

2. THEORY

Determinants of the reasons why people engage in health-promoting behaviors are described by social-cognitive health behavior change models. The most prominent models are the Health Belief Model, the Theory of Planned Behavior (TPB), and the Protection Motivation Theory (for an overview and critique of these and other models, see Abraham & Sheeran, 2000; Renner & Schwarzer, 2003a). The focus of these models has been on identifying a parsimonious set of predictors for forming an intention to adopt health promoting behaviors. Predictors are constructs such as perceived barriers, social norms, disease severity, personal vulnerability, perceived self-efficacy, etc. The current revised versions of these health behavior models share several common predictors. Outcome expectancies and perceived self-efficacy, in addition to personal vulnerability, are considered to play a major role in the intention formation process, (Bandura, 1997, 2000; Schwarzer, 1992; Weinstein, 1993). The wording of the predictors differs in these theories, but their meaning is comparable. For example, behavioral beliefs (as precursors of attitudes) can be equated to outcome expectancies, and behavioral control can be more or less matched to perceived self-efficacy (see also Noar & Zimmerman, 2005; Weinstein, 1993).

The Health Action Process Approach (HAPA) shares the basic concepts of most current models and extends these intention formation models by including an additional “postintentional” phase in which intentions are translated into actions (Lippke, Ziegelmann, & Schwarzer, 2004a; Luszczynska & Schwarzer, 2003; Renner & Schwarzer, 2003a, 2005; Schwarzer, 1992; Schwarzer, Luszczynska, Schütz, Ziegelmann, & Scholz, 2007; Schwarzer & Renner, 2000; Sniehotta, Scholz, & Schwarzer, 2005, 2006; Ziegelmann, Lippke, & Schwarzer, 2006). Thus, HAPA also incorporates basic ideas from stage models, for instance the Transtheoretical Model (TTM, Prochaska, Johnson, & Lee, 1998) and the Precaution Adoption Process Model (PAPM, Weinstein, 2003) and can therefore be considered to be a useful integration of current social-cognitive health behavior models. In the next session the main assumptions of the HAPA-Model will be discussed in more detail.

2.1. THE HAPA-MODEL - A HEALTH BEHAVIOR CHANGE MODEL

HAPA suggests a distinction between (a) *preintentional motivation* processes that lead to a behavioral intention, and (b) *postintentional volition* processes that lead

to the actual health behavior. Within both phases, different patterns of social-cognitive predictors may emerge. In the preintentional motivation phase, risk perception, outcome expectancies, and action self-efficacy are seen as antecedents for intention formation. *Risk perception* addresses the perceived vulnerability for certain diseases. It may set the stage for a contemplation process and further elaboration of thoughts about consequences of risk behaviors and one's competence to overcome them. *Outcome expectancies* are seen as being mainly influential in the motivation phase, when a person balances the pros and cons of certain behavioral consequences. Further, perceived *action self-efficacy*, that is the belief in one's capability to perform a desired action, is conceptualized as another determinant of intention formation. After a person develops an inclination towards practicing a particular health behavior, the "good intention" has to be transformed into detailed instructions on how to perform the desired action within the postintentional volition processes. The terms *planning* and *implementation intentions* have been used to address this phenomenon (Armitage, 2004; Gollwitzer, 1999; Sheeran, 2002). Intentions do not induce actions directly, but need to be mediated by planning, which represents a self-regulatory strategy. *Coping self-efficacy* contributes to the successful accomplishment of a desired action during the volitional phase. In the following section, the two constructs, phase-specific self-efficacy beliefs and planning, are explained in more detail.

