual initiation of these actions. His concept of *implementation intentions* is built upon the mental act of linking goal-directed responses to anticipated situations. By forming specific if – then plans detailing when, where and how to perform a certain behavior, the accessibility of the situation and the strength of the association between the situation and the goal-directed response are reinforced, thereby delegating the control of behavior to situational cues (Webb & Sheeran, 2007). The goal-directed action is consequently enacted relatively effortlessly and automatically once the critical situation is encountered (Gollwitzer, 1993, 1996, 1999).

Implementation intentions have been widely used and found very effective in the promotion of a broad range of health behaviors, such as physical activity (Milne et al., 2002; Prestwich et al., 2003a), healthy dietary intake (Armitage, 2004; Verplanken & Faes, 1999), cancer screening attendance (Sheeran & Orbell, 2000), and medical self-examinations (Orbell et al., 1997; Steadman & Quine, 2004) (for review and meta-analysis see (Gollwitzer & Sheeran, 2006; Sheeran et al., 2005a). However, although results from earlier observational studies indicate that self-regulatory planning positively impacts sun protection behavior (De Vries et al., 2006b; Jones et al., 2001; Van Osch et al., 2008c), the efficacy of implementation intentions in promoting sun protection behavior has not yet been experimentally tested.

With the aim of improving and complementing existing interventions in the area of skin cancer prevention, the current study presents the first empirical test of the efficacy of implementation intentions with regard to sun protection behavior. The impact of implementation intentions on parental sunscreen use was investigated in a randomized controlled trial with a medium-to-long term follow-up period of five months. We hypothesized that formation of implementation intentions would result in higher performance of adequate sunscreen use. However, as implementation intention effects may be sensitive to the strength of the respective goal intention (Sheeran et al., 2005b), we expected the effect of implementation intentions to occur only in parents with a high motivation towards the target behavior (Hypothesis 1). Furthermore, following the proposition by Gollwitzer that the efficacy of implementation intentions relies on the automatic elicitation of behavior by specified situational cues (Gollwitzer, 1993, 1996, 1999), we hypothesized that the behavioral effects of implementation intentions are purely volitional, indicating that they are not preceded by motivational change (Hypothesis 2).

## METHODS

### Procedure

The study sample consisted of parents of children aged six to nine years, residing in all parts of the Netherlands. The parents were all registered members of an internet panel of a private research company. In the spring (April) of 2005, a total of 1327 parents and children responded to an e-mail request to participate in an electronic survey about skin cancer prevention. Participants were explained that the study would comprise two measurements and that they would receive a small incentive (approximately € 2) after completing both questionnaires. Of those who responded, 291 failed to meet the inclusion criterion (child between six and nine years old), leaving 1036 parent-child dyads available for the baseline measurement (T1).

The parents were then randomly allocated to either the control group (questionnaire without implementation intention manipulation) or the experimental group (questionnaire with implementation intention manipulation) by means of computerized randomization executed at the private research company. Follow-up (T2) took place at the end of the summer, approximately five months after the baseline measurement. A total of 495 parents (48%) filled out the follow-up questionnaire. It was emphasized that the parent and child that filled out the baseline questionnaire also needed to fill out the follow-up questionnaire. However, in 59 cases, demographic data of either the child or parent at baseline did not fully correspond to data at the follow-up measurement, indicating that both questionnaires were filled out by a different child or parent. These respondents were excluded from the study, leaving 436 parent-child dyads (42%) available for analysis.

### Questionnaires

In the baseline questionnaire of both study groups (T1) *demographic variables* such as age, sex, educational level (low, medium, or high) and marital status (living with or without partner) of the parents were inquired after. Furthermore, *skin type* of the child was assessed by the use of Fitzpatrick's distinction of skin types (Fitzpatrick, 1988), ranging from 'skin burns very rapidly, does not (or barely) tan' (type 1) to 'skin never burns, tans very well' (type 6).

The *intention* towards sunscreen use was measured at both baseline and follow-up. Intention was measured by two items on a seven-point scale, assessing the extent to which the parents intended to always apply sunscreen with SPF 20+ every two hours when their child would be outside in the sun, and when the child would be at a swimming pool or beach (1 = definitely not to 7 = definitely yes;  $\alpha = 0.82$ ).

*Parental sunscreen use with regard to their child* was measured in the follow-up questionnaire asking the parents how often they had protected their child by using sunscreen with SPF 20+ every two hours when the child was at a swimming pool or beach during the past summer. Sunscreen use was measured on a five-point scale, ranging from 'never' (1) to 'always' (5), with the latter as the target outcome behavior.

## Planning intervention

At the end of the baseline questionnaire, parents in the experimental group were presented with the following explanation of the planning intervention.

Many people find it hard to carry out specific intentions. You are more likely to protect your child from the sun if you make a specific plan on when, where and how you will do this. We would like you to formulate such a specific plan on when, where and how you will protect your child from the sun in the upcoming summer. The behavior (sunscreen use) is already preprinted. We would like you to describe a situation in which you will perform that behavior.

The respondents were consecutively presented with a partly preprinted plan with regard to sunscreen use. The goal action (the 'then'-part of the implementation intention) was preprinted, and participants were asked to describe the critical situation (the 'if'-part) in which they would perform that action. The following text was presented on-screen: *'If ....., then I will apply sunscreen SPF 20+ on my child every two hours.'* After respondents formulated their plan, the plan was repeated on the screen to facilitate memorizing.

## Statistical analyses

Descriptive statistics were used to describe demographic distributions within the study sample. Independent-samples *t*-tests and  $X^2$  tests were used for attrition analysis and to investigate potential differences between both study groups at baseline. The efficacy of the implementation intention intervention, corrected for baseline intentions, was tested by means of univariate analysis of covariance (ANCOVA). Analysis of variance (ANOVA) with Tukey HSD contrasts were used to investigate differences between participants with high and low intention groups within both study groups.

## RESULTS

### Randomization check

Due to a faulty electronic setting of response intervals, recruitment in the experimental group was discontinued prematurely, resulting in somewhat dissimilar group sizes (control group:  $N = 251$ ; experimental group:  $N = 185$ ). Independent-samples *t*-tests, however, did not reveal any significant differences between the control group and the experimental group on age of the parents, child's skin type, or intention towards sunscreen use. Likewise,  $X^2$  tests did not detect any differences in sex, level of education or marital status, indicating that the randomization procedure was successful.

### Attrition analysis

Attrition analyses did not indicate significant differences in demographic factors or intention between the dropouts (total  $N = 541$ ; control group: 57.5%; experimental

group: 50.7%) and respondents who completed both measurements ( $N = 436$ ). Participants in the implementation intention group were, however, less likely to drop out than respondents in the control group ( $X^2 = 4.37$ ;  $p = 0.04$ ).

### Sample description

The majority of participating parents were female (77%) and most parents were living together with a partner or spouse (84%). The mean age of parents was 36.4 years ( $SD = 5.17$ ). Thirty-five percent of the parents had a low level of education (primary or basic vocational school), 47% had medium-level education (secondary vocational school or high school) and 18% had a high level of education (higher vocational school or university). All children were between 6 and 9 years of age, with a mean age of 7.3 years ( $SD = 1.08$ ). Seven percent of the children had skin type 1, 21% had skin type 2, 56% skin type 3, 13% skin type 4, 3% skin type 5, and 1% had skin type 6. With a mean score of 5.43 ( $SD = 1.27$ ), parents' intention to protect their child from the sun by using sunscreen was fairly high.

### Efficacy of the implementation intention manipulation (Hypothesis 1)

Univariate analysis of covariance (ANCOVA) indicated that there was no overall effect of the implementation intention intervention ( $F_{1,433} = 0.03$ ;  $p = 0.87$ ;  $\omega^2 = 0.01$ ) on sunscreen use when controlling for intention at baseline. Intentions towards sunscreen use were, however, a strong predictor of behavior at follow-up ( $F_{1,433} = 145.08$ ;  $p < 0.001$ ;  $\omega^2 = 0.50$ ). Subsequently, following recommendations by Sheeran and colleagues (Sheeran et al., 2005b), the interaction between intentions and implementation intentions was tested for significance. This *group x intention* interaction significantly affected behavior in a positive manner ( $F_{1,432} = 5.50$ ;  $p = 0.02$ ;  $\omega^2 = 0.11$ ).

When subdividing participants in high and low intention groups, based on median scores (median = 5.50), analysis of variance indicated that the implementation intention manipulation was effective in highly motivated participants (Table 7.1); motivated parents in the experimental group were more likely to always use sunscreen than those in the control group ( $F_{1,258} = 3.77$ ;  $p = 0.05$ ). Whereas 37.8% of motivated parents in the control group always used sunscreen, this percentage was 13.5% higher (51.3%) in the experimental group. In participants with sub-median intentions, implementation intentions did not have an effect on subsequent behavior ( $F_{1,174} = 2.17$ ;  $p = 0.14$ ), thereby confirming the hypothesis that implementation intentions are only effective if they are underpinned by strong intentions.

### Motivational effect of implementation intentions (Hypothesis 2)

Univariate covariance analysis was performed to estimate the effect of the implementation intention manipulation on intention at follow-up, corrected for intention scores at baseline. Intention scores at baseline were the only significant predictor of intention at follow-up ( $F_{1,433} = 362.11$ ;  $p < 0.001$ ). Neither the main effect of implementation intentions ( $F_{1,433} = 0.02$ ;  $p = 0.88$ ), nor the *group x intention* interaction effect was

significant ( $F_{1,432} = 1.51$ ;  $p = 0.22$ ), indicating that the behavioral effect of implementation intentions was not established as a result of a heightened intention towards sunscreen use.

**Table 7.1** Differences in mean scores for sunscreen use at follow-up, subdividing the control and implementation intention (II) groups in parents with high and low intentions.

	Never (%)	Sometimes (%)	Often (%)	Mostly (%)	Always (%)	Sunscreen use (SD)	Sign. <sup>1,2</sup>
Control, low intention (CL; N=108)	23.1	25.9	15.7	17.6	17.6	2.81 (1.43)	
Control, high intention (CH; N=143)	7.7	10.5	18.9	25.2	37.8	3.75 (1.28)	IH>CH>IL,CL
II, low intention (IL; N=68)	22.1	32.4	26.5	11.8	7.4	2.50 (1.18)	
II, high intention (IH; N=117)	5.1	10.3	10.3	23.1	51.3	4.05 (1.22)	

<sup>1</sup> Mean group differences were tested by Analysis of Variance with Tukey HSD contrasts.

<sup>2</sup>  $p < 0.05$

## DISCUSSION

This is the first study to report on the efficacy of implementation intentions in the area of sun protection behavior. Our results show that implementation intentions facilitate sunscreen use in motivated parents and thereby add further support to the growing body of evidence that the formation of implementation intentions can be effective in facilitating behavioral enactment (Brandstätter et al., 2001; Gollwitzer & Brandstätter, 1997; Gollwitzer & Sheeran, 2006; Oettingen et al., 2000). The finding that implementation intentions were only effective in motivated respondents is consistent with earlier studies (Orbell et al., 1997; Koestner et al., 2002; Sheeran et al., 2005b) and confirms our first hypothesis. It reflects the notion that the efficacy of implementation intentions is sensitive to the strength of the underlying intention; formulating specific plans towards reaching a goal behavior only works for those respondents who actually intend to reach the goal behavior.

Despite its effect on sun protection behavior, implementation intentions did not affect intentions towards this behavior, thereby confirming our second hypothesis. This finding replicates results of previous studies (Kellar & Abraham, 2005; Milne et al., 2002; Sheeran et al., 2005b) and suggests that motivational factors are not responsible for the behavioral effects of implementation intentions. With reference to multiphase models, such as the Model of Action Phases (Heckhausen & Gollwitzer,

1987), this outcome supports the assertion that the effects of implementation intention formation are purely established in the volitional phase and derive from triggering of goal-directed responses by specific environmental stimuli instead of conscious deliberation (Gollwitzer, 1993, 1996, 1999). Webb and Sheeran nicely demonstrated this by establishing that implementation intention efficacy is mediated by cue accessibility (accessibility of a specified situation) and cue-response linkage (the association between the specified situation and the goal-directed response) (Webb & Sheeran, 2007).

The present study is subject to some limitations that are worth noting. First, previous behavior was not taken into account, making it impossible to investigate behavior change. However, as the measure of previous behavior reflects the use of sunscreen in the past summer, approximately 10 months prior to our baseline measurement, it would have been less accurate and less reliable than other, more continuous assessments of previous behavior. Furthermore, as no baseline differences were found between groups, it may tentatively be presumed that both study groups were comparable in their previous sunscreen use.

Second, assessment of parental sunscreen use was based on a single-item measurement. Although the current measure of sunscreen use is frequently used in similar studies (Cardinez et al., 2005; Hall et al., 2001), single-item measurement may not do justice to the rather complex nature of sunscreen use and may therefore restrict its reliability and content validity.

Third, the current study relied on self-report data, which may be influenced by social desirability and recall bias, thereby potentially restricting the interpretation of findings. We, however, attempted to minimize bias by emphasizing the confidential nature of the study, by concealing the main purpose of our investigation to the participants, and by maintaining contact with participating parents exclusively by e-mail rather than in-person or by telephone. Furthermore, previous studies have found that self-reports of behavior are equally trustworthy for participants who have formed implementation intentions and those who have not (Sheeran & Orbell, 1999), and the effects of implementation intentions remain when participants engaging in potentially unreliable or biased reporting were excluded from analysis (Murgraff et al., 1996; Verplanken & Faes, 1999). These findings indicate that the effects of implementation intentions cannot be explained by recall bias or tendencies to engage in socially desirable reporting.

Lastly, two issues need further mentioning. Although at first they may seem shortcomings of the present study, further deliberation may provide fruitful directions for future research. First, as mentioned previously, participants in the experimental condition were asked to complete a partly preprinted plan. Although studies in which complete strategies were formulated show similar results, it may be that the working mechanisms in our intervention may be dissimilar to those in implementation intention manipulations in which both the *if* and *then* part are specified by the respondent. However, when considering that by forming merely one section of the plan the re-

ported effects can be reached, the current application of planning may be interesting for use in future interventions. Pre-specification of the goal-directed action, or possibly the critical situation (Van Osch et al., 2008a) in the if – then plan may yield the potential of rendering implementation intention interventions even more time-efficient and diminishing the risk of incomprehension and incorrect formation of plans. Future studies should investigate if and to what extent implementation intentions lose strength when they are partly pre-specified.

Furthermore, dropout analyses indicated that selective attrition took place. Respondents in the implementation intention condition were more likely to complete the follow-up measurement than respondents in the control group. Bearing in mind the potential of threatened validity of the study as a result of selective attrition, one may wonder whether the heightened willingness to participate is a positive side-effect of the implementation intention intervention. Replication of this finding would be an interesting alley for further research.

## **CONCLUSIONS**

In view of the finding that a substantial number of parents inadequately protect their child from UV-exposure, more health education efforts are needed in order to bring about a positive change in parental sun protection practices. The results of the present intervention are encouraging, notably because the planning intervention was minimal and its effects were still demonstrable five months after its application. The brief protocol tested in this study resulted in 13.5% more parents always using sunscreen, as compared to the control group. This effect was, however, only demonstrated in motivated parents. As implementation intentions were not effective in unmotivated participants and did not result in heightened intentions towards sun protection behavior, motivational interventions remain necessary for those low in motivation. Ideally, interventions in the area of sun protection behavior should consist of a traditional motivational component, aimed at increasing intentions, and a volitional component, in which motivated participants engage in specific planning in order to translate their intentions into actual behavior. Its time-efficient, inexpensive, and easy-to-implement qualities make implementation intention formation an interesting tool for application in volitional components of future interventions.

# CHAPTER 8

The influence of action planning in health protective and health risk behavior: an investigation of fruit and snack consumption

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## ABSTRACT

**Objectives:** Large discrepancies between people's intention to eat a healthy diet and actual dietary behavior indicate that motivation is not a sufficient instigator for healthy behavior. Research efforts to decrease this 'intention – behavior gap' have centered on aspects of self-regulation, most importantly self-regulatory planning. Most studies on the impact of self-regulatory planning in health and dietary behavior focus on the promotion of health protective behaviors. This study investigates and compares the predictive value of action planning in health protective behavior and the restriction of health risk behavior.

**Methods:** Two longitudinal observational studies were performed simultaneously, one focusing on fruit consumption (N = 572) and one on high-caloric snack consumption (N = 585) in Dutch adults. Structural equation modeling was used to investigate and compare the influence of action planning in both behaviors, correcting for demographics and the impact of motivational factors and past behavior. The nature of the influence of action planning was investigated by testing mediating and moderating effects.

**Results:** Action planning was a significant predictor of fruit consumption and restricted snack consumption beyond the influence of motivational factors and past behavior. The strength of influence of action planning did not differ between the two behaviors. Evidence for mediation of the intention – behavior relationship was found for both behaviors. Positive moderating effects of action planning were demonstrated for fruit consumption, indicating that individuals who report high levels of action planning are significantly more likely to translate their intentions into actual behavior.

**Conclusions:** The results indicate that the planning of specific preparatory actions predicts the performance of healthy dietary behavior and support the application of self-regulatory planning in both health protective and health risk behaviors. Future interventions in dietary modification may turn these findings to advantage by incorporating one common planning protocol to increase the likelihood that good intentions are translated into healthy dietary behavior.

## INTRODUCTION

Achieving and maintaining a healthy diet is all about consuming adequate amounts of wholesome nutrition and restricting the consumption of unhealthy, high-caloric foods. If only motivation would be enough for people to eat healthily, we would most likely not be faced with the alarming figures on overweight and obesity. Although approximately 60 to 80% of the Dutch adult population indicate that they intend to eat more fruit and less fat (Lechner et al., 1998; Van Assema et al., 2006; Verheijden et al., 2003), only 30% of Dutch adults consume sufficient amounts of fruit and approximately one in ten individuals comply with recommendations on saturated fat intake (Voedingscentrum, 1998).

This discrepancy between motivation and actual health behavior has been subject to profound scrutiny in the past decade. In a review of health behaviors (Sheeran, 2002), it was demonstrated that only 53% of individuals with positive intentions to engage in a health behavior translate their intentions into actual behavior. Furthermore, intentions have generally been found to account for only 20% to 40% of variance in behavior and behavior change (Conner & Armitage, 1998; Godin & Kok, 1996; Sutton, 1998). These findings conflict with most traditional social cognition theories, such as the Theory of Planned Behavior (Ajzen, 1991), Social Cognitive Theory (Bandura, 1986), and Protection Motivation Theory (Rogers, 1983), that consider intention as the most proximal and powerful predictor of health behavior (e.g., Ajzen, 1991; Bandura, 1986) and indicate that other, postmotivational processes are essential in the translation of intentions into behavior. Research efforts to narrow the intention – behavior gap have centered on aspects of self-regulation and have resulted in the proposition of planning cognitions as an important volitional factor affecting behavior and behavior change. Notions of these efforts are reflected in recent social cognition models such as the Health Action Process Approach (Schwarzer, 1992) and the I-Change Model (De Vries et al., 2005b, 2006b), that acknowledge and demonstrate the importance of self-regulatory planning as an important factor in the translation of intentions into behavior.

*Action planning* encompasses setting goals and planning specific actions in the striving for these goals. A substantial amount of studies that have recently been performed with regard to the impact of action planning have centered on the concept of *implementation intentions* (Gollwitzer, 1993, 1999) and related planning concepts in which plans are formulated that specify when, where, and how one intends to perform a specific behavior (Sniehotta et al., 2006b; Ziegelmann et al., 2006). The majority of published experimental studies have demonstrated efficacy of action planning in the promotion of a variety of health behaviors, such as physical activity (e.g., Milne et al., 2002; Ziegelmann et al., 2006) and healthy dietary intake (Armitage, 2004; Kellar & Abraham, 2005; Verplanken & Faes, 1999; for reviews see Gollwitzer & Sheeran, 2006; Sheeran et al., 2005a). Furthermore, correlational studies reliably point towards action planning as an important cognition in the transition of intentions to health

behaviors (e.g., Jones et al., 2001; Schwarzer et al., 2007; Sniehotta et al., 2005a) and it has consistently been found to mediate as well as moderate the intention – behavior relationship (e.g., Norman & Conner, 2005b; Sniehotta et al., 2005a; Van Osch et al., 2008c).

However, contrary to the almost continuous flux of positive results of action planning with regard to health promoting and health protective behaviors, there is a notable lack of studies investigating its influence on health risk behaviors, i.e., behaviors that should be reduced, ceased or prevented in order to benefit health (Gollwitzer & Sheeran, 2006), such as smoking, (excessive) alcohol consumption, and the consumption of unhealthy foods. In these latter ‘avoidance behaviors’, the goal behavior is to suppress and avoid an unwanted response (e.g., eating an unhealthy snack), whereas so far, most literature with regard to action planning has focused on ‘approach behaviors’ that imply the initiation of a desired response (e.g., eating fruit). With regard to nutrition behavior, there have been only four studies published that report on the effects of planning on the restriction of unhealthy eating (Achtziger et al., 2008; Armitage, 2004; Sullivan & Rothman, 2008; Verplanken & Faes, 1999). Although these studies varied in the applied forms of planning – the content of the formulated plans ranged from distraction-inhibition (Achtziger et al., 2008) to approach goals (Armitage, 2004; Verplanken & Faes, 1999) and avoidance goals (Sullivan & Rothman, 2008) – the overall picture that emerges from these studies tentatively indicates that action planning can effectively be applied to the restriction of health risk behaviors. The study by Verplanken and Faes, however, demonstrated that although the planning manipulation resulted in healthier dietary behavior, it did not break the negative influence of counterintentional, unhealthy habits, such as eating fatty snacks and sweets.