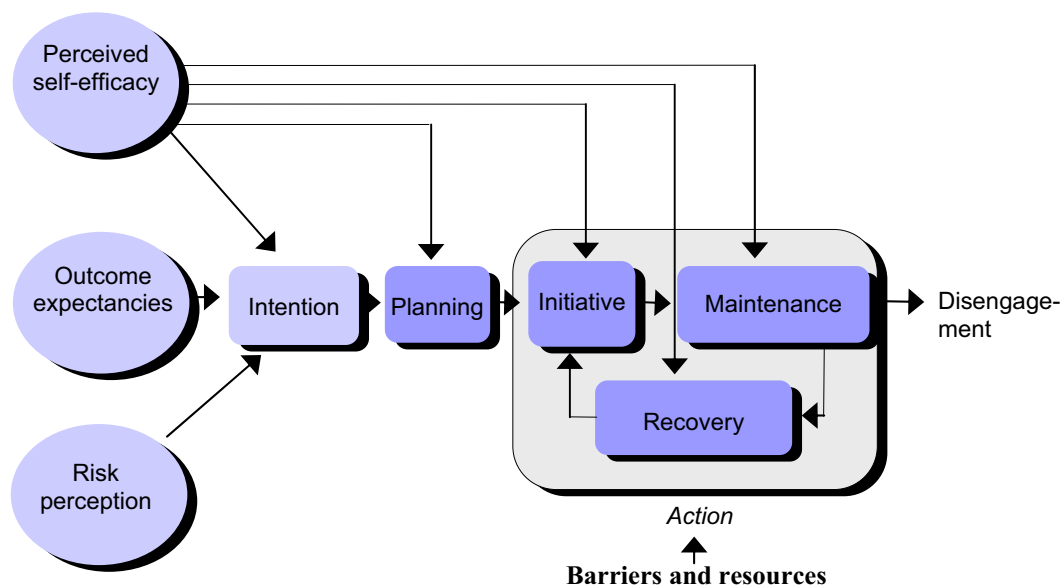


Figure 1: Health Action Process Approach (HAPA) Model (after Renner & Schwarzer, 2003)

2.1.1 Phase-Specific Self-Efficacy Beliefs

Perceived self-efficacy has been found important at all stages in the health behavior change process (Bandura, 1997), but it does not always represent exactly the same construct. Marlatt, Baer, and Quigley (1995) have introduced the concept of phase-specific self-efficacy, distinguishing between action self-efficacy, coping self-efficacy, and recovery self-efficacy.

The rationale for the distinction between various phase-specific self-efficacy beliefs is that during the course of health behavior change different tasks have to be mastered, and that different self-efficacy beliefs are required to master these tasks successfully. For example, a person might be confident in his or her capability to be physically active in general (i.e., high action self-efficacy), but might not be very confident of being able to maintain this activity on a long-term basis (low coping self-efficacy). Action self-efficacy refers to the first phase of the process, in which an individual does not yet act, but develops a motivation to do so. Coping self-efficacy (also labeled maintenance self-efficacy; Luszczynska & Schwarzer, 2003; Sniehotta, et al., 2005) describes optimistic beliefs about one's capability to deal with barriers that arise during the maintenance period (Schwarzer & Renner, 2000). In studies applying the HAPA model, action self-efficacy emerged as a significant predictor of

intentions, whereas coping self-efficacy contributed to the prediction of eating a low-fat and high-vitamin diet (Schwarzer & Renner, 2000; Renner & Schwarzer, 2005; see Sniehotta et al., 2005 for physical activity).

2.1.2 Planning

Intentions are more likely to be translated into action when people develop success scenarios and preparatory strategies of approaching a difficult task. Such preparatory strategies comprise planning. Planning can be further divided into action planning and coping planning. Action planning (Leventhal, Singer, & Jones, 1965) specifies when, where, and how to act. It is synonymous with the term implementation intention (Gollwitzer, 1999). In Milne, Orbell, and Sheeran's study (2002), for example, those students who formed action plans of when (day or days and time of day) and where they will take part in physical exercise were actually exercising at follow-up. Action plans are more effective than intentions when it comes to the likelihood of actual performance of behavior, mainly because the behavior is being elicited almost automatically when the relevant situational cues are encountered (Armitage, 2004; for an overview and meta-analysis, see Sheeran, 2002). Coping planning (Sniehotta et al., 2006) can help a person to overcome obstacles and to cope with difficulties by anticipating personal risk situations (i.e. situations that endanger the execution of intended behaviors) and by preparing suitable coping responses. Participants who formed such coping plans in addition to action plans developed higher physical activity levels in comparison with those who formed action plans only (Sniehotta et al., 2006).

2.1.3 HAPA - a Dynamic Stage Model

HAPA is conceptualized as a dynamic *stage model* that makes a distinction between a preintentional motivational phase and a postintentional volition phase of health behavior change (Renner & Schwarzer, 2003a; Renner & Schwarzer, 2005; Schwarzer, 1992; Schwarzer & Renner, 2000). Continuum models such as the Theory of Planned Behavior are aimed at identifying psychological constructs that influence intention and behavior while combining them to a single prediction equation (cf. Weinstein, Rothman, & Sutton, 1998). Thus, every person might execute a behavior

with certain probability ranging from very low to very high depending on strength of his/her health beliefs. Because the prediction of behavior is based on a single equation, a mechanism for the initiation of behavior is expected to be the same for everyone. In contrast to continuum models, stage models are based on the assumption that individuals move through discrete stages when adopting a health behavior (Prochaska & DiClemente, 1983; Prochaska, DiClemente, & Norcross, 1992; Weinstein & Sandman, 2002). Hence, people at different stages are assumed to require different interventions to help them move one step further in the sequence.

Weinstein et al. (1998) postulated four defining properties of a stage theory of health behavior: 1) a set of rules that assign each individual to one of a limited number of categories, 2) an ordering of the stages, 3) a requirement that people at a given stage face similar barriers and consequently that they can be helped by similar interventions, and 4) people in different stages should face different barriers to change. The existence of stages can be proven empirically if e.g., discontinuity patterns are observed. These discontinuity patterns may consist of mean differences in the social-cognitive variables in some stages and no mean differences in other stages, or an increase from one stage to the next and a decrease in the stage thereafter (Weinstein et al., 1998).

The critics of stage models have questioned the existence of stages, suggesting that the assumed stages are merely arbitrary divisions of an underlying continuum (Armitage & Arden, 2002; Sutton, 2000; Weinstein et al., 1998). Thus, pseudostages might emerge by randomly dichotomizing a continuous measure of intention into a two categories of intenders and nonintenders, for example. In this case, a researcher arbitrarily decides on the number and the cutpoints of the categories. Pseudostages created from a continuum satisfy the first and second criteria proposed by Weinstein et al. because people can be assigned to different categories and the categories can be brought in a sequence, with some categories that are more proximal to action than others. However, pseudostages do not fulfill the conditions required by the third and the fourth criteria. It is unlikely that people at the same pseudostage face the same barriers or that the nature of barriers changes as people move from one sequence of the continuum to another (Weinstein et al., 1998).

The assumption that HAPA is a stage model has been challenged. The main criticism expressed by Sutton (2005) is the lack of specification by the model of the factors that would influence the stage transition. Another point of criticism lies in an

inappropriate test of the stage-character of the HAPA model. One way of testing for existence of stages is to compare people at different stages on different social-cognitive variables. If a non-linear relationship between stages of change and for example self-efficacy is found, this would constitute a proof of the existence of stages. However, testing for discontinuity patterns provides a weak test of stage ideas, because changes that differ by variable could indicate a stage process or a nonlinear continuum process (Weinstein et al., 1998). Experiments provide a stricter test for the existence of stages. This can be done by matching an intervention to the stage of change that people are in. Thus, people in a certain stage (e.g. precontemplation) should benefit more from a treatment designed to move people from this stage (e.g. precontemplation) into the next stage (e.g. contemplation) than people in other stages (e.g. preparation).

So far the stage character of the HAPA model was tested mostly by the examination of discontinuity patterns. Discontinuity patterns might be reflected in a stage-specific pattern of association strength between various social-cognitive variables. In two recent studies of the HAPA this kind of discontinuity was investigated. Renner and Schwarzer (2005) adopted a two-stage approach by making a distinction between nonintenders and intenders. They analyzed the interplay of HAPA variables between nonintenders and intenders in the domain of nutrition and showed a stage-specific pattern. However, the structural differences between nonintenders and intenders were not analyzed via statistical tests. The study by Lippke, Ziegelmann and Schwarzer (2005) overcomes this shortage. The study participants were assigned to stages of change by an independent staging algorithm. It was hypothesized that intention formation, action planning and behavior change were at different levels in these three stages, and that these were differently predicted by self-efficacy, outcome expectancies and risk perception. This hypothesis was tested by using multi-group structural equation models. There were statistically significant structural differences in the interplay of social-cognitive variables between nonintenders, intenders, and actors in the domain of physical activity.

The stage character of the HAPA was tested recently by using a more strict test criterion via the matched intervention design (Lippke, Ziegelmann, & Schwarzer, 2004b). The study investigated whether an action planning intervention is beneficial for people that have the intention to be physically active but do not exercise yet. They

found that these persons benefited more from the planning intervention than persons without the intention to act or persons who had been active before.