All but one study (Achtziger et al., 2008) used general dietary assessments as their main outcome measure (e.g., mean daily calorie or fat intake), which makes it difficult to unravel the origin of dietary changes and compromises the interpretation of the effects of action planning in restricting unhealthy eating; a reduction in mean caloric intake can be brought about by a decrease in unhealthy, high-caloric food intake, as well as an overall lower food intake of both unhealthy and healthy foods, or even a lower intake of healthy foods. In order to ascertain that a decrease in unhealthy food consumption is the single cause of reductions in general measures of caloric or fat intake, congruence between the content of action plans and the outcome measures is required. Therefore, consumption measures of separate food categories (e.g., healthy snacks versus unhealthy snacks) are necessary.

Taken together, these findings and considerations establish the need for a more thorough investigation and comparison of the influence of action planning in the promotion of health protective behaviors and the restriction of health risk behaviors. Outcomes of this comparison may be particularly relevant in the area of dietary behavior change as achieving and maintaining a healthy diet implies both types of behaviors (i.e., the consumption of healthy foods should be increased, whereas the consumption of unhealthy foods should be decreased). If action planning proves to be important in

bridging the intention – behavior gap of both types of behaviors, future interventions may benefit from the use of a single type of planning and one common planning protocol for dietary behavior change.

In line with this reasoning, the present manuscript describes two separate, yet simultaneously performed, longitudinal studies that investigate and compare the influence of action planning in health protective behavior and health risk behavior with regard to nutrition. The health protective behavior under study is the consumption of fruit; the health risk behavior pertains to the restricted consumption of high-caloric snacks. Where most previous observational studies have failed to incorporate a measure of past behavior, which is generally the most powerful predictor of future behavior, the present study adequately accounted for the influence of past behavior. This enabled the investigation of the value of action planning in the prediction of behavior as well as behavior change.

In addition to the main research questions, we aimed to replicate previous findings with regard to the nature of the influence of action planning (e.g., Achtziger et al., 2008; Jones et al., 2001; Norman & Conner, 2005b; Sniehotta et al., 2005a; Van Osch et al., 2008c) and hypothesized that action planning mediates as well as moderates the intention – behavior relationship.

The action planning concept under investigation involves the planning of specific (preparatory) actions (e.g., Abraham et al., 1998, 1999b; Bagozzi, 1992; Hilberink et al., 2006; Van Osch et al., 2008c) that facilitate the performance of the ultimate goal behavior. This type of action planning ('preparatory planning') is based on goal-setting theory (Locke & Latham, 1990; Locke et al., 1981), assuming that when people are faced with specific goals (e.g., daily consumption of fruit), they tend to formulate plans and task strategies on how the goal can be reached (Bandura & Simon, 1977; Latham & Baldes, 1975; Locke & Latham, 1990). The development of these action plans predetermines a consecutive course of action (e.g., buying fruit, taking fruit along when you go to work, substituting snacks by fruit, etcetera) that is aimed at facilitating goal achievement.

## **METHODS**

### **Procedure**

Two separate studies were performed simultaneously, one focusing on fruit consumption and the other focusing on the consumption of high-caloric snacks. Both study samples consisted of Dutch adults (> 18 years) that were all registered members of an online survey panel of a private research company. A total of 806 participants were invited by e-mail to participate in the online study on fruit consumption and 807 participants were invited to participate in the online study on snack consumption. Invitations were study-specific, i.e., it was not possible for individuals to participate in both studies. Participants were explained that confidentiality would be ensured, that the con-

cerning study would comprise three measurements and that they would receive a small incentive (approximately € 3) after completing all three questionnaires. By activating a link in the e-mail, participants were directed to the web page where they could fill out the questionnaire.

At the baseline measurement (T1), 572 respondents (71.0%) filled out the questionnaire on fruit consumption and 585 respondents (72.5%) filled out the questionnaire on snack consumption. In the first follow-up measurement four weeks later (T2), 498 respondents participated in the fruit study (87.1 % of baseline) and 508 respondents participated in the snack study (86.8% of baseline), whereas a total of 434 respondents in the fruit study (75.9% of baseline) and 442 respondents in the snack study (75.6% of baseline) had completed all three questionnaires at the second follow-up measurement 8 weeks after baseline (T3).

### **Questionnaires**

In the baseline questionnaires of both studies, relevant demographic variables, past behavior (previous fruit or snack consumption) self-efficacy and intention were measured. At T2, action planning was measured, and at T3 the outcome behavior (current fruit or snack consumption) was assessed. The target behaviors that were mentioned in all questions were 'eating a sufficient amount of fruit each day', which was previously explained to participants as 'two pieces of fruit each day', and 'eating as little high-caloric snacks as possible', i.e., restricting the consumption of snacks.

#### *Demographics (T1)*

Gender, age, and highest completed educational level were inquired after. Educational level was categorized into 'low' (elementary education, medium general secondary education, preparatory vocational school, or lower vocational school), 'medium' (higher general secondary education, preparatory academic education, or medium vocational school) and 'high' (higher vocational school or university level).

#### *Self-efficacy (T1)*

Self-efficacy expectations were measured by four items in each study and asked to what extent respondents think they will be able to perform the target behavior in various situations (e.g., Brug et al., 1995b). For fruit consumption, these situations pertained to 'during the week', 'during the weekend', 'when you are very busy', and 'during the winter months' (Cronbach's  $\alpha = 0.91$ ). For snack consumption, these situations pertained to 'during the weekend', 'when you are very busy', 'when you are at a party', and 'when you have a craving for snacks' (Cronbach's  $\alpha = 0.81$ ). Answering options for each item ranged from 'I will certainly not be able to' (1) to 'I will certainly be able to' (7).

*Intention (T1)*

Intention was measured by two items in each study. The first item asked to what extent respondents intended to perform the target behavior (e.g., De Nooijer et al., 2006). In the second item a time-reference was added, asking respondents to what extent they intended to perform the target behavior in the next month (e.g., De Bruijn et al., 2005, 2007). For both questions, answering options ranged from 'I definitely do not intend to' (1) to 'I definitely intend to' (7). Reliability of the intention measure was high in both studies (fruit: Cronbach's  $\alpha = 0.93$ ; snack: Cronbach's  $\alpha = 0.96$ ).

*Action planning (T2)*

Action planning was assessed by five items in each study. Items were derived from literature review (e.g., Cullen et al., 2001; De Vries et al., 2008; Notwehr et al., 2006) and expert consulting. Respondents were asked to what extent they planned to perform several actions or preparatory behaviors in order to reach the target behavior.

With regard to fruit consumption, action plans pertained to 'buying fruit', 'eating fruit at a fixed time of day', 'putting a fruit basket on the table', 'taking fruit along with you when you go somewhere', and 'replacing unhealthy snacks by fruit' (Cronbach's  $\alpha = 0.75$ ).

For snack consumption, action plans pertained to 'buying less snacks', 'buying healthy alternatives for snacks', 'refraining from eating snacks at a fixed time of day', 'substituting snacks by healthy alternatives', and 'taking healthy alternatives along with you when you go somewhere' (Cronbach's  $\alpha = 0.92$ ). Answering options ranged from 'I am definitely not planning to' (1) to 'I am definitely planning to' (7).

*Fruit consumption (T1, T3)*

The measurement of fruit consumption was based on a validated questionnaire (Van den Brink et al., 2005) and comprised two items, referring to a) the amount of days in a week the respondent usually eats fruit (0 to 7), and b) the amount of fruit the respondent averagely consumes on each of these days. Multiplication of the responses to these two questions gives a proper measure of the amount of fruit consumed during a week.

*Snack consumption (T1, T3)*

The measurement of snack consumption was based on previous questionnaires (De Bruijn et al., 2005; Martens et al., 2005; Van Assema et al., 2001) and consisted of five items, measuring the consumption of five types of high-caloric snacks: 1. fatty snacks (e.g., hamburgers, pizza), 2. salty snacks (e.g., nuts, potato chips), 3. sugary snacks (e.g., cake, cookies), 4. candy bars, and 5. savory snacks (e.g., dices of cheese, sausage). Respondents were asked to indicate how many times per week they consumed each of the forenamed types of snacks. Answering options ranged from 'Never or less than once a week' (1) to 'Every day' (8). The five scores were added to indicate the total amount of snacks consumed per week.

### **Statistical analyses**

Structural Equation Modeling with Mplus 4.1 (Muthen & Muthen, 1998-2006), using Maximum Likelihood (ML) estimation was used to test hypothesized associations between the various cognitive constructs. Background variables (age, sex, and educational level) and behavioral measures of fruit and snack consumption were observed variables. Self-efficacy, intention, and action planning were latent constructs, measured by their separate indicators, as defined in the description of the questionnaires. In the basic models, intention and self-efficacy were modeled as direct influences on behavior, whereas self-efficacy also had an indirect effect through intention. In order to assess the contribution of action planning in the prediction of both behaviors, a constrained pathway between action planning and the outcome behavior was included in the basic models. In the extended models, this relationship was freed and estimated. All models were corrected for the background variables. Past behavior was later added to the model and was correlated with intention and self-efficacy, and directly predictive of current behavior.

The moderation hypothesis was tested using the Maximum Likelihood with robust standard errors and chi-square (MLR) because of the expected non-normality of the moderation model, as induced by the inclusion of the *intention x action planning* interaction term. The moderation models were compared to a constrained moderation model in which the interaction term was constrained to zero. The Satorra-Bentler scaled chi-square difference test was used to assess the statistical significance of the interaction term (Satorra & Bentler, 2001).

Model fit was assessed using the Comparative Fit Index (CFI), the Tucker-Lewis-Index (TLI), and the Root-Mean-Square Error of Approximation (RMSEA). For a satisfactory model fit, the CFI and the TLI should be high ( $> 0.90$ ), whereas the RMSEA should be low (preferably  $< 0.08$ ) (Tabachnick & Fidell, 2001).

## **RESULTS**

### **Description of samples**

Somewhat more than half of the respondents in the fruit consumption study were female (53.3%). The mean age of this sample was 47.8 years ( $SD = 16.0$ ) and most respondents had a medium level of education (42.5%). Approximately one quarter of the respondents had a low educational level (26.3%) and 31.2% had a high educational level.

In the snack consumption study, 48.9% of respondents were female and the mean age was 49.5 ( $SD = 15.4$ ). Again, most respondents had a medium level of education (37.6%), whereas 31.3% had a low level of education and 31.1% was highly educated. The mean intention towards eating sufficient amounts of fruit (Mean = 5.20;  $SD = 1.41$ ) was substantially higher than the intention to restrict the consumption of high-caloric snacks (Mean = 3.18;  $SD = 1.62$ ).

Chi-square difference tests and independent-samples t-tests did not indicate any demographic differences between the two study samples.

### **Attrition analyses**

Logistic regression analyses demonstrated that in the snack consumption study, drop-outs (N = 143) were somewhat lower educated than respondents who completed all three measurements (N = 442) (OR = 0.67, 95% CI = 0.98 – 1.02,  $p = 0.03$ ). No differences were found between drop-outs and completers with regard to age, sex, self-efficacy, intention and snack consumption at baseline, and action planning at the first follow-up. No indications of selective attrition were found in the fruit consumption study.

### **Measurement models**

Bivariate correlations between cognitions and outcome behaviors are depicted in Table 8.1. Self-efficacy tended to correlate most strongly with fruit and snack consumption, whereas action planning correlated most strongly with intention.

Confirmatory factor analyses were performed to test the measurement models with regard to both outcome behaviors. Both models included 11 items, measuring the three latent variables (self-efficacy, intention, and action planning). All factor loadings in both models were significant with values between 0.48 and 0.98 for the fruit consumption model and between 0.42 and 0.96 for the snack consumption model. The fit of both measurement models was satisfactory (fruit consumption: CFI = 0.98, TLI = 0.97, RMSEA = 0.06; snack consumption: CFI = 0.95, TLI = 0.93, RMSEA = 0.09).

### **Model results: Fruit consumption**

#### *Basic model*

The basic model with regard to fruit consumption fitted the data well (CFI = 0.95, TLI = 0.94, RMSEA = 0.06). Intention ( $\beta = 0.13$ ;  $p < 0.01$ ) and self-efficacy ( $\beta = 0.47$ ;  $p < 0.001$ ) were both significant predictors of fruit consumption, with self-efficacy exerting the strongest influence. Age was the only significant demographic predictor of fruit consumption ( $\beta = 0.15$ ;  $p < 0.001$ ). Together, they explained 36.2% of the variance in fruit consumption at T3, eight weeks after baseline.

**Table 8.1** Pearson correlations between cognitions, past and current outcome behaviors.<sup>a, b</sup>

	1	2	3	4	5
1. Self-efficacy	-	0.58	0.40	0.63	0.57
2. Intention	0.38	-	0.48	0.42	0.36
3. Action planning	0.17	0.57	-	0.31	0.33
4. Past fruit/snack consumption	-0.42	-0.31	-0.18	-	0.76
5. Fruit/snack consumption	-0.36	-0.29	-0.22	0.60	-

<sup>a</sup> All correlations in the fruit consumption study are depicted above the diagonal; correlations in the snack consumption study are depicted below the diagonal

<sup>b</sup> All correlations are significant at the 0.001 level (two-tailed)

### *Extended model*

To assess the influence of action planning on fruit consumption, action planning was modeled as a mediating variable between intention and behavior and between self-efficacy and behavior. The extended model fitted the data well (CFI = 0.96, TLI = 0.95, RMSEA = 0.06). Action planning significantly predicted fruit consumption ( $\beta = 0.20$ ;  $p < 0.001$ ). Self-efficacy retained its behavioral impact ( $\beta = 0.42$ ;  $p < 0.001$ ), whereas the influence of intention on fruit consumption was rendered non-significant ( $\beta = 0.05$ ;  $p > 0.10$ ). This latter result indicates that action planning fully mediated the relationship between intention and behavior. Action planning itself was positively predicted by both intention ( $\beta = 0.42$ ;  $p < 0.001$ ) and self-efficacy ( $\beta = 0.20$ ;  $p < 0.001$ ). The extended model accounted for 39.3% of the variance in fruit consumption.

To test whether the inclusion of action planning made a significant contribution to the prediction of fruit consumption, a log-likelihood difference chi-square test was performed. This test resulted in a  $\chi^2$ -value of 12.32 (df = 1;  $p < 0.001$ ), which indicates that adding action planning to the model significantly improved the prediction of fruit consumption.

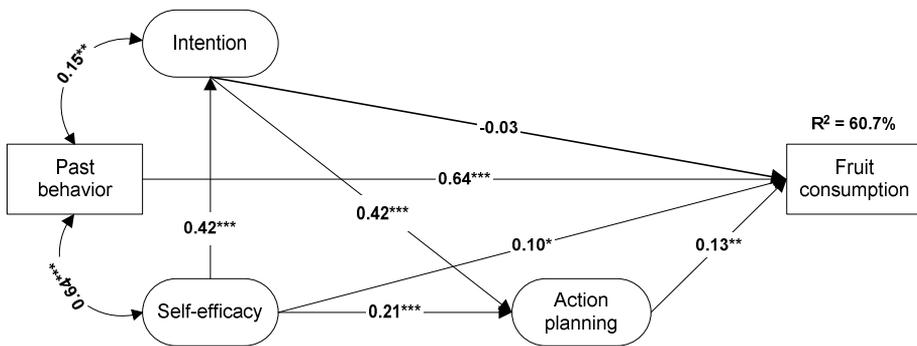
When past behavior was added to the model, action planning ( $\beta = 0.13$ ;  $p < 0.01$ ) and self-efficacy ( $\beta = 0.10$ ;  $p < 0.05$ ) remained significant (see Figure 8.1). Intention did not significantly predict behavior ( $\beta = -0.03$ ;  $p > 0.10$ ). Past behavior was the most powerful predictor of fruit consumption ( $\beta = 0.64$ ;  $p < 0.001$ ) and increased the explained variance of the model to 60.7%.

### *Moderating effect of action planning*

In order to estimate the potential moderating effect of action planning in the intention – behavior relationship, an *intention x action planning* interaction effect was added to the extended model (without past behavior). All other pathways were left unchanged. The interaction effect between action planning and intention was significant ( $t = 2.15$ ;  $p < 0.05$ ), indicating that action planning is more beneficial when intentions are high. We tested whether the inclusion of this interaction effect would result in a better model for explaining the role of action planning in the volitional phase. The Satorra-Bentler

scaled chi-square difference test (Satorra & Bentler, 2001) was used to compare the extended model to the extended model with added interaction effect. In this test, the usual normal-theory chi-square statistic is divided by a scaling correction to better approximate chi-square under non-normality, as is the case when estimating an interaction effect. Calculation of the corrected difference in -2 log likelihood ( $\Delta -2 LL = -5.04$ ;  $df = 1$ ;  $p < 0.01$ ) indicated that including the action planning x intention interaction effect significantly improved model fit.

The moderating effect of action planning was also tested in the presence of past behavior. However, when past behavior was added to the model, the action planning x intention interaction effect was no longer significant ( $t = 0.80$ ;  $p > 0.10$ ).



**Figure 8.1** Structural equation model with standardized regression coefficients assessing the behavioral influence of action planning with regard to fruit consumption.

\* $p < 0.05$  \*\* $p < 0.01$  \*\*\* $p < 0.001$

**Model results: Snack consumption**

*Basic model*

The basic model with regard to snack consumption fitted the data well (CFI = 0.94, TLI = 0.93, RMSEA = 0.07). Intention ( $\beta = -0.19$ ;  $p < 0.001$ ) and self-efficacy ( $\beta = -0.31$ ;  $p < 0.001$ ) were both significant predictors of snack consumption, with self-efficacy exerting the strongest influence. The explained variance of snack consumption (16.7%) was substantially lower than that of fruit consumption.

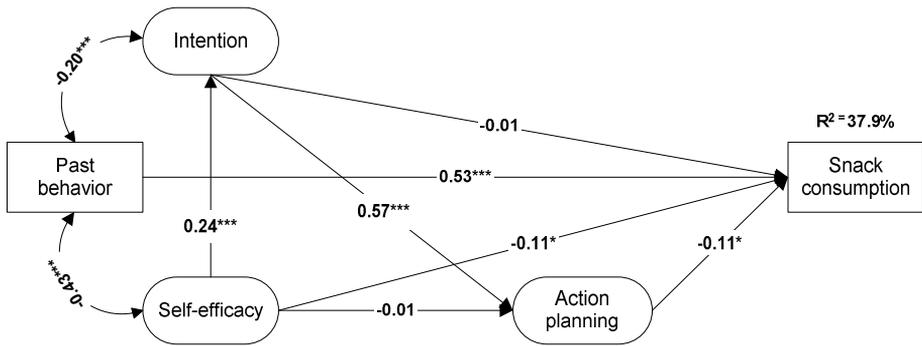
*Extended model*

To assess the influence of planning on snack consumption, action planning was modeled as a mediating variable between intention and behavior and between self-efficacy and behavior. This extended model fitted the data rather well (CFI = 0.95, TLI = 0.93, RMSEA = 0.07). Action planning was found to be a marginally significant negative predictor of snack consumption ( $\beta = -0.10$ ;  $p = 0.06$ ), suggesting that higher scores on plans to restrict snack consumption lead to lower snack consumption. Self-

efficacy ( $\beta = -0.31$ ;  $p < 0.001$ ) retained its influence on behavior. Although intention also remained significant ( $\beta = -0.13$ ;  $p < 0.05$ ), its predictive value was reduced as a result of the inclusion of action planning, indicating partial mediation of action planning in the intention – behavior relationship. Furthermore, intention was a strong predictor of action planning ( $\beta = 0.57$ ;  $p < 0.001$ ), whereas the impact of self-efficacy on action planning was practically absent ( $\beta = -0.01$ ;  $p > 0.10$ ). Together the behavioral determinants explained 17.5% of the variance in snack consumption.

To test whether the inclusion of action planning made a significant contribution to the prediction of snack consumption, a log-likelihood difference chi-square test was performed. This test resulted in a  $\chi^2$ -value of 3.51 (df = 1;  $p = 0.06$ ), indicating that adding action planning to the model resulted in a marginally significant improvement of the prediction of snack consumption.

When past behavior was added to the basic model, the influence of intention was no longer significant ( $\beta = -0.01$ ;  $p > 0.10$ ; see Figure 8.2). Although past behavior was the most powerful predictor of snack consumption ( $\beta = 0.53$ ;  $p < 0.001$ ) and increased the explained variance of the model to 37.9%, both action planning ( $\beta = -0.11$ ;  $p < 0.05$ ) and self-efficacy ( $\beta = -0.11$ ;  $p < 0.05$ ) were found to be significant predictors of behavior.



**Figure 8.2** Structural equation model with standardized regression coefficients assessing the behavioral influence of action planning with regard to snack consumption.

\* $p < 0.05$  \*\* $p < 0.01$  \*\*\* $p < 0.001$

To test if the behavioral influence of action planning differed with regard to the two behaviors, independent-samples comparison of correlation coefficients was performed (Ferguson, 1976). This test resulted in a z-value of 1.50, indicating that the influence of action planning did not significantly differ between the two behaviors ( $p > 0.10$ ).

*Moderating effect of action planning*

An *intention x action planning* interaction effect was included in the extended model to test for a potential moderating effect of action planning in the relationship between intention and snack consumption. Past behavior was initially excluded from the analyses; all other pathways were left unchanged.

A small trend towards significance was found for the interaction effect ( $t = -1.56$ ;  $p = 0.12$ ), which tentatively indicates that action planning may moderate the intention – behavior relationship. The Satorra-Bentler scaled chi-square difference test, however, indicated that the corrected difference in -2 log likelihood was non-significant ( $\Delta -2 LL = 2.32$ ;  $df = 1$ ;  $p > 0.10$ ) indicated that including the interaction effect did not improve model fit.

The moderating effect of action planning was also tested in the presence of past behavior. The action planning x intention interaction effect was not significant in this model ( $t = -0.49$ ;  $p > 0.10$ ).