In the present study, the stage character of the HAPA was not put to the test. As will be discussed in chapter 2.3.4 older adults are more inclined to have an intention to live a healthier lifestyle. Hence, age-related changes in the structure of HAPA variables might be confounded with stage-related changes. It will be investigated whether age related differences in the interplay of social-cognitive variables mirror the stage-related differences. Further empirical evidence with regard to predictive power of the HAPA-Model across different health behaviors will be reviewed next.

2.1.4 Empirical Evidence for HAPA

HAPA was successfully applied to various health promoting behaviors such as healthy nutrition, physical activity and breast self-examination (BSE). Schwarzer and Renner (2000) applied the theory to healthy eating using a convenience sample of 524 residents of Berlin. Participations completed a questionnaire with core HAPA-constructs on two occasions with six months in between. Intention was predicted by risk perception, outcome expectancies and action self efficacy (all constructs were assessed at t1) and these constructs explained 46% of the variance in intention. Coping self-efficacy had a strong association with action self-efficacy. Healthy nutrition behavior was assessed at t2 by two variables: low-fat dietary intake and high-fiber dietary intake. Both low-fat dietary intake and high-fiber dietary intake were predicted by intention and coping self-efficacy (assessed at t2) with 48% and 33% of explained variance, respectively.

Sniehotta et al. (2005) conducted a three-wave longitudinal study of 307 cardiac patients in rehabilitation. Risk perception, outcome expectancies and task self-efficacy were significant predictors of intention (all constructs measured at t1); coping self-efficacy, planning and a newly introduced construct action control (all constructs were assessed at t2) were significant predictors of at t3 assessed exercise behavior. The model explained 69% of the variance in the intention, 27% of the variance in planning, and 32% of the variance in exercise behavior.

The applicability of the HAPA-Model to breast self examination (BSE) was tested by Luszczynska and Schwarzer (2003). A sample of 418 students in Poland

filled out questionnaires on two occasions 12-15 weeks apart. Outcome expectancies and pre-action self-efficacy (equivalent with action self-efficacy) but not risk perception were significant predictors of intention (all constructs were assessed at t1). BSE behavior was significantly predicted by planning, maintenance self-efficacy (equivalent to coping self-efficacy), and recovery self-efficacy (all constructs were assessed at t2). The model explained 30% of the variance in intention, 29% of the variance in planning, and 31% of the variance in BSE behavior.

There are other studies that did not test the complete HAPA-Model but some by HAPA hypothesized relationships between variables (Lippke et al., 2004a; Renner & Schwarzer, 2005; Schwarzer & Fuchs, 1995). Up to the present, the HAPA model was applied to health promoting behaviors and not to health impairing or addictive behaviors, but see Murgraff and McDermott (2003) for application of HAPA to alcohol consumption. However, type of behavior might influence the strength of the postulated relationship between intention or planning and behavior. Therefore, one goal of the dissertation is to test whether the HAPA is equally well applicable to addictive behaviors as to health promoting ones. In the next section, the moderating role of behavior type in the intention-behavior relationship will be further elaborated.

2.1.5 Behavior Type: Health Promoting vs. Addictive Behaviors

Following DiClemente, Fairhurst, and Piotrowski (1995) a distinction between health promoting and addictive behaviors can be made. Addictive behaviors are those behaviors that are “experienced by the individual and viewed by the society as being difficult or problematic to keep under personal control” (p. 110). For example, most attempts to quit smoking end in failure. Less than 5% of smokers trying to quit on their own could remain abstinent for 12 months (Hughes, Gulliver, Fernwick, Valliere, Cruser, & Pepper, 1992; Ward et al., 1997). An attempt to change addictive behaviors imposes additional constraints on self-regulation because of the side effects of physical withdrawal on the physiological and psychological conditions of a person, e.g. craving (Killen & Fortmann, 1997; Shiffman et al., 1997; Witkiewitz & Marlatt, 2004). Moreover, after reviewing evidence from a wide array of animals studies Robinson and Berridge (2000) suggest in their incentive-sensitization model that repeated usages of nicotine, ethanol or other addictive substances might precipitate neuronal changes in the brain. The brain regions that are involved in the process of

incentive motivation and reward become hypersensitive for drugs and drug-associated stimuli and are responsible for instrumental drug seeking. Thus, drugs are not only consumed to bring about relief from withdrawal symptoms or to precipitate pleasurable effects of drugs, but are also (unconsciously) consumed because organism has learned that taking a drug is rewarding. It can be concluded that one of the characteristic features of addictive behaviors is that they are more driven by physiological forces than health promoting behaviors.