## DISCUSSION

The first important finding of the present study is that the addition of action planning exerts a significant influence on health protective behavior (i.e., fruit consumption) as well as on the restriction of health risk behavior (i.e., high-caloric snack consumption). Our results showed a better model fit when action plans were added to the model with only self-efficacy and intentions, indicating that the prediction of both types of behavior significantly benefited from the incorporation of action planning. When viewed in the light of the literature on other health behaviors, such as physical activity (Milne et al., 2002; Schwarzer et al., 2007; Sniehotta et al., 2006b; Ziegelmann et al., 2006), sun protection behavior (Van Osch et al., 2008b, 2008c), and (vitamin) pill intake (Liu & Park, 2004; Sheeran & Orbell, 1999), our findings with regard to fruit consumption support the notion that action planning is an important strategy to promote health protective behaviors and suggest that current social-cognitive models on health protective behavior should be extended by incorporating volitional planning cognitions that facilitate the transition from motivation to behavior.

Our findings with regard to snack consumption verify these suggestions and broaden their scope to include both health protective as well as health risk behaviors. The present study is the first to explicitly compare the influence of planning in both types of behaviors and found that the predictive value of action planning was equally powerful in the promotion of fruit consumption and the restriction of snack consumption. These findings indicate that one and the same type of planning can be applied in both types of health behaviors.

The second important finding concerns the inclusion of past behavior. Most previous observational studies that found a significant behavioral influence of action planning have failed to incorporate a measure of past behavior in the analyses, thereby precluding any inferences with regard to the influence of planning on behavior

change. In the present study, past behavior was, however, accounted for in the extended analyses. Even after the inclusion of past behavior, which is generally the most powerful predictor of future behavior, action planning remained significant, which demonstrated that action planning significantly predicts behavior change. These findings corroborate intervention studies, in which the formation of action plans has been shown to increase the performance of health behaviors (e.g., Kellar & Abraham, 2005; Milne et al., 2002).

The third important finding pertains to the established mediating and moderating effects of action planning. The longitudinal correlational design of the present study allowed us to examine the nature of the influence that action planning exerts in the intention – behavior relationship. Our findings of full mediation in the fruit consumption study and partial mediation in the snack consumption study confirm our hypothesis and correspond to results of previous studies, in which both full (e.g., Luszczynska & Schwarzer, 2003; Orbell & Sheeran, 2000; Sniehotta et al., 2005a) and partial (e.g., Jones et al., 2001; Norman & Conner, 2005b) mediation have been found in various behaviors. The difference in mediating effects may pertain to the strength of the underlying intentions. Wiedemann and colleagues (2009) have demonstrated that the strength of the mediated effect of action planning increases along with levels of intentions. The relatively low intention with regard to restricted snack consumption, as compared to fruit consumption, may therefore have precluded full mediation of the intention – behavior relationship by action planning.

The results with regard to potential moderating effects of action planning partially confirm our hypothesis. A positive moderating effect of action planning was demonstrated in the fruit consumption study, thereby replicating previous reports of moderation of the intention – behavior relationship (e.g., Jones et al., 2001; Norman & Conner, 2005b). However, only a small trend with regard to the moderation effect was found in the snack consumption study. The insignificance of this effect may, again, be explained by relatively low motivation scores; the overall intention towards restricted snack consumption was substantially lower than the intention to eat sufficient amounts of fruit, which may have precluded the appearance of moderating effects of action planning in the snack consumption study. Besides the proposition to incorporate action planning in existing, traditional social-cognitive models, these findings provide suggestions on how and where to integrate the concept; action planning can tentatively be considered as a mediator as well as moderator in the intention – behavior relationship.

Furthermore, whereas the four previous studies used a similar type of action planning (i.e., implementation intentions; Achtziger et al., 2008; Armitage, 2004; Sullivan & Rothman, 2008; Verplanken & Faes, 1999), the current study used a different approach. Instead of focusing on when, where, and how a goal-directed response will be implemented (i.e., eating fruit, not eating snacks), the formation of specific preparatory plans was emphasized. Although the former type of planning, i.e., implemental planning, has been subject of substantial research efforts to decrease to intention – behavior gap, the latter planning mode, i.e., preparatory planning, has also

been shown to reliably predict a variety of health behaviors (e.g., Abraham et al., 1999b; Van Osch et al., 2008c). Moreover, one of our previous studies compared the behavioral influence of both types of behaviors and found that preparatory planning outperformed implemental planning in the prediction of fruit consumption (Van Osch et al., *in press-b*). Further, preferably experimental, research is, however, recommended to substantiate the present findings and optimize planning concepts and interventions for both health protective and health risk behaviors. In doing so, the application of coping planning as a protocol for restriction of health risk behavior may be reckoned with. Coping planning is a barrier-focused strategy that pertains to the identification of risk situations and the specification of suitable coping responses (Sniehotta et al., 2005b). As this strategy has been shown to reliably predict performance of health behavior in the face of barriers (Scholz et al., 2007; Schüz et al., 2006; Sniehotta et al., 2005b, 2006b) and has been successfully applied to the restriction of health risk behavior, such as smoking (Van Osch et al., 2008a) and binge-drinking (Cooper et al., 2006; Murgraff et al., 1995), comparison of the benefits of this and other types of planning may yield vital knowledge for the optimization of planning interventions.

Limitations of the present study need to be acknowledged. First, a relatively low explained variance of snacking behavior was found, particularly when past behavior was not taken into account, indicating that other motivational, volitional, and/or environmental factors need to be taken into account for the prediction of snack consumption. The low explained variance is, however, not uncommon, as dietary behavior is generally not well-predicted with explained variances of 30% and higher being exceptions rather than the rule (Baranowski et al., 1999). Furthermore, although ultimately this study aims at optimizing the prediction of fruit and snack consumption, the primary purpose was to investigate the influence of action planning in the intention – behavior relationship. We therefore only took a limited number of other direct predictors of the behaviors into account (self-efficacy, intention, and later past behavior), whereas most previous studies included many more determinants, often resulting in higher explained variances (Brug et al., 2006; De Bruijn et al., 2005; Martens et al., 2005). Second, data were collected from a random sample of adults that were all members of an existing internet research panel. As these respondents voluntarily participate in surveys and receive incentives for their participation, the degree to which the findings generalize to the Dutch population at large may be limited. However, the demographic characteristics of the participants in both study samples corresponded rather well to demographic distributions within the Dutch adult population (Voedingscentrum, 1998), rendering substantial reduction of the external validity of our results unlikely. Third, attrition was found to be somewhat selective in the snack consumption sample as lower educated participants were more likely to drop out. This attrition bias may limit internal and external validity of the study. However, general attrition rates were equal in both study samples and the influence of educational level as a covariate was not significant. It is therefore unlikely that the main results of this study have been compromised as a result of attrition.

Although replication of the findings in preferably experimental settings is required for different behaviors as well as different types of action planning, the present study indicates that action planning may benefit both the actual performance and initiation of healthy behavior and the restriction and suppression of unhealthy behavior. Future interventions in dietary modification may turn these findings to advantage by incorporating one common planning protocol to increase the likelihood that good intentions are translated into healthy dietary behavior.

# CHAPTER 9

## Planning health behavior change: comparing the behavioral influence of two types of self-regulatory planning

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## ABSTRACT

**Objectives:** Recent efforts in health psychology to bridge the gap between individuals' intentions and behavior have centered on the influence of planning strategies. This study investigated the impact of two commonly used types of self-regulatory planning in the prediction of health promoting behavior.

**Methods:** This study employed a prospective longitudinal design. Three measurements were implemented in order to assess associations between various socio-cognitive determinants, planning, and health behavior. Structural equation modeling ( $N = 572$ ) was used to compare the value of *preparatory planning*, i.e., the planning of strategies and preparatory actions towards a goal behavior, and *implemental planning*, i.e., the planning of when, where, and how to perform a goal behavior, in the prediction of fruit consumption.

**Results:** Both preparatory planning ( $\beta = 0.21$ ;  $p < 0.001$ ) and implemental planning ( $\beta = 0.13$ ;  $p < 0.01$ ) were significant predictors of fruit consumption, over and above the influence of motivational factors. Comparison of differences in explained variance ( $\Delta R^2$ ) indicated that the contribution of preparatory planning was larger than that of implemental planning ( $z = 2.19$ ;  $p < 0.05$ ). Implemental planning did not contribute to the prediction of fruit consumption over and above the influence of preparatory planning when tested simultaneously.

**Conclusions:** The results provide a first indication that the planning of strategic preparatory actions may be more influential in predicting health behavior than implemental planning, focusing on when, where, and how to enact goal-directed behavior. Implications of the results and suggestions for future research are outlined.

## INTRODUCTION

Influential social cognition theories in the area of health psychology and health education have long considered intentions as the most proximal and powerful predictor of health behavior performance (Ajzen, 1991; Bandura, 1986). Although these theories have been applied to a wide range of behaviors with moderate success, they do not elaborate on postintentional processes and thereby overlook the fact that people often fail to act on their intentions (Godin & Conner, 2008; Orbell & Sheeran, 1998). Recent theoretical efforts to narrow the ‘intention – behavior gap’ yielded various cognitive processes and strategies that are of potential relevance in the post-intentional or volitional phase (e.g., Bagozzi, 1992, Kuhl, 1985). A number of theorists and models identify various planning or goal setting strategies and describe how cognitive representations of goals and actions influence behavioral performance (Bagozzi, 1992; Gollwitzer, 1999; Heckhausen, 1991; Schwarzer, 1992).

Planning is an important self-regulatory tool that enables efficient progress towards goal attainment and has been proposed as an influential strategy in the translation of intentions into behavior. It can be defined as the process of generating a sequence of behaviors used to translate an individual’s resources into actions aimed at goal achievement (Austin and Vancouver, 1996; Earley et al., 1987). Planning is thought to enhance action control through the generation of ever more precise action instructions, or *action plans* (Abraham et al., 1998).

Gollwitzer (1996) stated that planning can help individuals overcome intellectual as well as volitional problems of goal achievement. The intellectual benefits of planning involve developing a strategy to achieve a goal; its volitional benefits involve increased persistence, decreased distractibility and a readiness to seize opportunities to act (Diefendorff & Lord, 2003). This differentiation of planning benefits can be discerned in two mainstreams in literature concerned with the operationalisation of action planning. These pertain to a) the planning of a strategic course of preparatory actions, and b) the planning of the implementation of actions in specified situations.

The former type of planning, which will be referred to in this paper as ‘*preparatory planning*’ implies the planning of specific preparatory or instrumental acts in the service of ultimate goal achievement. This type of planning is based on principles of goal setting theory (Latham and Locke, 1990; Locke et al., 1981), assuming that the setting of specific proximal goals or subgoals (e.g., daily consumption of sufficient amounts of fruit) benefits the achievement of a distal or longer-term goal (e.g., healthy living; Bandura & Schunk, 1981; Latham & Locke, 1990; Strecher et al., 1995). When faced with specific goals, people tend to formulate plans and task strategies on how the goal can be reached (Bandura & Simon, 1977; Latham & Baldes, 1975; Locke & Latham, 1990). These strategies are deliberate action plans that are motivated by goals and can independently affect task performance. The development of these plans predetermines a consecutive course of action that is aimed at achieving the goal (e.g., buying fruit, taking fruit along when you go to work, substituting snacks by fruit, etcetera). In line with this reasoning, Bagozzi (1992) acknowledges that many intentions

involve a commitment to a series of actions rather than a single act. He recognizes the role of planning in the translation of intention into behavior and emphasizes the identification, coordination and monitoring of specific instrumental acts, or preparatory actions in the striving for goals. Supported by the long-standing recognition of importance of preparatory actions in cognitive behavior therapy and behavior modification approaches (Clark and Fairburn, 1996; Gammbrill, 1977), several studies have investigated the importance of the planning and performance of preparatory actions (e.g., Abraham et al., 1999b; Bagozzi and Edwards, 1998; De Vries et al., 2008; De Vries, et al., 2006b; Hilberink et al., 2006; van Empelen & Kok, 2006; van Osch et al., 2008c). In their study on postdecisional cognitive processes with regard to condom use, Abraham and colleagues (1999b) found that planning of specific preparatory actions (e.g., planning to buy condoms, suggest and negotiate condom use) may enhance the prediction of condom use among intenders. Similar results were found in one of our previous studies on parental sun protection behavior (Van Osch et al., 2008c), in which engagement in planning of specific preparatory actions, such as buying sunscreen and bringing along a bottle of sunscreen, significantly predicted sunscreen use over and above the influence of motivational variables.

The focus on the second type of planning, which will be referred to as '*implemental planning*' or '*when, where, how planning*' originated from research by Leventhal, Singer and Jones (1965) in which they demonstrated that fear appeals were most likely to instigate action when they were accompanied by specific instructions or action plans on how to act (i.e., where and when to go, and what to do to get a tetanus shot). In some of their earliest work on the distinction between pre- and postdecisional cognitive processes, Gollwitzer and Heckhausen (Gollwitzer et al., 1990; Heckhausen, 1987) point to the formation of so-called '*implemental intents*' as an important process in the postdecisional state of mind. Implemental intents involve committing oneself to when, where and how to enact a desired goal, a strategy that is later elaborated by Gollwitzer and renamed as '*implementation intentions*' (Gollwitzer, 1993, 1996, 1999). Implementation intentions are subordinate to and are to be distinguished from intentions and specify the when, where and how of responses that lead to goal attainment. The specific structure of implementation intentions ("If situation X is encountered, then I will initiate goal-directed behavior Y"; Gollwitzer & Sheeran, 2006) connects good opportunities to act (i.e., when and where) with to-be-performed behavioral responses (i.e., how). By anticipating a critical situation and specifying how to act in this situation, the mental representation of this situation is assumed to become highly activated (Gollwitzer, 1999; Webb & Sheeran, 2008) and the control of behavior is delegated from the self to the specified situational cues that rather automatically and effortlessly elicit the specified action (Gollwitzer, 1999; Gollwitzer & Sheeran, 2006).

Following ample experimental work demonstrating the efficacy of implementation intentions in the promotion of various (health) behaviors (Sheeran, 2002; Gollwitzer & Sheeran, 2006), attempts were made to investigate implementation intentions as a measured construct, as applied in correlational studies. Gollwitzer and Brandstätter (1997) adopted a global approach, in which respondents were presented with a

description of the form and content of implementation intentions and were subsequently asked whether or not they had formed such implementation intentions with regard to certain goals. Rise and colleagues (2003) and Sniehotta and colleagues (2005b) used a more specific approach, in which the main components of implementation intentions were attended to separately and respondents are asked whether or not (see Rise et al., 2003) and to what extent (see Sniehotta et al., 2005b) they had made detailed plans about when, where and how – sometimes complemented by other specifications, such as with whom and how long – particular behaviors were to be implemented. Although the studies by Gollwitzer and Brandstätter (1997) and Rise and colleagues (2003) found strong associations between implementation intention formation and performance of respective goal behaviors, the operationalization as developed by Sniehotta and colleagues (2005b) has been most widely used in recent publications and has been found to reliably predict health-related behavior (e.g., Luszczynska & Schwarzer, 2003; Schwarzer et al., 2007; Sniehotta et al., 2005a).

The main difference between preparatory planning and implemental planning is defined by the situational or contextual representation (i.e., the definition of when and where a goal-directed action will be performed) that is a fundamental characteristic of implemental planning but not of preparatory planning. Although various studies investigated the value of either preparatory or implemental planning in the prediction of health behaviors, by reason of theoretical insight and parsimony, it may be fruitful to distinguish between planning strategies and investigate whether one type of action planning outperforms and/or complements the other in predicting health behavior.

The present study therefore investigates the individual predictive value of preparatory planning and implemental planning with regard to fruit consumption, independent of the behavioral influences of intentions and self-efficacy. Since most health-related goals (e.g. adequate physical activity, healthy dietary intake) are relatively complex and comprise a number of sub-behaviors or preparatory behaviors, individuals may face numerous self-regulatory problems. In such complicated “multi-component” behaviors, which are often performed in a multitude of settings, lack of preparation may pose a more significant problem in achieving the ultimate goal behavior than common self-regulatory problems that have to do with implementation of the goal behavior, such as failing to recognize and seize opportunities to act (Gollwitzer & Sheeran, 2006). Previous studies have indeed shown modest influences of implemental planning in physical activity behavior, a rather complex behavior (e.g., Sniehotta et al., 2005a), and rather strong influences of implemental planning in relatively simple behaviors that are mostly performed in stable settings (e.g. seatbelt use or breast self-examination; Luszczynska & Schwarzer, 2003; Schwarzer et al., 2007). In the present study, we therefore hypothesized that adequate fruit consumption would benefit most from breaking down the outcome behavior in a set of feasible preparatory actions (e.g. buying fruit, taking fruit along with you) that facilitate the ultimate goal behavior. The unique variance in fruit consumption explained by each of the two types of action planning will be compared and a combined model will be examined in which the influences of both types of action planning are tested simultaneously.

## METHODS

### Procedure

The study sample consisted of Dutch adults (> 18 years) that were all registered members of an online survey panel of a private research company. A total of 806 participants were invited by e-mail to participate in a study on fruit consumption. A link provided in the e-mail lead participants to the online questionnaire. Participants were explained that the study would comprise three measurements, each one month apart, and that they would receive a small incentive (approximately € 3) after completing all three questionnaires. All participants signed for informed consent and were informed that they could withdraw from the study at any time.

At the baseline measurement (T1), 572 respondents (71.0%) filled out the questionnaire. In the first follow-up measurement four weeks later (T2), 498 respondents (87.1% of baseline) participated, whereas a total of 434 respondents (75.9% of baseline) had completed all three questionnaires at the second follow-up measurement 8 weeks after baseline (T3).

### Questionnaires

In the baseline questionnaire relevant demographic variables, attitude, social influences, self-efficacy, intention and past behavior (baseline fruit consumption) were measured. At T2, two types of action planning were measured, and at T3 fruit consumption was again assessed. The target behavior that was mentioned in all questions was 'eating a sufficient amount of fruit each day', which was explained to participants as 'two pieces of fruit each day'.

#### *Demographics (T1)*

Gender, age, and highest completed educational level were inquired after. Educational level was categorized into 'low' (elementary education, medium general secondary education, preparatory vocational school, or lower vocational school), 'medium' (higher general secondary education, preparatory academic education, or medium vocational school) and 'high' (higher vocational school or university level).

#### *Attitude (T1)*

Attitude towards fruit consumption was measured by three perceived benefits and two perceived barriers of fruit consumption, adapted from previous research (Brug et al., 1995a; Cox et al., 1996). Respondents were asked to indicate on a four-point scale to what extent they thought eating fruit is, for instance, 'beneficial to their health', 'tasteful' and 'inconvenient' (e.g., 1 = not beneficial to 4 = very beneficial). Higher scores indicated a more positive attitude towards adequate fruit consumption. Reliability was satisfactory (Cronbach's  $\alpha = 0.72$ ).

*Social influences (T1)*

Social influences with regard to fruit consumption were measured with three items (Cronbach's  $\alpha = 0.52$ ), assessing, respectively, the norm, support and modeling that respondents perceived in their social environment (e.g., Kremers et al., 2003). Respondents were asked to indicate to what extent important people in their environment think that the respondent should eat a sufficient amount of fruit (1 = definitely not to 7 = definitely yes), to what extent important people in their environment support them to eat fruit (1 = never to 5 = (almost) always), and how many of the important people in their environment often eat fruit (1 = (practically) none to 5 = (practically) everyone).

*Self-efficacy (T1)*

Self-efficacy expectations were measured by four items that asked to what extent respondents thought they would be able to eat two pieces of fruit per day in various situations (e.g., Brug et al., 1995b), e.g., 'during the weekend and 'during the winter months' (Cronbach's  $\alpha = 0.91$ ). Answering options ranged from 'I will certainly not be able to' (1) to 'I will certainly be able to' (7).

*Intention (T1)*

Intention was measured by two items. The first item asked to what extent respondents intended to eat two pieces of fruit (e.g., De Nooijer et al., 2006). In the second item a time-reference was added, asking respondents to what extent they intended to perform the target behavior in the next month (e.g., De Bruijn et al., 2007; Luszczynska et al., 2007b). For both questions, answering options ranged from 'I definitely do not intend to' (1) to 'I definitely intend to' (7). Reliability was high (Cronbach's  $\alpha = 0.93$ ).

*Preparatory planning (T2)*

Preparatory planning was assessed by five items, adapted from literature review (e.g., Cullen et al., 2001; De Vries et al., 2008; Notwehr et al., 2006) and expert consulting. Respondents were asked to what extent they planned to perform several actions or preparatory behaviors in order to reach the target behavior. The item stem, 'Have you made a plan to...' was followed by the items a) 'buy fruit', b) 'eat fruit at a fixed time of day', c) 'put a fruit basket on the table', d) 'take fruit along with you when you go somewhere', and e) 'replace unhealthy snacks by fruit'. Answering options ranged from 'definitely not' (1) to 'definitely yes' (7), and reliability was satisfactory (Cronbach's  $\alpha = 0.75$ ).

*Implemental planning (T2)*

Implemental planning was assessed by five items, adapted from items used by Sniehotta et al. (2005b) and Schwarzer et al. (2007). The item stem 'I have made a detailed plan regarding...' was followed by the items a) 'when to eat fruit', b) 'where to eat fruit', c) 'how to eat fruit (e.g. by drinking fruit juice, or by processing fruit in meals)', d) 'how often to eat fruit', and e) 'which fruit to eat'. Answering options ranged from

'completely disagree' (1) to 'completely agree' (5), and reliability was high (Cronbach's  $\alpha = 0.92$ ).

### *Fruit consumption (T1, T3)*

Fruit consumption was assessed by means of a validated measure (Van den Brink et al., 2005) comprising of two items, referring to a) the amount of days a week at which the respondent normally eats fruit (0 to 7), and b) the amount of fruit the respondent averagely consumes on each of these days. Multiplying the responses to these two questions gives a proper overview of the amount of fruit consumed during a week (Spearman correlation coefficients with two 24-hour consumption recalls = 0.68 for men, 0.75 for women; correct tertile classification = 52%; van den Brink et al., 2005).

### **Statistical analyses**

Covariance-based structural equation modeling with Mplus 4.1 (Muthen & Muthen, 1998-2006), using Maximum Likelihood (ML) estimation was used to test hypothesized associations between the various cognitive constructs. In order to maximize the information available in the data file, pairwise deletion was used for missing observations. The background variables (age, sex, and educational level) and the behavioral measure of fruit consumption were included as observed variables. Attitude, self-efficacy, social influence, intention, and both types of action planning were included as latent constructs, measured by their separate indicators (see "Questionnaires" section).

In the basic model, attitude, social influence and self-efficacy were modeled as direct influences on intention. Furthermore, self-efficacy and intention directly influenced behavior. Background variables were included as covariates with regard to behavior. Pathways from self-efficacy and intention to each type of action planning and constrained pathways between the two types of action planning and the outcome behavior were added to the basic models. In order to assess the individual contribution of both types of action planning, the latter relationships were subsequently freed and estimated. Past behavior was subsequently added as a direct predictor of fruit consumption at T3 to correct for previously established fruit consumption patterns.

Comparison of the influences of the two types of action planning was based on the difference in explained variance of fruit consumption ( $\Delta R^2$ ) after removing one of the planning types from a full model including both types of planning. Meng, Rosenthal, and Rubin's (1992) formulas for comparing two correlated correlations were used to test the difference in  $\Delta R^2$  for significance. Model fit was primarily assessed by the Comparative Fit Index (CFI), Tucker-Lewis-Index (TLI), Root-Mean-Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR). For a satisfactory model fit, the CFI and the TLI should be high ( $> 0.90$ ), whereas the RMSEA and SRMR should be low (preferably  $< 0.08$ ) (Tabachnick & Fidell, 2001; Hu & Bentler, 1999).

## RESULTS

### Sample description

Respondents' mean age was 47.8 years (SD = 16.0) and somewhat more than half of them were female (53.3%). Most respondents had a medium level of education (42.5%). Approximately one quarter of respondents was low educated (26.3%) and 31.2% had a high educational level. Respondents' mean fruit consumption at baseline was 8.3 servings per week (SD = 6.7). With a mean score of 5.20 (SD = 1.41) the intention towards sufficient fruit consumption was moderate to high. The mean score for preparatory planning was 4.47 (SD = 1.18), with the highest score for planning to 'buy fruit' and the lowest score for planning to 'put a fruit basket on the table'. The mean score for implemental planning was 2.93 (SD = 0.97), with the highest score for planning 'how often to eat fruit', and the lowest score for planning 'when to eat fruit'.

### Attrition analyses

Logistic regression analysis demonstrated no significant differences between respondents that dropped out between T1 and T3 and completers with regard to demographics, attitude, social influences, self-efficacy, intention, and fruit consumption as measured at T1, nor on both types of action planning, as measured at T2.

### Measurement model

Confirmatory factor analyses were performed to test the measurement model, which included 24 indicators measuring the six latent variables (attitude, social influence, self-efficacy, intention, and two types of action planning). All factor loadings were significant with values between 0.18 and 0.95 and model fit was satisfactory ( $\chi^2 = 789.55$ ,  $df = 237$ , CFI = 0.92, TLI = 0.91, RMSEA = 0.06, SRMR = 0.06).<sup>1,2</sup>

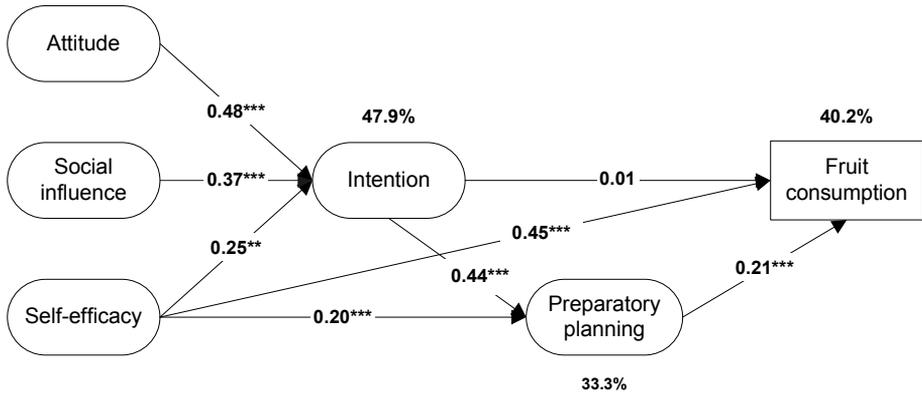
### Basic model

The basic model had satisfactory fit ( $\chi^2 = 960.51$ ,  $df = 324$ , CFI = 0.91, TLI = 0.90, RMSEA = 0.06, SRMR = 0.06). Attitude ( $\beta = 0.48$ ;  $p < 0.001$ ), social influence ( $\beta = 0.37$ ;  $p < 0.001$ ), and self-efficacy ( $\beta = 0.24$ ;  $p < 0.01$ ) were significant predictors of intention ( $R^2 = 47.8\%$ ). Intention ( $\beta = 0.10$ ;  $p < 0.05$ ) and self-efficacy ( $\beta = 0.50$ ;  $p < 0.001$ ) significantly predicted fruit consumption at T3, with self-efficacy exerting the strongest influence. Age was the only background variable that influenced fruit consumption ( $\beta = 0.14$ ;  $p < 0.001$ ). In total, 37.2% of the variance in fruit consumption was explained by these variables.

### The influence of preparatory planning

To assess the influence of preparatory planning, the previously constrained pathway between preparatory planning and fruit consumption was freed (see Figure 9.1). The model fitted the data well ( $\chi^2 = 946.98$ ,  $df = 323$ , CFI = 0.92, TLI = 0.90, RMSEA = 0.06, SRMR = 0.06) and preparatory planning significantly predicted fruit consumption

( $\beta = 0.21$ ;  $p < 0.001$ ). Self-efficacy retained its strong behavioral impact ( $\beta = 0.45$ ;  $p < 0.001$ ), whereas the influence of intention on fruit consumption was no longer significant ( $\beta = 0.01$ ;  $p > 0.10$ ). Preparatory planning itself was positively predicted by both intention ( $\beta = 0.44$ ;  $p < 0.001$ ) and self-efficacy ( $\beta = 0.20$ ;  $p < 0.001$ ), yielding an explained variance of preparatory planning of 33.3%. The model accounted for 40.2% of the variance in fruit consumption.



**Figure 9.1** Structural equation model with standardized regression coefficients representing the influence of preparatory planning on fruit consumption. Rectangles represent observed variables; circles represent latent variables. \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

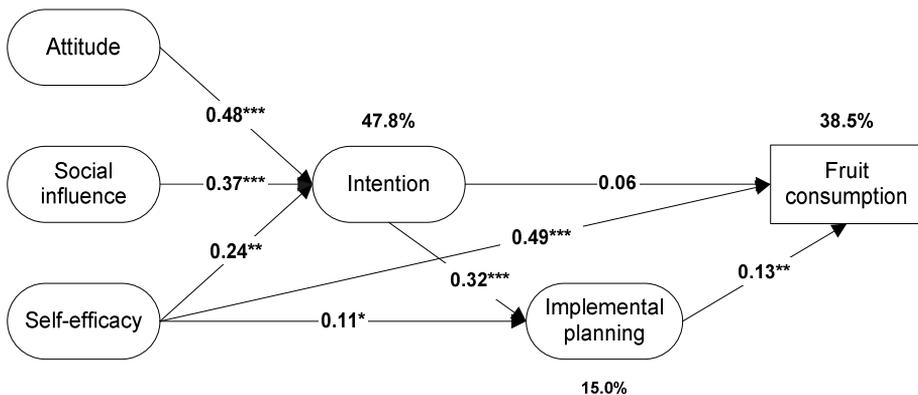
When past behavior (i.e., fruit consumption measured at T1) was added to the model as a direct predictor of current fruit consumption at T3, the explained variance increased to 59.7% ( $X^2 = 1014.73$ ,  $df = 347$ ,  $CFI = 0.92$ ,  $TLI = 0.90$ ,  $RMSEA = 0.06$ ,  $SRMR = 0.06$ ). Although past behavior was the most powerful predictor of fruit consumption ( $\beta = 0.65$ ;  $p < 0.001$ ) and reduced the influence of self-efficacy ( $\beta = 0.12$ ;  $p < 0.05$ ) and preparatory planning ( $\beta = 0.13$ ;  $p < 0.01$ ), both predictors remained significant.

**The influence of implemental planning**

To assess the influence of implemental planning, the previously constrained pathway between implemental planning and fruit consumption was freed, whereas the pathway between preparatory planning and fruit consumption was constrained to zero (see Figure 9.2). The model fitted the data well ( $X^2 = 952.35$ ,  $df = 323$ ,  $CFI = 0.92$ ,  $TLI = 0.90$ ,  $RMSEA = 0.06$ ,  $SRMR = 0.06$ ) and implemental planning also significantly predicted fruit consumption ( $\beta = 0.13$ ;  $p < 0.01$ ). Again, self-efficacy was the most powerful behavioral predictor ( $\beta = 0.49$ ;  $p < 0.001$ ), and once more the influence of intention, as demonstrated in the basic model, became insignificant ( $\beta = 0.06$ ;  $p > 0.10$ ). Implemental planning itself was predicted by both intention ( $\beta = 0.32$ ;  $p < 0.001$ )

and self-efficacy ( $\beta = 0.11$ ;  $p < 0.05$ ), yielding a substantially lower explained variance of implemental planning ( $R^2 = 15.0\%$ ) than of preparatory planning. The total model including implemental planning accounted for 38.5% of the variance in fruit consumption.

Adding past behavior to the model resulted in an explained variance of 58.9% ( $X^2 = 1021.78$ ,  $df = 347$ ,  $CFI = 0.92$ ,  $TLI = 0.90$ ,  $RMSEA = 0.06$ ,  $SRMR = 0.06$ ). Past behavior was the most powerful predictor of fruit consumption ( $\beta = 0.66$ ;  $p < 0.001$ ). Although the influence of self-efficacy remained significant ( $\beta = 0.14$ ;  $p < 0.01$ ), the impact of implemental planning was no longer significant ( $\beta = 0.03$ ;  $p > 0.10$ )



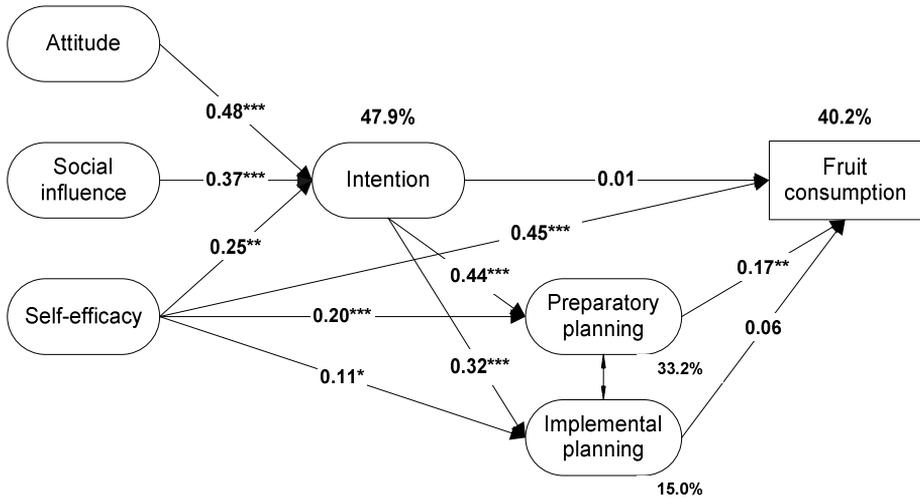
**Figure 9.2** Structural equation model with standardized regression coefficients representing the influence of implemental planning on fruit consumption. Rectangles represent observed variables; circles represent latent variables. \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

### Comparing the influence of preparatory planning and implemental planning

Adding preparatory planning to the basic model added 3.0% of explained variance of fruit consumption, compared to 1.3% for implemental planning. Comparison of the differences in explained variance ( $\Delta R^2$ ), using the methods described by Meng and colleagues (1992) yielded a z-value of 2.19 ( $p < 0.05$ ), indicating that the contribution of preparatory planning to the prediction of fruit consumption was significantly larger than that of implemental planning.

In order to examine potential complementariness of the two types of action planning a full model, simultaneously incorporating both types of action planning, was tested. Both types of action planning were assumed to be correlated. The model fitted the data well ( $X^2 = 945.54$ ,  $df = 322$ ,  $CFI = 0.92$ ,  $TLI = 0.90$ ,  $RMSEA = 0.06$ ,  $SRMR = 0.06$ ). Preparatory planning significantly predicted fruit consumption ( $\beta = 0.17$ ;  $p = 0.01$ ), whereas the influence of implemental planning did not reach statistical significance ( $\beta = 0.06$ ;  $p > 0.10$ ; see Figure 9.3), indicating that the influences of both types

of planning are not complementary. Both types of action planning were moderately correlated ( $r = 0.30$ ;  $p < 0.001$ ). The explained variance of fruit consumption in the combined model was 40.2%, indicating that implemental planning did not contribute to the prediction of fruit consumption over and above the influence of preparatory planning.



**Figure 9.3** Structural equation model with standardized regression coefficients representing the influences of preparatory and implemental planning on fruit consumption. Rectangles represent observed variables; circles represent latent variables. \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

When past behavior was added to this full model ( $X^2 = 1014.45$ ,  $df = 346$ ,  $CFI = 0.92$ ,  $TLI = 0.91$ ,  $RMSEA = 0.06$ ,  $SRMR = 0.06$ ) the explained variance of fruit consumption was increased to 59.8%. Past behavior was the most powerful predictor ( $\beta = 0.65$ ;  $p < 0.001$ ), followed by preparatory planning ( $\beta = 0.15$ ;  $p < 0.01$ ) and self-efficacy ( $\beta = 0.12$ ;  $p < 0.05$ ). Implemental planning did not significantly contribute to the prediction of fruit consumption ( $\beta = -0.02$ ;  $p > 0.10$ ).

Lastly, potential interaction between the two types of planning was tested by adding a preparatory planning x implemental planning interaction term to the predictive model using Robust Maximum Likelihood estimation. The interaction term was non-significant ( $p > 0.10$ ), indicating that no moderation of either type of planning took place.

## DISCUSSION

To our knowledge, this is the first study to compare the value of specific types of planning in the prediction of health behavior. Although replication of the present results is requisite for other health behaviors and other, preferably experimental settings, there are several findings that merit consideration and may provide fruitful directions for future research.

First, both types of planning significantly predicted the consumption of fruit over and above the influence of motivational variables, thereby replicating results from previous studies (e.g., Schwarzer et al., 2007; van Osch et al., 2008c). Although the explained variance added by both types of planning was limited (1.3% and 3%), our findings nonetheless validate claims to include planning in existing social-psychological models, as part of the endeavor to bridge the gap between intention and behavior. The influence of implemental planning was, however, annihilated when past behavior was taken into account. A potential explanation may be that when past behavior is low, implemental planning may be too specific. The unfamiliarity with the behavior may prevent individuals from making, and benefiting from, detailed plans on when, where, and how to perform the behavior. Breaking down the behavior in multiple preparatory actions may simplify the behavior and may therefore be better suited for the purpose of initiating behavior. We performed post-hoc multigroup analyses to investigate this possible explanation. These analyses demonstrated that although both types of planning failed to significantly predict future behavior in individuals with high levels of past behavior (highest tertile:  $\geq 12$  pieces of fruit per week), preparatory planning positively influenced fruit consumption in all other individuals, whereas implemental planning only predicted behavior in individuals in the middle tertile (5-11 pieces of fruit per week). Implemental planning did not influence fruit consumption in those individuals with no or little experience with the goal behavior ( $\leq 4$  pieces of fruit per week; lowest tertile), which may indicate that, indeed, implemental planning is less suitable for individuals with low levels of past behavior.

Second, the predictive value of preparatory planning was higher than that of implemental planning. These findings may tentatively be interpreted as a first indication that the planning of strategic goal-directed actions may be more influential than planning when, where, and how to enact goal-directed behavior in predicting health behavior, more specifically behaviors of a complexity that corresponds to fruit consumption. However, one may argue that different cognitive mechanisms underlie both types of planning, rendering comparison of their predictive values difficult. It may for instance be argued that both types of action planning are complementary or fully independent, thereby justifying the incorporation of both planning cognitions in behavior explaining models. Our results, however, suggest that the impacts of both types of planning are neither independent nor complementary. Both variables were moderately correlated and the inclusion of implemental planning did not result in any additional explained variance over and above the influence of preparatory planning. Further

research is, however, warranted to substantiate these findings and investigate the possibility of other relationships between planning cognitions.

One possible explanation for our main finding may be that implemental planning has a strong impact when the to-be-performed behavior is relatively simple, whereas for more complex behaviors, breaking down the goal-behavior in a sequence of preparatory actions may be more beneficial. This explanation is tentatively supported by previous studies that showed modest influences of implemental planning ( $\beta$ 's of .28 and .16) in physical exercise behavior, a rather complex behavior (Sniehotta et al., 2005a), and rather strong influences of implemental planning in breast self-examination ( $\beta$  of .49) and seatbelt use ( $\beta$  of .44), relatively simple behaviors (Luszczynska & Schwarzer, 2003; Schwarzer et al., 2007). In their study on fruit and vegetable consumption, Schwarzer and colleagues (2007; Study 3), nevertheless found a very strong relationship between implemental planning and behavior ( $\beta$  of .63). An important limitation of this study was, however, that planning and behavior were measured cross-sectionally, thereby precluding any causal inferences and possibly inflating their relationship.

When viewed in the light of the various self-regulatory problems that individuals may experience in goal striving (see Gollwitzer & Sheeran, 2006), the present results may indicate that lack of preparation with regard to the goal behavior of fruit consumption (e.g., failing to buy fruit or to take fruit along) is a more prominent problem than failure to recognize and seize the opportunities to eat fruit. Relatively complex "multi-component" behaviors, such as adequate fruit consumption, may benefit most from first breaking down the goal behavior in several strategic preparatory actions, thereby creating good conditions for viability of the goal-directed response and goal attainment (i.e., eating fruit), and then formulating implemental plans to facilitate recognition and seizing of opportunities to perform the goal behavior. Dewitte, Verguts and Lens (2003) propose a similar rationale for their finding that difficult goals did not benefit from the formation of implementation intentions. They suggest that *'...implementing a goal (i.e., specifying when and where it should be implemented) might be useless unless some preparatory actions have been performed.'* (Dewitte et al., 2003; p.87). When an individual faces a difficult goal, he should first specify what exactly needs to be done, rather than specify the when and where of goal attainment. In these instances, specifying strategic preparatory actions might therefore be more beneficial than specifying when or where one wants to reach the goal. This hypothesized conditional character of the relationship between the two types of planning should, however, be explored in future research, examining both difficult and easy-to-reach goals.

Another interesting finding pertains to the prediction of both types of planning from motivational variables. With an explained variance of more than twice that of implemental planning, preparatory planning was relatively well predicted from self-efficacy and intention. Although there is still a need for consideration of additional predictors, this finding once more indicates that preparatory planning would be suitable

for incorporation in motivation-based explanatory models. Only 15% of the variance in implemental planning could be explained by the perceived self-efficacy and intention measures. Some previous studies, however, demonstrated, higher explained variances of implemental planning by incorporating other types of self-efficacy measures as predictors, such as maintenance self-efficacy (Sniehotta et al., 2005a), coping self-efficacy (Luszczynska & Schwarzer, 2003) and recovery self-efficacy (Schwarzer et al., 2007). These and potentially other factors may therefore be considered as additional predictors of action planning in future studies.

Some limitations of the present study need to be acknowledged. First, data were collected from a random sample of adults that were all members of an existing internet research panel. As these respondents voluntarily participate in surveys and receive incentives for their participation, the degree to which the findings generalize to the Dutch population at large may be limited. However, the demographic characteristics of the participants in the study sample corresponded rather well to demographic distributions within the Dutch adult population (Voedingscentrum, 1998), rendering substantial reduction of the external validity of our results unlikely.

Second, as both types of planning were assessed in the same questionnaire the possibility of influence cannot be excluded. Assessment of preparatory planning preceded implemental planning and may therefore have impacted scores on implemental planning, for instance by triggering participants to make specific plans with regard to fruit consumption. The moderate relationship between the two planning cognitions, however, does not indicate significant transfer. Furthermore, if both types of planning would have been assessed in separate samples, investigation of the issue of complementarity would not have been possible.

In conclusion, although replication of our results in future, preferably experimental research is required, this study indicates that, in order to initiate health behavior it may be of particular concern to break down the goal behavior in a sequence of preparatory actions and strategies. Future health promoting interventions may benefit from applying this technique and may focus on teaching individuals to engage in preparatory planning.

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**Notes:**

<sup>1</sup> An anonymous reviewer indicated that, although reliability was not fully satisfactory, the inclusion of these items as three directly observed exogenous variables would imply the untenable assumption that their reliabilities are one, since no measurement component would be associated with these variables. The items were therefore forced into a factor model.

<sup>2</sup> Exploratory factor analysis indicated that the preparatory planning item 'Have you made a plan to eat fruit at a fixed time of day?' also had a significant factor loading of 0.49 on implemental planning. Although its factor loading on preparatory planning was higher (0.63), we repeated all analyses without this item. The results did not change as a result of this adjustment.



# CHAPTER 10

General Discussion

The present thesis elaborates on the influence of pre- and postmotivational factors in health behavior change. The objectives of this thesis were fivefold. The first two objectives pertain to the influence of several premotivational factors and aim to 1) explore the relationship between premotivational and motivational factors, and 2) examine the (independent) influence of premotivational factors on health behavior. The greater part of the thesis pertains to the postmotivational influence of self-regulatory action planning and aims to 3) investigate the impact and predictive value of action planning with regard to health protective and health risk behaviors, 4) disentangle the nature of the relationship between intention, action planning, and behavior, and 5) optimize future planning interventions.