Most of the social-cognitive models of behavior change do not make a difference with regard to the quality of prediction for different behaviors. However, it is evident from the meta-analyses of different behaviors (Godin & Kok, 1996; Randall & Wolff, 1994; Webb & Sheeran, 2006) that the type of behavior influences the degree of intention-behavior consistency. The results of the Godin and Kok's meta-analysis showed that TPB performed quite well across behavioral categories with respect to explaining intentions. However, for the prediction of behavior its efficiency varies. For instance, the R^2 was quite low for clinical and screening behaviors ($R^2 = 16$), whereas much higher values were observed for addictive behaviors ($R^2 = 41$), followed by exercise behavior ($R^2 = 36$) and eating behavior ($R^2 = 25$).

Randall and Wolff (1994) came up with similar results. The correlations between intention and behavior in the domain of addictive behaviors range from $r = .29$ to $r = .81$, whereas for physical activity the correlations between intention and behavior ranged only from $r = .22$ to $r = .53$. However, the strength of the intention behavior relationship declined sharply over time for alcohol/drug related activities. Randall and Wolff (1994) speculated that the inability to enact one's intention in this area may result from various personal and environmental control factors.

In a recent meta-analysis, Webb and Sheeran (2006) only reviewed studies that experimentally tested the intention-behavior relationship via randomized control trials. Changes in motivation were induced in an experimental group but not in the control group. At follow-ups, changes in respective behavior were compared between groups. The intention-behavior relationship was moderated by the behavior type. Intentions engendered smaller effects on behavior in the case of addictive behaviors ($d_+ = .19$) compared with health promoting behaviors ($d_+ = .45$). Webb and Sheeran argue that intention, or more general the "reasoned action route", has less impact on future behavior when there is potential for "social reaction" (for a similar line of reasoning see Wallace, Paulson, Lord, & Bond, 2005). Thus, addictive behaviors such

as alcohol and smoking are likely prone to social pressure, because they are mostly performed in social contexts. Thus, along with physical dependence social pressure might also put additional constraints on the self-regulation of addictive behaviors.

There seems to be a discrepancy between the empirical findings for addictive behavior being well predicted from intentions and the definition of addictive behavior as being less under personal control (but see findings by Webb & Sheeran, 2006). The reason might lie in the way intentions are usually assessed. There is an asymmetry of intention assessment depending on the type of the behavior, health promoting vs. health impairing or addictive behavior. The former are usually assessed by asking participants whether they intend to be physically active, for example. Thus, the prediction is made in the direction of improvement of one's general health status. The latter ones are assessed by asking participants whether they intend to continue to smoke in the next couple of weeks or months. Thus, the direction of prediction is not toward behavior change, but toward continuation of health impairing behaviors. Therefore, the large amount of variance being explained by the prediction of addictive behaviors is no longer surprising. In the meta-analysis by Webb and Scheeran the intentions are assessed as quitting intention and the study as already mentioned yielded an expected result of the smaller intention-behavior consistency for addictive behaviors. An overview over TPB's studies for addictive behaviors is given in table 1¹.

¹ The overview is based on author's own investigation and is in no way exclusive.

Table 1: Examples of research applying health behavior change theories to addictive behaviors