Four research projects were implemented that encompassed eight studies, which collectively aimed to enhance the prediction and promotion of health behavior. The purpose of this final chapter is to summarize and integrate the findings of the studies presented in this thesis. The main results will be presented and discussed according to each of the five main research objectives, followed by practical and theoretical implications of these results. Subsequently, strengths and limitations of the conducted research as well as future perspectives with regard to relevant research areas will be elaborated on.

## BEYOND MOTIVATION: PREMOTIVATIONAL FACTORS IN BEHAVIOR CHANGE

### Examination of relationships between premotivational and motivational factors

The premotivational factors that were explored in the present thesis include awareness, knowledge, and risk perception, of which the latter two were most extensively investigated. The relationship between premotivational and motivational factors was explored in Chapter 6. Although knowledge, perceived susceptibility and perceived severity were found to positively correlate with all motivational factors (attitude, social influence, self-efficacy, and intention), these correlations tended to be low to moderate ( $r_s \leq 0.35$ ). Generally, perceived susceptibility was most highly correlated with motivational factors, followed by perceived severity. These univariate findings, as well as the finding that premotivational factors correlated most strongly with the attitude concept, were largely validated by regression weights when the pattern of associations was analyzed in a structural equation model. Both perceived susceptibility and severity were positively associated with all three motivational factors, most strongly with attitude, whereas knowledge was only demonstrated to be weakly associated with self-efficacy. No direct associations between premotivational factors and intention were demonstrated, indicating that the influence of premotivational factors was fully mediated by motivational factors.

In conclusion, the most powerful associations of premotivational factors were found for the attitude concept. Since attitude was most strongly related to intention, this may indicate that the influence of premotivational factors on intention is most likely mediated by attitude.

### Investigation of the (independent) influences of premotivational factors on health behaviors

In Chapters 2 and 6, the possibility of direct influences of premotivational factors on health behavior was explored. The cross-sectional analysis of determinants of cancer detection behaviors (Chapter 2) indicated that passive detection behavior (i.e., attentiveness to cancer symptoms) was mainly associated with premotivational factors, such as knowledge and awareness, rather than motivational factors. In this passive and less goal-directed behavior, for which conscious cognitive deliberations may not be required, motivational factors may play a less important role. In contrast, the more active and goal-directed behavior of medical help seeking was mainly associated with motivational factors, such as attitude, self-efficacy, and intention. The only premotivational correlate of behavior was perceived susceptibility, for which, unexpectedly, a negative relationship with medical help seeking was found.

In the longitudinal study on sun protection behavior (Chapter 6), motivational factors, such as attitude, social influence, self-efficacy and intention, consistently

showed strong correlations with the outcome behavior. Only weak behavioral associations were found for the premotivational factors knowledge, perceived susceptibility, and perceived severity. In the prospective structural equation model of determinants of sun protection behavior, no significant direct influences of any of the premotivational factors on behavior were demonstrated. The influence of knowledge, perceived susceptibility and perceived severity on intention and behavior was fully mediated by the motivational factors, particularly attitude and possibly self-efficacy.

In conclusion, the somewhat mixed results with regard to direct behavioral influences in the cross-sectional study and the lack of direct influences in the longitudinal study suggest that premotivational factors are unlikely to have strong proximal effects on health behavior.

### **Implications of the findings on premotivational factors**

The thesis' objectives with regard to the influence of premotivational factors were rather explorative. Although some findings of the studies should be prudently interpreted due to their cross-sectional nature, they allow for several implications.

First, the virtually absent contribution of knowledge to motivational factors suggests that knowledge may be an even more distal factor in the behavior change process that may precede the formation of risk perceptions. This proposition is in line with assumptions made by Weinstein (1988). In his Precaution Adoption Process Model, (lack of) knowledge is important in the first stage of behavior change, when people are not yet aware or knowledgeable about the existence of a health threat. It may be that only when people are aware of a health threat, they can become personally engaged and may perceive themselves at risk for the threat. Knowledge and awareness about the existence and consequences of a health threat and related health behaviors may therefore be a prerequisite for perceptions of risk. This proposition should, however, be further investigated in future studies.

Second, the finding that premotivational factors, most importantly risk perceptions, were mainly associated with the attitude concept corresponds with theoretical considerations of the I-Change Model (De Vries et al., *in preparation*) and later notions by Schwarzer (e.g., Schwarzer, 2008), in which risk perceptions are thought to primarily influence outcome expectations and thereby set the stage for a contemplation process with regard to behavior change. Furthermore, implicit conceptualizations of attitude and outcome expectancies in the Theory of Planned Behavior (TPB; Ajzen, 1988, 1991) and Social Cognitive Theory (Bandura, 1986) comport with the proposition of attitude as the most important correlate of risk perceptions. In the TPB, perceptions of risk may be assessed via behavioral beliefs, whereas in the SCT, outcome expectancies may include risk perception components. Further research is needed to reflect on the positioning of risk perception in health behavior models and to explicitly investigate whether risk perceptions should be posited as independent precedents of

attitude or outcome expectancies, or if they may be better incorporated within these constructs.

Furthermore, the mixed results with regard to direct behavioral influences of premotivational factors concur with overall findings in the literature, particularly with regard to risk perceptions. Neither theories of health behavior nor empirical studies appear to agree on the importance of risk perception. Both positive (e.g., Brewer et al., 2007; Norman et al., 1999; Seydel et al., 1990) and negative (e.g., Abraham et al., 1994; Ben-Ahron et al., 1995) correlations of perceived risk with intentions and behavior have been reported. Several explanations for these mixed findings have been outlined by, amongst others, Weinstein and Nicholich (1993). It is, for instance suggested that people may infer their susceptibility judgments from their current behavior (e.g., "I eat healthily, and therefore my risk of cancer is low."), which may lead to negative associations between susceptibility perceptions and concurrent health behavior, as measured in cross-sectional studies. However, meta-analyses have demonstrated significant, but weak, positive correlations between risk perceptions and concurrent health behavior, which coincides with the argument that individuals that currently engage in health protective behavior, do this because they perceive themselves as being at risk (e.g., Floyd et al., 2000; Harrison et al., 1992).

Mixed findings in literature with regard to the predictive value of perceived risk (see Aspinwall et al., 1991; Gerrard et al., 1996) may also be accounted for by its varying operationalization and assessment in various studies and approaches (see Brewer et al., 2007). Both the content of risk perception concepts (e.g., conditional vs. unconditional risk, absolute vs. relative risk, etcetera) and procedures with regard to the indexing of perceived risk (e.g., separate analysis vs. multiplicative or additive functions of susceptibility and severity components) have been subject to substantial variability in previous literature. In their meta-analysis of high-quality studies on the relationship between risk perception and health behavior, Brewer and colleagues (2007) argue that risk perceptions are rightly placed as core concepts in theories of health behavior. However, they do not indicate how or where to incorporate them. Based on the results from the longitudinal study presented in Chapter 6, risk perception may be considered and should be incorporated as a rather distal factor in the behavior change process, mainly exerting its influence in the early stages of behavior change. This consideration corresponds to notions of De Vries and colleagues, who propose risk perception as one of the core premotivational factors in the I-Change Model (De Vries et al., 2003b, 2005b). These findings may be reckoned with in the development of future health behavior interventions, as they imply that the provision of health risk information is mainly suitable for individuals who are not yet sufficiently aware of health risks. Risk information may be effective in getting individuals to move from unawareness towards deliberation of recommended risk-related behaviors. Its impact may, however, not reach beyond this transition.

Furthermore, the inconsistencies in the present thesis with regard to the direct behavioral influence of premotivational factors may relate to the diversity of

behaviors that were assessed. Both disease detection and health protective behaviors were examined, the first of which could be further subdivided into more passively and actively performed behaviors. Whereas premotivational factors did not directly influence the actively performed health protective behavior (i.e., sun protection behavior), their influence was most powerful in passive cancer detection behavior. It may be that the limited goal-directivity of the latter, more passively performed behavior to some extent prohibits conscious deliberation of motivational factors and increases the importance of preceding awareness factors. However, the cross-sectional nature of the concerning study precludes any causal inferences and to some extent limits the weight that can be attributed to its findings. Hence, replication of these findings using longitudinal and experimental studies is required.

Altogether, although the findings with regard to the influence of premotivational factors in Chapters 2 and 6 are not conclusive, they generally subscribe to the conception that premotivational factors are unlikely to have a strong, proximal or direct impact on behavior (Leventhal et al., 1999; Norman & Conner, 2005a). Their influence may be most apparent in earlier stages of health behavior change, a notion that is conceptually shared by various health behavior models, such as the Precaution Adoption Process Model (Weinstein, 1988, 1998), the Health Action Process Approach (Schwarzer, 2008), and the I-Change Model (De Vries et al., 2003b, 2005b). An overview of current evidence on this issue, in the form of reviews or meta-analyses, is, however, indispensable to facilitate the drawing of manifest conclusions.

## **BEYOND MOTIVATION: POSTMOTIVATIONAL FACTORS IN BEHAVIOR CHANGE**

### **Impact and predictive value of action planning in health protective and health risk behaviors**

Three observational and two experimental studies were conducted to investigate the impact and predictive value of action planning with regard to health behavior. In Chapter 6, the behavioral influence of a particular type of action planning, referred to as preparatory planning or the planning of specific preparatory actions, was found to significantly predict parental sun protection behavior over and above the influence of self-efficacy and intention. In Chapter 8, a significant influence of preparatory planning was demonstrated for two types of behaviors, health protective behavior (fruit consumption) and health risk behavior (high-caloric snack consumption). Whereas the efficacy of action planning in promoting the performance of health protective behaviors has been demonstrated rather reliably, the findings with regard to the influence of action planning in the restriction of health risk behavior are rather innovative. Again, action planning exerted its behavioral influence beyond the impact of self-efficacy, intention, as well as past behavior, indicating that not only behavior but also behavior change could be reliably predicted from levels of action planning. Chapter 9 corrob-

rated the findings from previous chapters by demonstrating that both preparatory planning and implemental planning (i.e., the planning of the implementation of behavior) significantly predicted fruit consumption over and above the influence of motivational factors.

Although the independent contribution of action planning was modest, with an additional explained variance in behavior between one and three percent, findings from the three observational studies correspond to results from previous studies (e.g., Luszczynska & Schwarzer, 2003; Sniehotta et al., 2005a, 2006a) and provide consistent support for the inclusion of action planning constructs as a postmotivational factor in existing health behavior models.

Two randomized controlled trials were performed to strengthen the findings from the observational studies. In the first study, described in Chapter 4, the formation of coping plans (i.e., a specific type of action planning, in which anticipated barriers or risk situations are linked to specified coping responses) with regard to the prevention of smoking relapse was found to significantly increase seven-month continuous abstinence rates. No short-term effects of coping planning were, however, demonstrated. The delayed effect of coping planning may indicate that this type of planning plays a more important role in the later stages of behavior change, in which newly adopted behavior should be maintained, as opposed to the action phase in which behavior is initiated. The medium to long-term effects were demonstrated alongside participation in a national smoking campaign, which was found to be highly effective in increasing short- and long-term abstinence rates in the evaluation study described in Chapter 3. In addition to the growing evidence for the efficacy of planning in the promotion of various health protective behaviors (e.g., Gollwitzer & Sheeran, 2006; Sheeran, 2002), this was the first experimental study to rigorously demonstrate the efficacy of plan formation in the cessation of a health risk behavior, i.e., smoking.

The second experimental study on parental sun protection behavior (Chapter 7) yielded comparable results with regard to the efficacy of action planning. Parents who formulated implementation intentions on when, where and how to protect their children from the sun were more likely to perform adequate sun protection behavior in the upcoming summer. This effect was, however, only demonstrated for highly motivated individuals, a finding that coincides with several previous reports of moderation effects in the literature on action planning, and more specifically implementation intentions (e.g., Orbell et al., 1997; Scholz et al., 2008; Sheeran et al., 2005b).

In conclusion, findings from the presented observational as well as experimental studies on the behavioral influence of action planning consistently indicate that action planning increases the likelihood of performance of intended behavior. Additionally, the results lend support to the notion that these types of plans are mostly relevant for individuals that are motivated to change their behavior.

## **Disentanglement of the nature of the relationship between intention, action planning and behavior**

Following the consistent findings with regard to the positive influence of action planning, in-depth analyses on the nature of this influence were performed. Tests of mediation and moderation were completed to disentangle the relationship between intention, action planning, and behavior.

Action planning was found to fully mediate the intention – behavior relationship with regard to fruit consumption (Chapter 8 and 9) and to partially mediate this relationship in sun protection behavior (Chapter 6) and the restriction of snack consumption (Chapter 8). Furthermore, partial mediation of the behavioral influence of self-efficacy by action planning was demonstrated for sun protection behavior (Chapter 6).

The findings with regard to mediating effects of action planning corroborate reports of both full (e.g., Luszczynska & Schwarzer, 2003; Sniehotta et al., 2005a) and partial (e.g., Jones et al., 2001; Norman & Conner, 2005b) mediation in previous studies. Variation with regard to full or partial mediation across studies and behaviors may pertain to varying strengths of the intention – behavior relationships and the recent proposition of moderated mediation of action planning in the intention – behavior relationship. Wiedemann and colleagues (2009) have demonstrated that the strength of the mediated effect of action planning increases along with levels of intentions. The relatively low intention with regard to restricted snack consumption, as compared to fruit consumption and sun protection behavior, may therefore have precluded full mediation of the intention – behavior relationship by action planning. Furthermore, the occurrence of full mediation, as demonstrated in the study on fruit consumption, is more likely when the direct behavioral effect of intention is less powerful. Considering the equal regression weights for the influence of action planning on behavior for fruit consumption and sun protection behavior, the relatively weak direct effect of intention on fruit consumption may therefore have been a more likely candidate for full mediation than the powerful effect of intention on parental sun protection behavior.

Moderating effects of action planning were found in two of the three behaviors investigated, i.e., sun protection behavior and fruit consumption. For these behaviors, a significant *intention x action planning* interaction effect was demonstrated, indicating that individuals who report high levels of action planning are more likely to translate their intentions into behavior. Vice versa, multi-group analyses also demonstrated moderation of the action planning – behavior relationship by intention, indicating that highly motivated individuals are more likely to translate their action plans into actual behavior (Chapter 6). The non-significant moderation in the study on snack consumption may, again, be explained by the fact that the intention scores with regard to restricting snacking behavior were too low and homogeneous for a moderation effect to be detected.

Both experimental studies seem to corroborate the main findings with regard to moderation. A significant moderating effect of intention was found with regard to the efficacy of implementation intention formation in the promotion of adequate sunscreen use; only highly motivated parents benefited from the planning intervention (Chapter 7). Moreover, the sample of smokers recruited for the coping planning intervention (Chapter 4), entirely consisted of high-intenders, as they all participated in a smoking cessation contest which obliged, or at least urged them to undertake a smoking cessation attempt within one month. All participants could therefore be considered 'preparers'. Although we could not explicitly compare the efficacy of the coping planning intervention between high and low intenders, the efficacy of the planning intervention in this study and the moderating effects demonstrated in our as well as other observational and experimental studies are in line with the proposition that, in any case, action plan formation is effective when embedded in firm intentions towards the outcome behavior (e.g., Koestner et al., 2002; Orbell et al., 1997; Scholz et al., 2008; Sheeran et al., 2005b).

In conclusion, substantial support was found for mediating and moderating influences of action planning in the intention – behavior relationship. Interestingly, findings from the observational study on sun protection behavior (Chapter 6) indicate that the combination of both influences, i.e., the simultaneous incorporation of action planning as a mediator as well as moderator in the intention – behavior relationship, yields optimal effects in the bridging of the intention – behavior gap. Postulation of this dual role in health behavior models may therefore be recommended.

### **Optimizing future planning interventions**

While the previous studies suggest that self-regulatory planning is an important concept and strategy in the translation of intentions into behavior, subsequent research is indicated to optimize the measurement of the various types of action planning as a determinant and how to best translate these constructs into behavior change strategies. For this objective we investigated and compared two types of action planning, preparatory planning and implemental planning, that have been elaborated on in previous literature. Furthermore, we attempted to identify characteristics and correlates of effective planning. These efforts will be discussed in separate paragraphs below.

#### *Comparing different types of action planning*

Although substantial distinctions and inconsistencies exist with regard to terminology and conceptualization of planning strategies, at least two mainstreams can be discerned in literature. These pertain to a) preparatory planning, or the planning of a strategic course of preparatory actions aimed at achieving a goal behavior, and b)

implemental planning, or the planning of the implementation of goal-directed actions in specified situations.

In Chapter 9, the influences of both types of action planning were investigated and compared in a longitudinal, observational study on the consumption of fruit. In line with findings from previous studies in which each type of planning was investigated separately (e.g., Abraham et al., 1999b; De Vries et al., 2008; Luszczynska & Schwarzer, 2003; Sniehotta et al., 2005a), both preparatory planning and implemental planning were found to be significant predictors of fruit consumption, independent of the impact of intention and self-efficacy. Implemental planning, however, did not predict current behavior once past behavior was accounted for. Comparison of the added explained variances yielded by inclusion of either type of planning indicated that the contribution of preparatory planning was significantly larger than that of implemental planning. Furthermore, implemental planning did not contribute to the prediction of behavior over and above the influence of preparatory planning when tested simultaneously.

In conclusion, these findings provide a first indication that the planning of strategic goal-directed actions may be particularly important in the prediction of health behavior and tentatively suggest that preparatory planning may under certain conditions be more important than planning when, where, and how to enact goal-directed behavior. However, caution is warranted when interpreting these results, as it cannot be ruled out that dissimilarities and inadequacies in the currently applied operationalizations of planning may account for the differential effects. Furthermore, replication of these findings and further research is required for firm conclusions to be drawn with regard to the types of behaviors and conditions this indication may apply to. It is, for instance, conceivable that implemental planning has a stronger impact when the to-be-performed behavior is relatively simple, whereas for more complex “multi-component” behaviors, such as fruit consumption, breaking down the goal-behavior in a sequence of preparatory actions may be more beneficial. Moreover, the possibility of sequential planning processes may be taken into account; preparatory planning may precede implemental planning in the sense that the planning and execution of preparatory actions sets the stage for implemental planning and facilitates the actual implementation of goal-directed behavior. Future studies are indicated to shed further light onto these possibilities.

#### *Identifying characteristics and correlates of effective planning*

Although implementation intention formation has been proven effective in the promotion of a wide array of health behaviors (Gollwitzer & Sheeran, 2006; Sheeran, 2002), recently, reports of unsuccessful attempts have been surfacing (e.g., Jackson et al., 2005, 2006; Michie et al., 2004; Rutter et al., 2006). Apart from variance in study populations, behaviors, and operationalizations of planning, one important factor that may underlie efficacy discrepancies is the quality of formulated plans. The hypothesis

that indicators of plan quality (i.e., instrumentality, or correctness, and specificity of plans) influence planning efficacy was tested in Chapter 5.

The instrumentality of implementation intentions did not significantly affect the outcome behavior, i.e., smoking abstinence, indicating that it is not the mere 'correctness' or viability of a plan that determines its efficacy. In-depth analysis, however, demonstrated that a very small group of respondents may have distorted the results to some extent; they mostly wrote down nonsense plans and may therefore tentatively be considered as either uninvolved in plan formation, or inadequately committed to upright participation in the study contest. Exclusion of potentially uninvolved participants resulted in small trends, indicating that instrumental planning may be associated with higher smoking abstinence rates. However, these findings are not conclusive and the influence of plan instrumentality and possible confounding factors should be investigated further.

The specificity with which plans were formulated was significantly associated with positive outcome behavior. This main finding is in line with findings from two recent studies by Ziegelmann and colleagues (2006) and De Vet and colleagues (2008), which also found that more detailed planning resulted in higher exercise performance. However, Chapter 5 expands the scope of these findings to the area of health risk behaviors (i.e., smoking) and is somewhat more detailed in its propositions. Whereas medium and highly specific planning resulted in higher abstinence rates than less specific planning, smoking abstinence did not differ between medium and high specificity, indicating that highly detailed planning does not result in additional effects once a certain threshold for specificity is attained. The proposition of a linear association between specificity and behavior efficacy was therefore not fully supported. This may be explained by potential difficulties that are experienced when one or more components of a highly detailed plan are not present or cannot be performed in the specified critical situation of the plan. If the pre-conditions for the specified response cannot be met once the critical situation is encountered, contemplation on alternative responses will be necessary and automatization of the response may be rendered less likely. The formation of medium specific plans may thus suffice the purpose of optimization of planning interventions. Furthermore, it was found that the formation of multiple specific plans exceeded the efficacy of the formation of single or no plans. Although the suggestion that multiple plans increase behavioral efficacy corroborates previous findings of a study by De Vet and colleagues (2008), optimal numbers of plan formation have yet to be thoroughly examined.

Chapter 5 also investigated various demographic and social cognitive factors as potential correlates of the two features of plan quality, i.e., instrumentality and specificity. Gender, educational level, behavioral experience, and intention were found to be significantly associated with plan quality. Women, higher educated individuals, and participants with more behavioral experience (i.e., participants who had made more previous smoking cessation attempts) were more likely to formulate instrumental

plans. Women and participants who were highly motivated to remain abstinent formulated more specific plans than men and participants with weaker intentions.

Lastly, Chapter 5 demonstrates that almost one in four respondents failed to formulate three instrumental plans, indicating that a substantial proportion of individuals were either unwilling or unable to comply with the planning protocol. This proportion is however, relatively low when compared to the few previous studies that have documented non-compliance. In a study by Michie and colleagues (2004), it was found that more than one-third of participants did not comply with intervention instructions to formulate an action plan, whereas De Vet and coworkers (2008) found that almost 40% of respondents were not able or willing to formulate at least one complete and precise implementation. Despite the probability of substantial negative bias in the overall efficacy of planning interventions, issues of non-compliance and possibilities for its preclusion have not been well-documented and should be more profoundly investigated in future studies.

In conclusion, Chapter 5 identifies specificity of plan formation as a moderator of action planning efficacy, recognizes several demographic and socio-cognitive correlates of plan quality, and gives insight into the important problem of non-compliance to planning protocols. Consideration of these findings may substantially contribute to the optimization of future planning interventions.

## **Implications of the findings on postmotivational factors**

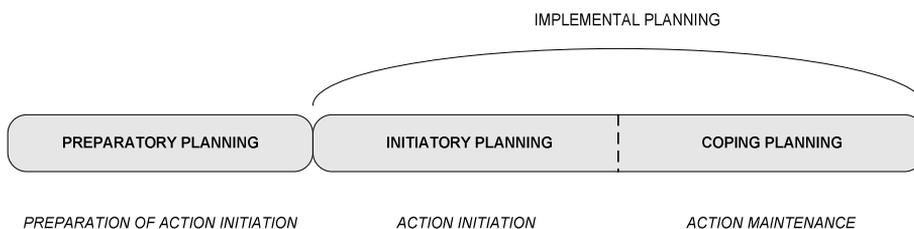
### *Theoretical implications*

The studies presented in this thesis consistently characterize action planning as a significant contributor to the prediction and promotion of health behavior. These findings firmly establish action planning as an important factor in the postmotivational phase of behavior change, both as a determinant to better predict behavior, and as a behavior change strategy. Yet, its added contribution alongside more traditional motivational concepts remained modest and the infamous gap between intentions and behavior has not yet been closed. Research into potential moderators of the influence of action planning and other social cognitive and self-regulatory factors that may help bridge the intention – behavior gap, is therefore strongly recommended. Notwithstanding the relative modesty of its contribution in predictive models of behavior change and the consideration that planning is not a panacea for unhealthy lifestyle behaviors, the current findings imply that existing motivation-based health behavior models and theories would do well to incorporate action planning in their framework. The predictive values of more traditional models, such as the Theory of Planned Behavior (Ajzen, 1991), the Health Belief Model (Janz & Becker, 1984; Rosenstock, 1974) and Protection Motivation Theory (Rogers, 1983), are expected to benefit from this extension.

The present thesis provides some suggestions on the features of the incorporation of action planning in existing models. Based on multiple analyses on the nature

of its influence, it would be recommendable to adopt planning as a mediator as well as moderator in the relationship between intention and behavior. This recommendation concurs with growing evidence for moderating effects generated by empirical research on the efficacy of implementation intentions (e.g., Sheeran et al., 2005b). Existing multi-phase models that recognize the impact of planning in the postmotivational phase, such as the Health Action Process Approach (HAPA; Schwarzer, 1992, 2008) and the I-Change Model (De Vries et al., 2003b, 2005b) have yet to acknowledge this dual role of planning. At present, the HAPA postulates action planning merely as a full mediator in the intention – behavior relationship, whereas the I-Change Model seems to mainly appreciate its moderating role.

With regard to the type of action planning to incorporate, the present thesis provides tentative implications. The study in Chapter 9 explicitly compared the independent influences of two main types of action planning, favoring the planning of preparatory actions (i.e., preparatory planning) over the planning of the implementation of actions in specified situations (i.e., implemental planning). However, this proposition should be addressed with prudence as this was the first study to suggest a distinction in the contribution of these two types of planning and explanations other than those that pertain to mere differences in efficacy may be valid. Future observational and experimental studies should be implemented across different types of behaviors and settings, in order to substantiate these findings and reach consensus on when to use which type(s) of action planning. The possibility of sequential planning processes may, for instance, be taken into account; preparatory planning may precede implemental planning in the sense that the planning and execution of preparatory actions sets the stage for implemental planning and facilitates actual action initiation, as suggested in the graphical representation of planning types in Figure 10.1.



**Figure 10.1** Proposed conceptual and terminological differentiation of action planning types.

We feel that an additional remark with regard to the terminology used to indicate action planning concepts would be appropriate. Whereas the terminology that is mostly used in current literature on action planning is rather narrow, the results of the present thesis suggest the application of multiple types of action planning. In view of potential

ambiguity it would be sensible to use corresponding denominations for the planning types, which may more adequately and clearly represent their proposed functionality. We therefore suggest to further define the terminology as used in the general introduction of this thesis (Chapter 1; see Figure 1.2) and the chapters on the influence of action planning. Whereas the term *action planning* will remain to be used as an umbrella concept, in the remainder of this general discussion we will use the terms *preparatory planning* to indicate the planning of specific preparatory or instrumental acts in the service of goal achievement, *initiatory planning* to indicate the planning of the initiation of goal-directed behavior in anticipated situations, and the functionally related *coping planning* to specifically indicate the planning of coping responses in anticipated situations in order to prevent goal striving from straying off course.

Although all three types of planning, portrayed in Figure 10.1, were examined in the presented studies, the chronological differentiation between these types was not a primary objective. The recognition of the three distinct types of action planning was effectively the result of the various studies that were performed and should be further specified. Accordingly, differences between these distinct constructs and the conditions that determine their impact should be investigated more profoundly in future research. Nevertheless, a delayed effect of coping planning was established in the prevention of smoking relapse (Chapter 4), which may indicate that the main involvement of coping planning takes place later in the behavioral change process, when a newly adopted behavior is to be maintained for a longer period of time. This suggestion concurs with research findings and propositions made by Sniehotta, Ziegelmann, and Scholz and colleagues (Scholz et al., 2008; Sniehotta et al., 2005b; Ziegelmann et al., 2006) in which they argue that action planning (cf. the planning of when, where, and how one intends to act; now described as initiatory planning) primarily promotes the initiation of action, whereas coping planning is grounded upon personal experience with the intended behavior and therefore plays a more important role in maintaining the behavior. A final theoretical implication of the current findings may therefore pertain to the postulation of coping planning influences in the maintenance phase of health behavior models.

### *Practical implications*

Both observational and experimental studies established significant positive effects of action planning in the promotion of various health protective behaviors and the restriction of health risk behaviors. Combined with corroborating evidence in literature (e.g., Gollwitzer & Sheeran, 2006; Sheeran, 2002), these findings imply that practical application of planning interventions in future health promotion programs is recommendable. This may imply applications as a stand-alone intervention, as described in Chapter 7, or as an add-on intervention, as described in Chapter 4. The internet-based self-administered planning interventions used in the present thesis are very brief, inexpensive, and relatively easy to implement. Approximately the same qualities apply to self-administered written interventions, which have also been shown to be effective

(e.g., Milne et al., 2002; Sheeran & Orbell, 2000; Sniehotta et al., 2006b). Furthermore, a study by Ziegelmann and colleagues suggests that researcher-assisted planning protocols result in the formulation of more complete action plans and may be more effective, at least for older individuals, than self-administered interventions (Ziegelmann et al., 2006). However, the substantial increase in time and financial investments and reduction in the number of individuals reached by researcher-assisted interventions should be borne in mind when considering the utilization of planning protocols.

The higher-quality plans derived from research-assisted protocols and the difficulty that some individuals experienced in complying with the planning protocol, as described in Chapter 5, may imply that better and more elaborate instructions are needed to optimize the efficacy of planning interventions. Non-compliance with the protocol may be caused by either unwillingness or inability to formulate plans. For those individuals that are unwilling, it may be beneficial to provide a more detailed explanation of the benefits of planning, whereas individuals that are unable to formulate high-quality plans may benefit from a more detailed instruction on how to formulate good plans. Furthermore, as certain socio-demographic groups were more likely than others to complete the planning intervention, it deserves recommendation to adapt or tailor planning instructions to individuals' personal needs. Apart from these specific adaptations, the main recommendation with regard to future planning interventions pertains to the finding that the specificity of planning is significantly related to behavioral performance and successful goal striving. Future intervention studies may turn this finding to good account by explicitly encouraging participants to furnish action plans with sufficient detail.

Another implication of the findings in this thesis is concerned with the distinction between the two types of implemental planning, initiatory planning and coping planning. In the development of planning interventions, the possibility of sequential planning processes may be reckoned with. Previous and current findings suggest that coping planning primarily affects behavioral performance in the later stages of the change process, when adopted behavior should be maintained (e.g., Scholz et al., 2008; Ziegelmann et al., 2006). A time sequence in the provision of multiple planning interventions may therefore be considered and investigated in order to optimize efficacy. The formation of implemental initiatory plans may be applied in the earlier stages of behavior change, when individuals are planning to adopt a new behavior and initiate behavioral performance. Subsequently, coping planning may be applied to help them maintain the behavior. In this respect, the application of preparatory planning techniques may also deserve merit. Although the efficacy of preparatory planning was not investigated experimentally, findings from all observational studies in this thesis point towards the importance of preparatory planning in the translation of intentions into behavior. If substantiated by experimental findings, future health promoting interventions may benefit from applying this technique and may focus on teaching

individuals to engage in preparatory planning when intending to adopt a new health behavior.

A final implication for practice refers to the consistent support for moderator effects of action planning and intention. The behavioral impact of action planning is sensitive to the strength of the underlying intention, and vice versa, implying that formulating specific plans towards reaching a goal behavior only or mostly works for those individuals with high intentions towards the goal behavior. Motivational interventions, aimed at increasing intentions, therefore remain necessary for individuals low in motivation. Ideally, future interventions in the area of health promotion should consist of a more traditional motivational component, possibly preceded by an awareness-raising premotivational component, as well as a volitional component, in which motivated individuals engage in specific preparatory and implemental planning in order to translate their intentions into actual behavior.

### **General limitations and strengths of the presented research**

The findings of all studies on premotivational and postmotivational factors should be viewed in the light of several general limitations and methodological issues. These issues are elaborated on below. Furthermore, several strengths of the implemented research will be outlined.

#### *Reliance on self-report*

As collection of objective measures of health-related behaviors is often difficult, if not virtually impossible, within research settings that are often restricted by limited time and monetary expenses, all studies presented in this thesis rely on self-reported performance of health behavior. The validity of self-reported health behavior has, however, often been questioned. It is thought that self-reports tend to suffer from social desirability bias and fragmented recall, which indicates that frequent behaviors blend into generic representations that lack time and space and hamper accurate recall, forcing individuals to rely on estimation strategies. As these estimation strategies are often inaccurate, personal behavioral performance is often thought to be over- or underestimated (Schwarz, 1999). Inaccurate estimations may have detrimental effects on future health behavior performance and ultimately individuals' health, as individuals who overestimate their behavioral performance and are therefore unaware of the inadequacy of their own behavior are unlikely to change and improve their behavior (e.g., Brug et al., 1994; Lechner et al., 1998; Ronda et al., 2001).

However, with regard to smoking, biochemical validation by means of, for instance, cotinine and carbon monoxide measurements has indicated high levels of sensitivity and specificity for self-reports (Patrick et al., 1994) and self-administered questionnaires have been found to be as reliable and valid as more objective methods of assessing smoking status (Dolcini et al., 1996). In Chapters 3, 4, and 5 of the

present thesis, self-report data on smoking status was used. Partial verification of self-reports took place by obligatory biochemical assessment of smoking status in participants who were elected as winners in the smoking cessation contest. Accuracy of self-report with regard to fruit consumption (Chapters 8 and 9) was obtained by the use of a validated questionnaire (Van den Brink et al., 2005), whereas the snack consumption measure used in Chapter 8 was based on relevant questions from a validated food frequency questionnaire designed to assess fat intake (Van Assema et al., 2001). Assessments of sunscreen use (Chapters 6 and 7), and cancer detection behaviors (Chapter 2) were based on previously used questionnaires (e.g., De Nooijer et al., 2003; De Vries et al., 2005a, 2005b; Geller et al., 2002; Glanz et al., 1999). Although these questionnaires have not been validated, self-reports of sunscreen use have demonstrated good criterion validity when compared with researcher observation and sunscreen swabbing (O’Riordan et al., 2006). Attentiveness to cancer symptoms has, however, not been subject to extensive study and is extremely difficult to objectively measure due to its passive nature. Furthermore, the relatively low incidence of cancer symptoms in a given population and the inevitable reliance on individuals’ reports with regard to the detection of symptoms restricts the possibilities for measuring actual timely medical help-seeking behavior. Therefore, to our knowledge, no objective verification for these behaviors is currently available. Furthermore, in all studies, we attempted to minimize potential bias by emphasizing the confidential nature of the research, by concealing the main study purposes to the participants, and by maintaining contact with participants exclusively by e-mail or telephone, thereby avoiding any face-to-face contacts and precluding higher probabilities of social desirability bias.

#### *Validity of the concepts under study*

An issue related to the previous paragraph is the validity of the concepts used in the present thesis. With regard to the premotivational concepts under study, the operationalization of risk perception should be mentioned. Perceptions of risks are commonly assumed to comprise an individual’s estimation of susceptibility or vulnerability to a certain illness or threat, and its perceived severity. Although multiple hypotheses with regard to the combination of susceptibility and severity have been suggested (i.e., multiplicative and additive functions; see Becker & Maiman, 1975; Kirscht et al., 1976; Rogers, 1975, 1983), most studies in health behavior literature consider the separate main effects of both concepts. This was also the approach taken in the present thesis. To our knowledge, there have not been any studies that reliably demonstrate significant benefits of the combined operationalization over the separate measurement of susceptibility and severity components. However, it is possible that different operationalizations with regard to the measurement of the susceptibility and severity components (e.g., absolute versus relative and conditional susceptibility), and different conceptualizations (e.g., separate or combined influence of the susceptibility and severity components) would have yielded different results with regard to the behavioral influence of risk perception. Furthermore, the risk perception concepts in this thesis

were not validated and in part suffered from the restricted reliability and content validity that may be associated with single-item measurement. There is an absolute need for more research in this area, which should aim at reaching consensus about the optimal operationalization of the risk perception concept.

It is of particular importance to address the validity of the action planning concepts used in this thesis. Although in recent years the use of planning concepts has prospered in the area of health psychology and health promotion, the validity of their measurements has not been firmly established, thereby restricting the robustness and reliability of the findings with regard to these concepts. Only recently, attempts have been made to validate implemental planning concepts. In a study by Rhodes and colleagues (2006), confirmatory factor analysis indicated that whereas motivation and initiatory planning items possessed discriminant validity, intention and initiatory planning items could not be sufficiently discriminated. Astrom (2008), on the other hand, demonstrated factorial validity of intention and two types of implemental planning, initiatory and coping planning. However, half of the items from the two original planning scales revealed highly correlated random errors and needed to be dropped in order to yield an appropriate fit of the measurement model. Furthermore, although implemental planning is allegedly derived from the concept of implementation intentions (Gollwitzer, 1999), it has been suggested that the item-constructs often used in literature (e.g., Luszczynska & Schwarzer, 2003; Scholz et al., 2008; Sniehotta et al., 2005b) may not sufficiently address the contingency management and stimulus control properties that are central to implementation intentions (see Rise et al., 2003). In view of this concern and the inconsistent results with regard to validity, profound validation of implemental planning concepts is recommended for future research.

Apart from empirical analysis of general goal setting scales (e.g., Lee et al., 1991; Locke & Latham, 1984), the validity of preparatory planning concepts, as measured in the present thesis, has not been profoundly evaluated. As different preparatory acts are relevant for different behaviors, specific preparatory planning concepts will vary between behaviors. It deserves merit for future studies on preparatory planning to develop one basic measurement template and several valid clusters of preparatory acts for separate health behaviors (e.g., fruit consumption, sunscreen use, condom use, exercising, etcetera).

Notwithstanding the apparent lack of validation studies with regard to action planning concepts in relevant literature, the present thesis provides some initial significations with regard to the predictive, construct, and discriminant validity of preparatory planning and initiatory planning. The statistical significance of both types of planning in the prediction of health behavior, over and above the influence of relevant motivational factors, may be considered an indicator of sufficient predictive validity of both concepts. Furthermore, their mutual correlation and their correlations with the related intention concept indicate at least a certain degree of construct validity, whereas adequate fit of the measurement models that resulted from confirmatory factor analyses, imply discriminant validity of both action planning concepts and intention. In

addition, the content of both planning concepts was based on literature review and expert consulting, thereby warranting a certain degree of content and face validity. However, as none of these validity questions have been addressed systematically in the present thesis, profound empirical analysis of both concepts is indispensable for future applications.

*Cross-sectional vs. longitudinal study design*

Although the majority of studies in this thesis were of a longitudinal nature, inferences with regard to the first two research objectives are partially based on studies of cross-sectional design. The study on early cancer detection behavior, described in Chapter 2, was entirely cross-sectional, whereas in the observational study on parental sun protection behavior, described in Chapter 6, premotivational and motivational factors were measured at the same time point. Although common in social sciences (Blossfeld & Rohwer, 1995), the use of cross-sectional study designs complicates the deduction of causal conclusions. Caution is therefore warranted in the interpretation of the findings from Chapters 2 and 6. The possibility of inverse cognition – behavior relationships, as implied by the negative association between perceived susceptibility and medical help seeking in Chapter 2, should therefore be reckoned with.

*Limited contribution of the concepts under study to the explained variance in behavior*

The studies in this thesis collectively aimed to enhance the prediction of health behavior. Although the findings of the studies provide more insight in the process of behavior change, the pre- and postmotivational factors that were investigated resulted in a modest increase in the explanation of behavior and behavior change, over and above the contribution of the commonly assessed motivational factors.

The inclusion of premotivational factors as correlates of cancer detection behaviors (Chapter 2) resulted in an increased variance of approximately five to ten percent of the variance in passive detection behavior and medical help seeking. However, premotivational factors and behavior were measured cross-sectionally in this study, and when the behavioral influence of the premotivational factors knowledge and risk perception was assessed longitudinally in the study on parental sunscreen use (Chapter 6), they did not significantly predict behavior and failed to increase the explained variance. It can therefore tentatively be concluded that premotivational factors are mainly influential early in the behavior change process and do not provide a substantial contribution to the prediction of behavior over and above the influence of motivational factors. Further research is needed to thoroughly investigate the impact of premotivational variables in the premotivational phase of behavior change, or the development of awareness in individuals. In line with conclusions formulated by the Precaution Adoption Process Model (Weinstein, 1988), the I-Change Model (De Vries et al., 2003b, 2005b) hypothesizes that internal and external cues, knowledge, and risk perception contribute to the development of personal awareness of a health threat and related health behaviors. The present thesis has not investigated this particular hy-

pothesis. In the context of cancer-related behaviors, these early processes of behavior change may, however, be particularly relevant, as expeditious progress in health sciences and medicine continuously calls for the initiation of new behaviors, such as the readiness for genetic susceptibility testing (e.g., De Vries et al., 2005a; Mesters et al., 2005) or participation in cancer screening programs (e.g., Blalock et al., 1990; Knops-Dullens et al., 2007).

Whereas the modest and nonsignificant contribution of premotivational factors to the prediction of behavior was anticipated on, the influence of the postmotivational factor action planning was expected to exert a powerful and proximal influence on behavior and to substantially contribute to its prediction. Notwithstanding the consistent significant results with regard to the efficacy and predictive value of action planning, the added explained variance that was yielded by its inclusion, however, remained rather small. This may imply that other postmotivational factors play a role in the prediction of health behavior, and/or that the currently used operationalizations of action planning have not fully encompassed the scope of planning health-related behaviors. This issue reverts to the previous discussion on the validity of action planning concepts and may have resulted in less than optimal measurement of action planning and, subsequently, less than optimal contributions to the prediction of behavior. Future studies should therefore attempt to isolate those plans and preparatory actions that optimally mimic individuals' process of planning specific health behaviors, for instance by gathering extensive information through qualitative research including individual or focus group interviews.

Furthermore, the modest contribution of action planning may pertain to its postulated role as mediator in the relationship between intention and behavior. As a mediating variable, action planning may bridge the intention – behavior gap in the sense that it explicates the causal mechanism by which intention influences behavior; however, inclusion of a mediator variable does not by itself enhance the intention – behavior relationship and does not per definition imply that a greater proportion of the variance in behavior will be accounted for. However, the explanatory value that is gained by incorporating the nature of the influence of action planning in behavior change models may surpass its predictive value when considering the development of interventions. In this respect, the postulation of action planning as a mediator and moderator variable is highly useful as an understanding of the factors that lead some people but not others to perform a certain behavior has important implications for the nature and the content of intervention programs (Sutton, 1998); it tells us not only what factor to target (i.e., action planning), but also who to target (i.e., high-intenders) and what the interventions should look like (i.e., formation of action plans).

Two standpoints can be taken when discussing the contribution of action planning to the prediction of behavior and behavior change. From one point of view, the addition of one to three percent to the prediction of health behavior may not be considered a giant leap forward and may raise the question whether this added predictive value countervails against the loss of parsimony of existing health behavior

models. On the other hand, it may be argued that, as human behavior is constituted of such a complex array of factors that may never be fully unraveled, every step that brings us closer to its explanation should be encouraged. Particularly when viewing the observational findings in the light of the substantial benefits that were gained in the experimental studies, we are very much inclined towards supporting the second standpoint.

#### *Strengths of the presented research*

Consolidation of the results of the presented research on pre- and postmotivational factors is benefited by several study strengths. First, in several of the studies structural equation modeling (SEM) techniques were used to assess the relationships between various independent and dependent variables. SEM techniques bear several advantages over first generation regression models, such as linear regression and analysis of variance. SEM enables the analysis of complex causal networks by modeling the relationships between multiple independent and dependent constructs simultaneously (Gerbing & Anderson, 1988). These intricate networks may characterize real-world processes better than simple correlation-based models, rendering SEM more suited for the mathematical modeling of complex processes, such as the process of behavior change. Furthermore, by combining the analysis of the measurement model (i.e., the assumed causation among a set of dependent and independent variables) and the structural model (i.e., the loadings of measurements on their expected constructs), measurement errors are analyzed as an integral part of the model and factor analysis is combined in one operation with the testing of hypotheses (Gefen et al., 2000). This results in a more rigorous analysis of a proposed research model, and very often, a better methodological assessment tool (Bollen, 1989; Bullock et al., 1994).