Study	Sample	Intention's assessment	Results (behavior regressed on intentions/correlation between intentions and behavior)
Norman and Conner (2006)	N= 589 college students; 1 week follow-up	1. Do you intend to engage in a binge drinking session over the next week? 2. How likely is it that you will engage in a binge drinking session over the next week?	Binge drinking regressed on intention and self-efficacy: Beta for intention = .40** and for self-efficacy = 0.44**
McMillan and Conner (2003)	N = 141, college students; 6 months follow-up	1. Please indicate how many alcoholic drinks you intend to have per week over the next 6 month period? 2. Please indicate how many cigarettes (if any) you intend to smoke over the next 6 month period?	Variance explained in smoking ($R^2 = 0.42$; Beta for intention = .37***, for PBC = 0.42***) Variance explained in alcohol ($R^2 = 0.29$; Beta for intention = .39***, for PBC = 0.25***)
Johnston and White (2003)	N = 289, college students; 2 weeks follow-up	1. I intent to drink five or more standard alcoholic beverages in a single session in the next two weeks (extremely unlikely – extremely likely) 2. For me to drink five or more standard alcoholic beverages in a single session in the next two weeks would be (very difficult – very easy)	Variance explained in alcohol ($R^2 = 0.51$; Beta for intention = .47***, for PBC = 0.14)
Armitage, Conner, Loach, and Willetts (1999)	N = 121, college students, 1 week follow-up	1. I intend to (I plan to; I want to) drink alcohol in the next week	Variance explained in alcohol ($R^2 = 0.17$; Beta for intention = .94*, for self-efficacy = 0.33)
Wilkinson and Abraham (2004)	N = 225; 13-14 year old school kids, 6 month follow-up	1. The likelihood of me smoking in the next six months is (very unlikely – very likely). 2. I intend to smoke in the next six months.	Correlation between intention and smoking behavior = .64
Conner, Warren, and Close (1999)	Study1 N = 115, college students, two weeks follow-up	1. I intend to drink alcohol in the next 2 weeks. 2. I want to drink alcohol in the next 2 weeks.	Variance explained in alcohol ($R^2 = 0.40$; Beta for intention = .25*, for PBC = 0.47**)

Godin, Valois, Lepage, and Desharnais (1992)	Study 1 N = 346, general population	1. What is the probability out of 100 that you will not smoke cigarettes within the next 6 month?	Variance explained in smoking ($R^2 = 0.25$; Beta for intention = .16, for PBC = 0.42***
McMillan, Higgins, and Conner (2005)	N = 741, 12-13 year old school kids, 3 month follow up	1. I plan not to smoke this term. 2. I do not want to smoke this term. 3. I will try not to smoke this term.	Variance explained in smoking ($R^2 = 0.29$; Odds ratio for intention = 1.44*, for PBC = 0.31***)
Rise and Kovac (2006)	N = 939 smoker, 4 month follow-up	1. I intend to quite smoking during the next 4 months.	Variance explained in smoking ($R^2 = 0.13$; Beta for intention = .29, for PBC = 0.14)
Mugraff, DcDermontt, and Walsh (2001)	N = 128, women college student; 2 week follow-up	1. I intent to limit my drinking to no more than 2 units per drinking session in the next two weeks. 2. I feel that I can limit my drinking to no more than 2 units per drinking session, even if I run into difficulties	Variance explained in alcohol ($R^2 = 0.21$; Beta for intention = -.16, for self-efficacy = -0.33***)
Dijkstra, De Vries, Kok, and Roijackers (1999)	N = 243, smokers, 14 month follow-up	1. Do you intent to quit smoking? 2. How probable is it that you will quit smoking?	Odd ratio for intention to quit = 1.43**

As can be seen in Table 1 the intention-behavior relationship is often assessed in an asymmetric way. In the last five studies listed in the Table 1, the intention was assessed as quitting intention. In the studies by Godin et al. (1992) and Rise and Kovac (2006) the relationship between intention and behavior was weaker than in the studies in which intention was assessed as continuation intention. Moreover, in almost all the studies assessing quitting intention perceived behavior control was a stronger predictor of behavior than intention (but see Rise & Kovac, 2006). These findings point to the fact that addictive behaviors might be more under control of physiological and/or environmental factors, for example. The studies listed above have one major limitation. Almost all of them were conducted using adolescent or student samples and therefore have limited generality. Besides, there are only a few studies that assessed intention as quitting intention which makes the comparability of the behavior change models across domains (health promoting vs. addictive behaviors)

problematic. The present study overcomes these shortcomings by using a convenience sample and by assessing intention as intention to change a behavior of interest across different behavior domains.

2.1.6 The Role of Past Behavior

It has been argued that many health behaviors are determined by one's past behavior, rather than by cognitions as described in health behavior change models and therefore past behavior should be included in the health behavior change models (Eagly & Chaiken, 1993; Sutton, 1994)². The usual explanation for this phenomenon is that the behavior in question has become habitual, i.e. is under the control of environmental stimulus cues and not under the control of intentions (Ouellette & Wood, 1998). The argument is based on the results of a number of studies showing past behavior to be the best predictor of future behavior (Bagozzi & Kimmel, 1995; Godin, Valois, & Lepage, 1993; Norman & Smith, 1995). Following this view, past behavior should be considered as an independent predictor of future actions.