The main strengths of the presented research pertain to its overall diversity. Considerable variation was applied with regard to the research designs and research settings, study populations, and types of health behaviors that were investigated, thereby ensuring relative generalizability and external validity of the overall results and conclusions. Both observational and experimental studies were performed, in which parents of young children, adults, as well as elderly people participated. Furthermore, both telephonic and internet-based surveys were used, and a variety of health protective, health risk and disease detection behaviors were investigated. Moreover, all studies had relatively large sample sizes, ranging from 400 to 1600 participants, thereby ensuring adequate statistical power and reducing the risk of research error (Gore & Altman, 1982).

## **Recommendations for future research on premotivational factors**

The present thesis addressed several premotivational factors, amongst others knowledge, awareness of health risks and relevant health behavior, and risk perception. The breadth and depth of study on this subject matter could and should, however, be extended in future research. Future studies may, for instance, benefit from considering the related, yet under-researched issue of individuals' awareness of the adequacy of their own health behavior. Although not included in the present studies, unawareness of engagement in unhealthy behavior or erroneous self-classification with regard to meeting the norm of healthy behavior negatively affects the motivation towards behavior change. So-called 'alleged actors' or 'unaware precontemplators', i.e., individuals who wrongfully consider their behavior to be healthy, do not experience the need to change their behavior towards more healthy standards (e.g., Lechner et al., 1998; Ronda et al., 2001). Unawareness of the inappropriateness of one's own behavior may thus act as an important inhibitor to deliberation of behavior change. Both research and practice would do well to take this type of awareness into account; further studies are needed to indicate the magnitude of this issue in various health behaviors, whereas future interventions, most importantly stage-based or tailored interventions, should incorporate and provide feedback on objective assessments in addition to commonly used self-assessments of health behaviors in order to increase awareness of unhealthy behavior.

As the impact of premotivational factors may vary across studies as a result of differences in study design and types of behaviors investigated (e.g., Brewer et al., 2007), future studies should shed further light on the optimal operationalization and positioning of premotivational factors in the process of behavior change. This may be achieved by assessing their influence in various types of health-related behaviors using longitudinal designs, by testing potential mediating influences of motivational factors, and by comparison of different conceptualizations. The completion of comprehensive and systematic reviews and meta-analyses on the status of various proposed premotivational factors in health behavior research would therefore be recommendable.

Distinctively, research is needed to reflect on the positioning of risk perception in health behavior models and to explicitly investigate whether risk perceptions should be posited as independent precedents of attitude or outcome expectancies, or if they may be better incorporated within these constructs. Moreover, the conceptualization of risk perception deserves extensive consideration. Whereas studies in the present thesis used the two most widely acknowledged components of risk perception, i.e., perceived susceptibility and perceived severity, as separate constructs, combination of these components has been suggested in previous research (i.e., multiplicative or additive functions; see Becker & Maiman, 1975; Kirscht et al., 1976; Rogers, 1975, 1983). No consensus on the conceptualization of risk perception has, however, been reached to date. Future studies should therefore point toward optimal conceptualiza-

tion, in terms of the reliability, validity, and predictive value of this influential premotivational factor.

Lastly, research to test the efficacy of stage-based health promotion interventions, is recommended. The proposition that the influence of premotivational factors mainly takes place early in the process of health behavior change implies that the provision of knowledge and awareness raising information and specific information on the risks associated with a threat or risk behavior would be most beneficial for individuals in the early stages of health behavior change. Thorough investigation of this hypothesis deserves merit as this may contribute to consensus reaching and may provide fruitful directions for optimization of future health behavior interventions.

### **Recommendations for future research on postmotivational factors**

From a virtually inexhaustible set of future perspectives with regard to research on postmotivational factors, four central themes will be extracted and briefly outlined below.

#### *Consensus reaching*

First and foremost, efforts should be combined in order to reach consensus on the operationalization and application of action planning in observational and experimental studies. To this effect, the action planning concepts that are at present widely used should be profoundly validated. Emphasis should be placed on the determination of construct and discriminant validity. With regard to preparatory planning, explorative research is recommended to determine optimal sets of relevant preparatory actions for various health behaviors, whereas the conceptual basis of implemental planning, as often used in observational research, should be further examined. Although implemental planning purportedly originates from Gollwitzer's implementation intentions, it is not clear whether it adequately captures the contingency management and stimulus control properties that are central to implementation intentions (e.g., Rise et al., 2003). Furthermore, discriminant validity of planning concepts should be tested to examine its conceptual differences from intention and motivation concepts. This is of particular importance for observational studies that use questionnaires in the Dutch language, since the item stems for intention and planning concepts tend to share semantic similarities in this language.

Validation and optimization of planning concepts will likely result in higher reliability, validity, and generalizability of study findings. Once validated, the influence of multiple types of action planning can be reliably tested and compared in various settings and behaviors, precipitating the consensus reaching with regard to when to use which type of planning. In addition, there is need for an overview of current evidence with regard to the influence and efficacy of the various types of action planning in observational and experimental studies. Reviews and meta-analyses may contribute

to consensus reaching and provide fruitful directions for future research and applications of action planning.

*In-depth analysis of the intention – behavior gap: mediating and moderating influences*

The presented studies in this thesis focus only on action planning as a postmotivational factor in health behavior change. Although significant, its overall modest contribution to the explanation of behavior implies that other factors may be vital in the translation of intention into behavior. Research into other potential mediators and moderators in the relationship between intention and behavior as well as between action planning and behavior is therefore strongly recommended. Several mediator and moderator candidates will be briefly elaborated on below.

Mediating influences in the intention – behavior and action planning – behavior relationships may derive from other self-regulatory and action control strategies, such as self-monitoring (e.g., Mallach et al., 2006; Sniehotta et al., 2006a), effort and persistence (e.g., Bagozzi, 1992; Thomson et al., 2006). The setting of specific goals and planning of specific actions may for instance increase the effort and persistence that is exerted in the goal striving process, whereby the likelihood of goal achievement is increased (e.g., Sniehotta et al., 2006a; Thomson et al., 2006). Furthermore, commitment to goals, explicated in intentions or specific plans, and specific volitional self-efficacy beliefs may serve as an important mediator in the postmotivational phase and is worthy of further investigation (e.g., Lechner et al., 2007; Luszczynska et al., 2007a).

Moderating influences in the relationship of intention and action planning with behavior may for instance pertain to factors such as high levels of goal conflict and resulting decreased goal commitment (e.g., Kruglanski et al., 2002; Liourta & Van Empelen, 2008), and certain personality or dispositional characteristics, such as socially prescribed perfectionism and conscientiousness (Powers et al., 2005; Prestwich et al., 2003b), which may exert inhibitory influences, whereas high levels of goal commitment (De Nooijer et al., 2006), action orientation (Kuhl, 1985; Norman et al., 2003), and self-concordance or intrinsic regulation of goals (Koestner et al., 2002) may serve a facilitating purpose in the translation of intentions and plans into actual behavior. Furthermore, habit strength may be considered as a potentially important moderator in the intention – behavior relationship (e.g., Kremers & Brug, 2008; Verplanken et al., 1998) and possibly the action planning – behavior relationship (Webb et al., *in press*).

Although the results of the fairly recent research interest in self-regulatory planning strategies are encouraging, research on postmotivational factors is still in relative infancy. By in-depth examination and consideration of the above mentioned and other potential moderators and mediators in the volitional or postmotivational phase, the intention – behavior gap may be gradually diminished. Taking moderators of planning efficacy into account may furthermore eventuate in optimization of future planning interventions, which will be elaborated on below.

*Optimizing the application of action planning: creating (pre)conditions for efficacy*

In addition to the consideration of potential moderators of planning efficacy, it is necessary to increase knowledge about the conditions under which action planning is effective. The three main types of action planning described in this thesis may have differential effects according to the chronology, research populations, and research and behavioral settings they are tested in. Notwithstanding the large amount of studies that have investigated the efficacy of planning, variation in these conditions has been rather limited.

With regard to *chronology*, or timing in the behavior change process, the majority of studies have investigated behavioral performance in samples that cover the entire array of the behavior change process in the sense that they incorporate individuals who have been performing a behavior for a long time, individuals who have just initiated behavior, and individuals who have not yet initiated the behavior, but are preparing, contemplating, or not contemplating to do so. As most studies are set out to test the efficacy of planning in the initiation of behavior, the first two groups of individuals (i.e., maintainers and actors) do not reflect the purpose and may even obscure the interpretation of study findings. As it is suggested that initiatory planning and coping planning have differential effects, depending on their positioning in the behavior change process, it may deserve consideration to tailor the type of planning to individuals' needs. In such 'phase-specific' planning applications, preparers, and possibly recent actors, may be provided with implemental initiatory plans on when, where, and how to initiate healthy behavior, whereas actors and maintainers receive coping planning interventions that suit their specific needs to maintain their healthy behavior and overcome possible setbacks and (re)lapses into unhealthy behavior. Based on its conceptual features, preparatory planning may be considered suitable for application prior to, or possibly in combination with, implemental initiatory planning. By providing such phase-specific interventions and information on self-regulatory planning and possibly other strategies, the complexity and chronic nature of (health) behavior is more rightfully served. However, this consideration and the overall suggestion of individually tailored planning interventions should be substantiated in future studies.

The notion of tailored planning interventions also applies to the *research populations* and the *behavioral settings*, in which the influence and efficacy of action planning is tested. With regard to research populations, the majority of studies have used student samples or samples drawn from the general population. To date, patient populations, high-risk groups, and subgroups of lower social economic status have, for instance, been relatively under-represented in planning research. As these groups may substantially differ with regard to various characteristics, such as (intrinsic) motivation and cognitive capacity, they may require different approaches. As was shown in the present thesis, lower educated individuals were, for instance, less likely to formulate high quality plans. For these individuals it may therefore be helpful to provide more elaborate instructions in the planning intervention. In order to optimize future planning applications, it is recommended to intensify research efforts in this area

and to possibly develop planning interventions that are tailored to the wishes and needs of specific subgroups in the population.

In addition, future applications may also take the behavioral settings into account, implying the use of different types of planning for different types of behavior. Future research is recommended to investigate which type of planning (e.g., preparatory planning, initiatory planning or coping planning) is most suited for which type of behavior (e.g., simple versus complex behavior, one-shot versus repeated behavior, health protective or approach behavior versus health risk or avoidance behavior). To date, particularly avoidance or health risk behaviors have been very much underexposed in planning literature (Gollwitzer & Sheeran, 2006; Prestwich et al., 2006). As the cessation of health risk behaviors, such as smoking or alcohol use, may chiefly require the capability to cope with difficult situations, it deserves merit to investigate whether the reduction of health risk behaviors benefits more from, for instance, coping planning, than from implemental initiatory planning or preparatory planning.

A last recommendation with regard to the preconditions for action planning efficacy pertains to the *research settings* in which its efficacy should be determined. Most studies to date were either of an observational nature or applied an experimental design, in which laboratory or otherwise controlled settings were used. In order to determine effectiveness, there is a definite need for investigating the natural formation of action plans (Orbell & Sheeran, 2000) and adequate testing of planning strategies in field settings, under real-life non-ideal circumstances.

### *Expanding the horizon*

Current applications of planning strategies in health settings mostly pertain to promoting healthy lifestyle behaviors in the overall non-symptomatic general population (but see e.g., Scholz et al., 2007; Sniehotta et al., 2006b). Widening this emphasis on prevention towards applications in patient care and clinical settings may yield substantial health profits. Cross-over and interdisciplinary integration of the knowledge and experience recently gained in behavioral sciences to other scientific areas and vice versa should therefore be encouraged. Planning and other self-regulatory strategies are well-known and often used strategies in Cognitive Behavior Therapy (see e.g., Kanfer, 1979; Lazarus, 1989), a therapeutic approach that incorporates both behavioral and cognitive techniques to support change, predominantly in psychopathological behavior (e.g., Hobbis & Sutton, 2005; Roth & Fonagy, 1996). However, cognitive-behavioral approaches to self-regulation of behavior that are commonly applied in patient care and therapeutic settings, such as individual or group counseling and skill-training sessions, are often fairly intensive (e.g., Hendriks et al., 2008; Herbert et al., 2004). The current studies on action planning substantiate the efficacy of much less extensive protocols, which have the advantage of limited time, effort, and monetary expenditure. Application of such minimal-intensity planning protocols in, for instance, patient's self-management practices and adherence to medication or rehabilitation regimes, may yield significant benefits for both patient and care provider. Utilization of

brief self-regulatory planning interventions as part of specific therapeutic programs may be conceivable, where, as has been indicated by previous research on implementation intentions, particular efficacy may be achieved in patients suffering from executive functioning disorders and problems of action control, such as Attention Deficit Hyperactivity Disorder (ADHD; Gawrilow & Gollwitzer, 2008), schizophrenia (Schmitt, 1997), and frontal lobe lesions (Lengfelder & Gollwitzer, 2001). Prevention and treatment of addictive disorders may also benefit from the use of the specific planning techniques discussed in this thesis (Prestwich et al., 2006). Lastly, although action planning applications have mostly been applied to the regulation of behavior, they may be equally effective in the regulation of thoughts and emotions (e.g., Achtziger et al., 2008; Stewart & Payne, 2008). Clinical and non-clinical applications of particularly implemental planning strategies may be suitable for the suppression of and coping with unwanted thoughts and feelings in everyday life, as well as management of psychological conditions, such as depression and anxiety disorders. Profound exploration of the possibilities for these and likewise applications is therefore strongly recommended in order to expand the horizon of self-regulatory planning strategies.



# SUMMARY

At least one-third of all cancer cases are preventable. Primary cancer prevention relies upon the modification of preventable risk factors, particularly the modification of lifestyle behaviors. The present thesis elaborates on several cancer-related lifestyle behaviors, such as smoking, exposure to ultraviolet radiation, and dietary behaviors. Furthermore, two behaviors related to the early detection of cancer, or secondary cancer prevention, are discussed. All behaviors are outlined within a social cognition approach, which centers on the investigation of factors that determine why individuals do or do not adopt health behaviors.

Several social cognitive models and theoretical frameworks have been developed that aim to identify sets of factors that allow for an optimal explanation and prediction of health behavior. These models to a certain extent overlap and show consensus with regard to the proposition of certain essential factors. Most traditional social cognitive models of behavior change, such as the Theory of Planned Behavior (TPB; Ajzen, 1988, 1991) and Social Cognitive Theory (SCT; Bandura, 1986) focus on motivational factors, or factors that determine the strength of an individual's motivation to perform a health behavior. They generally assume that motivation, or intention, is the most proximal and single most powerful predictor of behavior. Two main criticisms of these 'motivation-based' models pertain to their failure to appreciate the value of more distal, or premotivational, factors and the lack of insight they provide into the processes by which intentions are translated into actual behavior. Particularly the latter criticism was sparked by the rather limited amount of variance in behavior that can be explained by motivational factors, such as self-efficacy expectations and intention, resulting in the so-called 'intention – behavior gap'.

In recent years, multi-phase models of behavior change have received increasing attention in the area of health education and promotion. These models differ from traditional models in so far as they conceptualize health behavior change as encompassing several discrete phases, in which the influence of different factors is proposed. Current multi-phase models, such as the Transtheoretical Model (TTM; Prochaska et al., 1992), Precaution Adoption Process Model (PAPM; Weinstein, 1998), Health Action Process Approach (HAPA; Schwarzer, 1992), and the I-Change Model (De Vries et al., 2003b, 2005b) commonly share a tripartite stage division that incorporates 1) a premotivational phase, in which individuals should become sufficiently aware of a health threat, 2) a motivational phase, in which deliberation on motivational tendencies takes place, and which culminates in intention formation, and 3) a postmotivational phase, which encompasses the striving towards intention realization and ends with successful acting. Whereas propounded factors in the motivational phases have been elaborately investigated in earlier research, research efforts directed towards factors that are thought to exert their influence in the premotivational phase (e.g., risk perception, knowledge) have been limited, and efforts with regard to the explicit investigation of potentially relevant factors in the postmotivational phase (e.g., action planning) have only recently been initiated.

The research projects described in this thesis were set out to investigate the influence of pre- and postmotivational factors in the health behavior change process. With regard to postmotivational factors, emphasis was placed on the influence of self-regulatory planning strategies. The five main research aims of this thesis were outlined in the general introduction (Chapter 1):

- 1) Examination of the relationships between premotivational and motivational factors.
- 2) Investigation of the (independent) influences of premotivational factors on health behavior.
- 3) Investigation of the impact and predictive value of action planning with regard to health protective as well as health risk behavior.
- 4) Disentanglement of the nature of the relationship between intention, action planning, and behavior.
- 5) Optimization of future planning interventions by a) comparing the behavioral influence of different types of planning, and b) identifying characteristics and correlates of effective planning.

A mixture of observational and experimental studies was implemented, collectively aiming to enhance the prediction and promotion of health behavior.

The first two research aims are elaborated on in Chapters 2 and 6. In Chapter 2, an analysis of determinants of two cancer detection behaviors is described. This study of cross-sectional design investigated the associations of various premotivational and motivational factors with a) attentiveness to cancer warning signs, and b) timely medical help seeking. Whereas the former, more passive behavior was mainly associated with premotivational factors, such as knowledge and awareness, the latter, more active behavior was predominantly associated with motivational factors, such as attitude, self-efficacy, and intention. These results are somewhat inconsistent with the findings from the longitudinal study on parental sun protection behavior presented in Chapter 6. In this study, the weak correlations between premotivational factors and the outcome behavior were found to be fully mediated by motivational factors; none of the premotivational factors (i.e., knowledge, perceived susceptibility, and perceived severity) had a direct influence on behavior. In addition, Chapter 6 also elaborates on the relationship between premotivational and motivational factors. In a structural equation model of determinants of parental sunscreen use, associations with motivational factors were low to moderate for perceived susceptibility and perceived severity, and almost nonexistent for knowledge. The premotivational factors were most strongly associated with the attitude concept. As no direct relationships between premotivational factors and intention were demonstrated, the influence of premotivational factors is suggested to be fully mediated by motivational factors, particularly attitude. Although not conclusive, these findings with regard to the influence of premotivational factors overall suggest that premotivational factors are unlikely to have a strong, proximal or direct impact on behavior. Their influence may be most apparent in earlier stages of

health behavior change, a notion that is conceptually shared by various health behavior models, such as the PAPM, HAPA, and I-Change Model.

Chapter 3 describes the evaluation of a national smoking cessation contest. In a randomized controlled trial, the short- and long-term impact and appreciation of the cessation contest and its separate elements was examined. The cessation contest was found to be highly effective, as contest participants were significantly more likely than respondents in the control group to have quit smoking after one month and to remain continuously abstinent in the twelve following months. In an add-on intervention, described in Chapter 4, contest participants that were randomly allocated to an additional intervention group were asked to formulate three coping plans, i.e., implementation intentions on which actions they planned to undertake to refrain from smoking in personal risk situations. Coping plan formation was found to increase seven-month continuous smoking abstinence rates with a significant three to seven percent, based on respondent-only and intention to treat analyses, respectively. The finding that the relatively brief and easy to administer add-on planning intervention was able to significantly increase abstinence rates over and above the effects of the smoking cessation contest is encouraging. In addition to previous evidence for the efficacy of planning in the promotion of various health protective behaviors (e.g., Gollwitzer & Sheeran, 2006), this study explicitly demonstrated the efficacy of plan formation in the cessation of a health risk behavior. Since no short-term effects of coping planning were found, this delayed effect suggests that coping planning, as opposed to action planning, may play a more important role in the later stages of behavior change, in which a newly adopted behavior should be maintained.

With the aim of optimizing plan formation in future applications, the quality of the plans that were formulated in Chapter 4 was rated according to instrumentality and specificity. In Chapter 5, the individual contribution of these features on goal achievement, i.e., smoking abstinence, is described. Although mere instrumentality did not significantly affect behavior, plan specificity positively predicted smoking abstinence. The formation of medium to highly specific plans resulted in higher abstinence rates than plans that were low in specificity, implying that individuals need to be encouraged to furnish their plans with sufficient detail. Furthermore, gender, education, previous behavioral experience, and motivation were found to be correlates of plan quality. These factors should therefore be taken into account in the development of future planning interventions. Chapter 5 also provides insight into the issue of non-compliance with planning protocols. One in four participants made at least one non-instrumental plan, indicating that they were either not willing or unable to complete the planning protocol. Although still relatively low in comparison with other studies, such high proportions of non-compliance may seriously hamper intervention efficacy and should therefore be taken into consideration when developing and testing planning interventions.

Chapters 6 to 9 generally corroborate the main findings with regard to the behavioral efficacy of action planning, described in Chapter 4, and apply the concept

of action planning to other health behaviors. In Chapter 6, a longitudinal observational study into premotivational, motivational and postmotivational determinants of parental sunscreen use is described. This study mainly aimed to investigate the behavioral influence of action planning and to disentangle the nature of its impact in the intention – behavior relationship. Action planning significantly predicted parental sunscreen use over and above the predictive value of motivational factors. Its relative contribution to the explained variance in behavior was significant, but modest (1.5%). Furthermore, strong support was found for the role of action planning as a mediator as well as moderator in the intention – behavior relationship. Multigroup analyses indicated that the intention – behavior relationship was stronger in individuals reporting high levels of action planning. Vice versa, action planning predicted sunscreen use better in individuals who expressed a strong intention towards the behavior. The combination of both influences, i.e., the simultaneous incorporation of action planning as a mediator and moderator, yielded optimal effects in the bridging of the intention – behavior gap by adding 3.3% of explained variance in behavior.

The findings of the study described in Chapter 7 substantiate the proposed moderating influence of action planning. In this study, the effects of action plan formation were tested within a randomized controlled trial. The planning intervention, in which participants were asked to formulate an implementation intention on when and where they planned to use sunscreen, had a significant positive effect on adequate parental sunscreen use. This effect was, however, only demonstrated for motivated parents. With a difference of 13.5%, highly motivated parents in the experimental planning group were significantly more likely to adequately protect their children from the sun than highly motivated parents in the control group, thereby corroborating the moderating influence of action planning in the intention – behavior relationship.

Chapters 8 and 9 discuss the influence of action planning in dietary behaviors. In the longitudinal observational study described in Chapter 8, two types of behaviors are investigated: health protective behavior (i.e., fruit consumption) and health risk behavior (i.e., high-caloric snack consumption). The influence of action planning on the restriction of health risk behaviors has only sporadically been investigated, but this study indicated that its influence is equally powerful in both types of behaviors. Furthermore, evidence for mediation of the intention – behavior relationship was found for both behaviors, thereby replicating findings described in Chapter 6.

In Chapter 9, the behavioral influences of two mainstream planning strategies were investigated and compared in a longitudinal study on the consumption of fruit. Both preparatory planning, i.e., the planning of specific goal-directed preparatory actions, and implemental planning, i.e., the planning of the implementation of goal-directed actions in specified situations, were found to be significant predictors of fruit consumption, thereby corroborating findings from the previous chapters. Incorporating preparatory planning in the predictive model yielded a significantly larger, though still modest (3.0%), proportion of added explained variance in behavior than the inclusion of implemental planning (1.3%). Furthermore, implemental planning did not contribute

to the prediction of behavior over and above the influence of preparatory planning when tested simultaneously. In order to initiate health behavior it may therefore be of particular concern to break down the goal behavior in a sequence of preparatory actions and strategies.

In the last chapter of this thesis (Chapter 10) the main results of all studies are briefly outlined and implications, shortcomings and strengths of the implemented research are discussed. Furthermore, several recommendations for future research on pre- and postmotivational factors are elaborated on. With regard to the influence of premotivational factors, it is tentatively concluded that premotivational factors, such as risk perception and knowledge, are unlikely to have a strong proximal influence on behavior. Their impact may be most apparent in earlier stages of health behavior change, when awareness with regard to health risks is raised. However, as the studies on premotivational factors were rather explorative, in-depth research is required for derivation of more decisive conclusions.

With regard to the influence of postmotivational factors, it is concluded in Chapter 10 that action planning is an important mediating and moderating factor in the relationship between intention and behavior. In observational studies, its contribution to the prediction of behavior is significant, but modest. Although it is recommended to incorporate action planning in existing health behavior models, other postmotivational factors should also be considered in order to close the intention – behavior gap. In view of its efficacy in promoting health protective behavior and restricting health risk behavior and the general efficiency with which planning interventions can be implemented, it deserves merit to consider implementing planning protocols in future interventions aimed at promoting healthy behavior.

# SAMENVATTING

Tenminste een derde van alle gevallen van kanker kan voorkomen worden. Primaire kankerpreventie richt zich voornamelijk op de modificatie van vermijdbare risicofactoren voor kanker, in het bijzonder het veranderen van gezondheidsgedragingen. Dit proefschrift behandelt verschillende gezondheids-gedragingen die aan kanker zijn gerelateerd, zoals roken, blootstelling aan ultraviolette straling, en voedingsgedrag. Daarnaast worden twee gedragingen onderzocht die zijn gerelateerd aan secundaire preventie van kanker, of het vroegtijdig ontdekken van kanker. De gedragingen worden onderzocht binnen het raamwerk van de sociaal cognitieve benadering. Deze benadering richt zich op het onderzoeken van factoren die bepalen of mensen wel of niet bepaalde gedragingen uitvoeren.

In de afgelopen decennia zijn verschillende sociaal cognitieve modellen en theoretische kaders ontwikkeld die tot doel hebben een verzameling factoren te identificeren die leidt tot een optimale verklaring en voorspelling van gedrag. Deze modellen overlappen in zekere mate en zijn eensgezind wat betreft de propositie van bepaalde essentiële factoren. De meeste traditionele sociaal cognitieve modellen van gedragsverandering, zoals de Theory of Planned Behavior (TPB; Ajzen, 1988, 1991) en Social Cognitive Theory (Bandura, 1986) concentreren zich op motivationele factoren, of factoren die de sterkte van iemands motivatie om een bepaald gedrag uit te voeren, bepalen. Deze modellen veronderstellen doorgaans dat motivatie, of intentie, de beste en meest proximale voorspeller van gedrag is. Twee belangrijke kritieken op deze “motivatie-gestuurde” modellen betreffen hun gebrek aan evaluatie van meer distale, of premotivationale, factoren en het gebrek aan inzicht in de processen die ervoor zorgen dat een intentie daadwerkelijk wordt omgezet in gedrag. Vooral deze laatste kritiek is aangewakkerd door de betrekkelijk beperkte hoeveelheid variatie in gedrag die kan worden verklaard door motivationele factoren, zoals eigen effectiviteitsverwachtingen en intentie, wat resulteert in de zogenoemde ‘intentie – gedragskloof’.

Op het gebied van gezondheidsvoorlichting en –bevordering is er recentelijk veel aandacht uitgegaan naar multi-fase modellen van gedragsverandering. Deze modellen verschillen in zoverre van de traditionele modellen dat zij gedragsverandering conceptualiseren als een proces dat plaatsvindt in verschillende fasen, waarin de invloed van verschillende factoren wordt verondersteld. Huidige multi-fase modellen, zoals het Transtheoretical Model (TTM; Prochaska et al., 1992), Precaution Adoption Process Model (PAPM; Weinstein, 1988), Health Action Process Approach (HAPA; Schwarzer, 1992), en het I-Change Model (De Vries et al., 2003b, 2005b) delen over het algemeen de veronderstelling van een driedelige fase-indeling, welke de volgende fasen incorporeert: 1) een premotivationale fase, waarin individuen voldoende bewust moeten worden van een gezondheidsrisico en het relevante gezondheidsgedrag, 2) een motivationele fase, waarin beraadslaging over het doelgedrag plaatsvindt en welke uitmondt in de vorming van een intentie, en 3) een postmotivationale fase, waarin het individu streeft naar en zich inspant om het doelgedrag uit te voeren en welke eindigt met het succesvol uitvoeren van het doelgedrag. Terwijl eerdere studies

de veronderstelde factoren in de motivationele fase reeds uitvoerig hebben onderzocht, is onderzoek naar factoren in de premotivationale fase (bijvoorbeeld risicoperceptie, kennis) relatief beperkt en is er pas recentelijk onderzoek op gang gebracht naar mogelijk relevante factoren in de postmotivationale fase (bijvoorbeeld action planning).

De onderzoeksprojecten die in dit proefschrift zijn beschreven hadden tot doel om de invloed van pre- en postmotivationale factoren in het proces van gedragsverandering te onderzoeken. Met betrekking tot postmotivationale factoren is de nadruk gelegd op de invloed van zelf-regulatieve planning strategieën. De vijf voornaamste doelstellingen van dit proefschrift zijn beschreven in de algemene introductie (Hoofdstuk 1):

- 1) Onderzoeken van de relaties tussen premotivationale en motivationele factoren.
- 2) Onderzoeken van de (onafhankelijke) invloeden van premotivationale factoren op gezondheidsgedrag.
- 3) Toetsen van de effecten en predictieve waarde van action planning met betrekking tot gezondheidsbeschermende en gezondheidsrisico-gedragingen.
- 4) Ontrafelen van de aard van de relatie tussen intentie, action planning, en gedrag.
- 5) Optimaliseren van toekomstige planning interventies door a) de invloed van verschillende typen planning op gedrag te vergelijken, en b) kenmerken en correlaten van effectieve planning te identificeren.

Een mengeling van observationele en experimentele studies is uitgevoerd die gezamenlijk tot doel hadden de voorspelling en bevordering van gezondheidsgedrag te verbeteren.

De eerste twee onderzoeksdoelen worden behandeld in Hoofdstuk 2 en 6. In Hoofdstuk 2 wordt een determinantenanalyse van twee kanker detectie gedragingen beschreven. Deze cross-sectionele studie onderzocht de verbanden tussen verschillende premotivationale en motivationele factoren en a) alertheid op waarschuwingstekens van kanker, en b) tijdig medisch hulpzoekgedrag. Terwijl het eerste, meer passieve gedrag voornamelijk gerelateerd was aan premotivationale factoren, zoals kennis en bewustzijn, was het tweede, actief uitgevoerde gedrag voornamelijk gerelateerd aan motivationele factoren, zoals attitude, eigen effectiviteit, en intentie. Deze resultaten zijn enigszins inconsistent met de bevindingen uit de longitudinale studie naar ouderlijk zonbeschermingsgedrag, beschreven in Hoofdstuk 6. Uit deze studie bleek namelijk dat de zwakke correlaties tussen premotivationale factoren en gedrag volledig gemedieerd werden door motivationele factoren; geen enkele van de premotivationale factoren (kennis, gepercipieerde vatbaarheid, en gepercipieerde ernst) had een directe invloed op gedrag. Daarnaast is in Hoofdstuk 6 ook de relatie tussen premotivationale en motivationele factoren onderzocht. Een structural equation model van de determinanten van ouderlijk zonbeschermingsgedrag liet zien dat de associaties tussen de risicoperceptie concepten (vatbaarheid en ernst) en de motivationele

factoren zwak tot matig waren, terwijl er tussen kennis en de motivationele factoren nagenoeg geen verband bestond. De premotivationale factoren waren het sterkst gerelateerd aan het attitude concept. Aangezien er geen directe relatie werd aangetoond tussen premotivationale factoren en intentie, kan worden geconcludeerd dat de invloed van premotivationale factoren volledig wordt gemedieerd door motivationele factoren, met name attitude. Hoewel de bevindingen met betrekking tot de invloed van premotivationale factoren niet eenduidig zijn duiden zij erop dat het onwaarschijnlijk is dat premotivationale factoren een sterke, proximale of directe invloed hebben op gedrag. Hun invloed lijkt bovenal te worden uitgeoefend in de eerdere fasen van gedragsverandering, een veronderstelling die wordt gedeeld door verschillende gedragsverklarende modellen, zoals het PAPM, HAPA, en het I-Change Model.

Hoofdstuk 3 beschrijft de evaluatie van een nationale stoppen-met-roken wedstrijd. In een randomized controlled trial worden de korte en lange termijn effecten van de wedstrijd getoetst. Daarnaast worden de effecten en de waardering van de verschillende onderdelen van de interventie onderzocht. De stoppen-met-roken interventie bleek zeer effectief; zowel op de korte termijn (na één maand) als lange termijn (na twaalf maanden) bleken deelnemers aan de interventie significant vaker abstinente te zijn dan respondenten in de controle groep. In een additionele interventie, welke beschreven is in Hoofdstuk 4, werd een at random gekozen groep deelnemers aan de stoppen-met-roken wedstrijd gevraagd om drie coping plannen in de vorm van implementatie intenties te formuleren. In deze coping plannen gaven respondenten aan wat zij van plan waren te doen om te voorkomen dat zij in bepaalde persoonlijke risicosituaties weer zouden gaan roken. Het maken van deze plannen bleek een significant effect te hebben op continue abstinentie; respondent-only en intention to treat analyses lieten zien dat de continue zevenmaandse abstinentie percentages in de experimentele groep drie, respectievelijk zeven, procent hoger waren dan in de controle groep. Het feit dat deze relatief korte en makkelijk uitvoerbare additionele interventie significante lange-termijn effecten opleverde, naast de reeds effectieve stoppen-met-roken wedstrijd, is een zeer bemoedigend resultaat. Naast een reeks van positieve resultaten met betrekking tot de effectiviteit van action planning in het bevorderen van gezondheidsbeschermende gedragingen (e.g., Gollwitzer & Sheeran, 2006), toont deze studie aan dat het maken van actieplannen ook effectief kan zijn in het vermijden of stoppen van gezondheidsrisico-gedragingen. Er werden geen korte termijn effecten van de planningsinterventie gevonden. Dit vertraagde effect van coping planning kan erop duiden dat coping planning een belangrijkere rol speelt in de latere stadia van gedragsverandering. Daar waar action planning mogelijk het meest effectief is in het initiëren van gedrag, is coping planning mogelijk voornamelijk van belang bij het volhouden van gedrag.

In een nieuwe studie is de kwaliteit van de in Hoofdstuk 4 beschreven coping plannen beoordeeld. Hoofdstuk 5 beschrijft deze studie en geeft aan hoe de plannen zijn geclassificeerd op basis van de mate van correctheid ('instrumentality') en concreetheid, of specificiteit. Analyses naar de individuele effecten van deze twee ken-

merken op het uitkomstgedrag, abstinentie van roken, lieten zien dat enkel de correctheid van plannen geen significante invloed had op gedrag. De mate van specificiteit bleek echter een positieve voorspeller; het formuleren van matig tot zeer specifieke plannen resulteerde in significant hogere abstinentie percentages dan weinig specifieke plannen. Deze bevinding impliceert dat respondenten gestimuleerd moeten worden om hun plannen zo concreet mogelijk te maken en deze te voorzien van voldoende detail. Verder kwamen uit dit onderzoek enkele correlaten van de kwaliteit van geformuleerde plannen naar voren. Geslacht, opleidingsniveau, gedragservaring, en motivatie bleken significant gerelateerd te zijn aan de kwaliteit van de gemaakte plannen. Het verdient derhalve aanbeveling om bij de ontwikkeling van planningsinterventies rekening te houden met deze factoren. Hoofdstuk 5 geeft ook inzicht in het probleem van non-compliance, oftewel het niet volgen of voleindigen van het interventie protocol. Circa één op de vier deelnemers (23%) maakte tenminste één incorrect plan. Dit kan duiden op onbereidwilligheid of onvermogen om het planning protocol te voleindigen. Hoewel dit percentage relatief laag is in vergelijking met andere studies, kan deze non-compliance een serieuze bedreiging vormen voor de effectiviteit van de interventie en dient hier rekening mee te worden gehouden bij het ontwikkelen en toetsen van planning interventies.

Over het algemeen bevestigen Hoofdstuk 6 tot en met 9 de belangrijkste resultaten met betrekking tot de effectiviteit van action planning, zoals beschreven in Hoofdstuk 4. In Hoofdstuk 6 tot en met 9 wordt het concept action planning toegepast op andere gezondheidsgedragingen en wordt de aard van de invloed van action planning op gedrag verder uitgediept. In Hoofdstuk 6 wordt een longitudinale observationele studie naar premotivationale, motivationele, en postmotivationale determinanten van ouderlijk zonbeschermingsgedrag beschreven. Deze studie had als voornaamste doel om de invloed van action planning op gedrag te onderzoeken en de aard van de relatie tussen intentie, action planning, en gedrag te ontrafelen. Action planning was een significante voorspeller van gedrag, naast de invloed van motivationele factoren zoals eigen effectiviteit en intentie. Met een additionele bijdrage van 1.5% in de verklaarde variantie van gedrag was de invloed van action planning significant, maar bescheiden. Verder werd er sterk bewijs gevonden voor zowel een mediërende als modererende invloed van action planning in de relatie tussen intentie en gedrag. Multigroup analyses lieten zien dat de intentie – gedragsrelatie sterker was in individuen die een hoge mate van action planning rapporteerden. Vice versa voorspelde action planning het doelgedrag beter in individuen die een hoge intentie hadden om het gedrag uit te voeren. De combinatie van beide invloeden, dat wil zeggen het gelijktijdig incorporeren van action planning als mediator en moderator, leverde 3.3% extra verklaarde variantie in gedrag op en bleek optimaal in het verkleinen van de kloof tussen intentie en gedrag.

De bevindingen die zijn beschreven in Hoofdstuk 7 bevestigen de modereerende invloed van action planning. In deze studie zijn de effecten van het opstellen van actie plannen onderzocht in een randomized controlled trial. De planningsinterven-

tie, die bestond uit het formuleren van een implementatie intentie over wanneer en waar men van plan was anti-zonnebrandmiddel te gebruiken, had een significant positief effect op adequaat ouderlijk zonbeschermingsgedrag. Dit effect was echter alleen aantoonbaar voor gemotiveerde ouders. Met een verschil van 13.5% vertoonden significant meer hoog-gemotiveerde ouders in de experimentele planningsgroep adequaat zonbeschermingsgedrag dan hoog-gemotiveerde ouders in de controle groep. Deze interactie tussen intentie en action planning bekrachtigt de gehypothetiseerde modererende invloed van action planning in de intentie – gedragsrelatie.

In Hoofdstuk 8 en 9 wordt de invloed van action planning in voedingsgedrag behandeld. In de longitudinale observationele studie die is beschreven in Hoofdstuk 8 worden twee typen gedrag onderzocht: gezondheidsbeschermend gedrag – in deze studie gerepresenteerd door fruitconsumptie – en gezondheidsrisico-gedrag, gerepresenteerd door de consumptie van calorierijke snacks. Daar waar de invloed van action planning in het beperken van gezondheidsrisico-gedrag, en meer specifiek op het gebied van voeding, tot nu toe slechts sporadisch is onderzocht, liet deze studie zien dat de grootte van de invloed van action planning in beide typen gedrag vergelijkbaar is. Daarnaast werd het mediërend effect van action planning in de intentie – gedragsrelatie, zoals eerder beschreven in Hoofdstuk 6, gerepliceerd.

Hoofdstuk 9 beschrijft een longitudinale studie waarin de invloeden van twee typen planning op fruitconsumptie worden onderzocht en vergeleken. Aansluitend aan resultaten in eerdere hoofdstukken, bleken zowel preparatory planning, oftewel het plannen van specifieke doelgerichte voorbereidende acties, als implemental planning, oftewel het plannen van de implementatie van doelgerichte acties in specifieke situaties, significante voorspellers van fruitconsumptie. Het includeren van preparatory planning in het predictieve model leverde een significant hogere verklaarde variantie (3.0%) in gedrag op dan de inclusie van implemental planning (1.3%). Daarnaast droeg implemental planning, in tegenstelling tot preparatory planning, niet meer significant bij aan de voorspelling van gedrag wanneer de twee typen planning gelijktijdig in het regressiemodel werden opgenomen. Dit kan erop duiden dat het met name belangrijk is om een doelgedrag uit te splitsen in een reeks voorbereidende acties en strategieën die uiteindelijk de initiatie van het gewenste gezondheidsgedrag faciliteren.

In het laatste hoofdstuk van dit proefschrift (Hoofdstuk 10) worden de belangrijkste resultaten van alle studies kort samengevat en worden theoretische en praktische implicaties en beperkingen van het uitgevoerde onderzoek weergegeven. Daarnaast worden suggesties en aanbevelingen gedaan voor toekomstig onderzoek naar pre- en postmotivationale factoren. Met betrekking tot premotivationale factoren kan voorzichtig geconcludeerd worden dat het onwaarschijnlijk is dat premotivationale factoren als risicoperceptie en kennis een sterke proximale invloed hebben op gezondheidsgedrag. Hun invloed lijkt het meest zichtbaar in de eerdere fasen van gedragsverandering, wanneer bewustzijn ten aanzien van gezondheidsrisico's en gedragingen wordt bepaald. Echter, gezien de gedeeltelijk cross-sectionele en explo-

ratieve aard van de studies naar premotivationale factoren, is meer onderzoek aange-  
wezen om sluitende conclusies aan deze resultaten te verbinden.

Met betrekking tot de invloed van postmotivationale factoren concludeert Hoofdstuk 10 dat action planning een belangrijke mediërende en modererende factor is in de relatie tussen intentie en gedrag. In observationele studies bleek de bijdrage van action planning significant, maar bescheiden. Het verdient aanbeveling om action planning te incorporeren in bestaande sociaal cognitieve gedragsmodellen. Desalniettemin dienen andere postmotivationale factoren te worden overwogen en onderzocht om de kloof tussen intentie en gedrag te dichten. Gezien de effectiviteit van planningsinterventies in het bevorderen van gezondheidsbeschermend gedrag en het beperken van risicogedrag, en de efficiëntie waarmee deze interventies kunnen worden geïmplementeerd verdient het aanbeveling om het gebruik van planningscomponenten in toekomstige gedragsinterventies te stimuleren.



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# CURRICULUM VITAE

Liesbeth van Osch was born on August 5, 1980 in Roermond, the Netherlands. In 1998, she received her Gymnasium diploma cum laude at the Bisschoppelijk College Schöndeln in Roermond. She started her study Psychology, discipline Neuropsychology, at Maastricht University, from which she graduated with distinction in August 2002. Immediately after her graduation she went to work at the Department of Pharmacology of Oxford University, England, where she worked as a researcher at the OPTIMA (Oxford Project To Investigate Memory and Ageing) project and investigated several neurological and psychosocial aspects of memory disorders and Alzheimer's disease. Subsequently, she moved to the United States to work as a researcher at the Department of Geriatrics of the University of Arkansas for Medical Sciences in Little Rock, Arkansas. Upon her return to the Netherlands in 2003, she studied Health Promotion and Health Education at the Open University and worked at the Netherlands Organization for Health Research and Development (ZonMw) in The Hague.

In June 2004, Liesbeth started her PhD project at the Department of Health Education and Health Promotion at the Faculty of Health, Medicine and Life Sciences of Maastricht University. This project concerned a research collaboration with the Prevention and Patient Support Division of the Dutch Cancer Society and encompassed consultation and evaluation of various health education programs of the Dutch Cancer Society. For her thesis, she carried out several studies to investigate the influence of pre- and postmotivational factors on health behavior, with an emphasis on self-regulatory planning strategies.

In January 2008, she was appointed an Assistant Professorship in Health Communication and Social Oncology at the same department, where she is currently dividing her time between research and teaching.

# PUBLICATION LIST

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Van Osch, L., Lechner, L., Reubsaet, A., De Nooijer, J., & De Vries, H. (2007). Passive cancer detection and medical help seeking for cancer symptoms: (in)adequate behavior and psychosocial determinants. *European Journal of Cancer Prevention, 16*, 266-274.

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