Ouellette and Wood (1998) suggested that action generation and control can follow two routes: either an automatic repetition of previously established routines or a controlled, conscious reliance on behavioral intentions. Which path will be perused depends on the context characteristics of the given behavior. A distinction was made between stable and unstable contexts. If a certain behavior has been performed frequently in stable contexts, it can be executed almost automatically (i.e., without conscious awareness of the relevant intention), and future behavior could be a direct function of past behavior frequency. If past behavior has not become a routine or if the context in which the behavior performed is difficult and unstable then behavior will demand some degree of deliberation. Behavior is likely to be guided by consciously formed intentions. In such cases, the effect of past behavior on future behavior is mediated through its impact on conscious intentions.

This view was strongly criticized by Ajzen (2002). He argues that from the reasoned action perspective there is no inevitable link between the frequency of past behavior and its routinization. The frequent performance of a certain behavior in the past does not necessarily prove habituation. In order to empirically test the habituation

² The criticism was addressed to the Theory of Planned Behavior. Hence, HAPA uses similar social-cognitive constructs and does not explicitly include past behavior as a predictor of future behavior, the critique would apply to HAPA as well.

hypothesis, one needs an independent measure of habit, which is still lacking. Ajzen further argues that a strong link between past behavior and future behavior is merely indicator of stability of the behavior over time. The stability of the behavior might be attributable to the fact that both past and current behavior is determined by the same health beliefs. In the context of the HAPA model, health beliefs such as intention, planning and self-efficacy might have affected health behaviors in the past and continue to exert their influence in the present. High stability of behavior may also be attributable to the common method variance of behavior assessment in contrast to the assessment of the social-cognitive variables (Ajzen, 2002).

After depicting the reasons why past behavior is the best predictor of future behavior, possible grounds for the limited predictive validity of social-cognitive determinants will be discussed next. People usually form an intention that contradicts their past behavior, e.g. to quit smoking. Ajzen (2002) sees in the instability of intentions the main source for the small predictive power of intentions. He further argues that people might form unrealistic expectations with regard to their self-efficacy and controllability of the situation and fail to translate their intention into action. In these situations, past behavior is the best predictor of action since past behavior reflects people's preexisting response tendencies. Research has identified that past behavior is a significant predictor of current behavior among individuals with unstable TPB cognitions but not for those with stable TPB cognitions (Conner, Sheeran, Norman, & Armitage, 2000; Sheeran, Orbell, & Trafimow, 1999). Following theoretical assumptions, cognitions should always be a prerequisite of behavior (Ajzen, 1991), but due to their temporal instability are sometimes weaker predictors of future action than past behavior. Therefore past behavior does not gain us additional insights in the process of behavior change but does add predictive value statistically.

2.2 UNIVERSALITY OF HEALTH BEHAVIOR MODELS

Current health behavior models, such as the HAPA, implicitly presume that behavior can be predicted on the basis of core social-cognitive variables irrespective of participants' social-cultural background, gender, or age. These factors are either not explicitly included in these models, or they represent distal background variables exerting their influence through the more proximal social cognitive variables.

Consequently, one could argue that these models implicitly assume that they are likewise applicable in different cultures or age groups.

Yali and Revenson (2004) raised the issue of applicability of current theories to other cultures: “In light of changing population demographics, health psychologists must question whether current theories and design choices are equally relevant across cultures and contexts. If not, they must generate theories and design research that are more culturally anchored, and in some cases, unique to particular cultures and contexts” (p. 149). Most studies with application of behavior change models were conducted with Western samples, raising the question of whether these models are also predictive in other cultures, e.g., Eastern societies.

2.2.1 Behavior Change Theories and Social-Cultural Context

With the work of Hofstede (1980) the search for meaningful dimensions that describe ways in which cultures differ systematically has started. The most prominent dimension is, probably, the one of individualism versus collectivism (Hofstede, 2001; Markus & Kitayama, 1991; Triandis, 1995). The constituting feature of individualism is the assumption that individuals perceive themselves as independent of one another. Different definitions of individualism all conceptualize individualism as a worldview that highlights the personal – personal goals, personal uniqueness, and personal agency – and downplays the social (Fiske, Kitayama, Markus, & Nisbett, 1998; Markus & Kitayama, 1991; Oyserman, Coon, & Kimmelmeier, 2002; Triandis, 1995). One of the central assumptions of the collectivistic worldview is the interdependence of people within the group. According to Schwartz (1990), collectivist societies are communal societies characterized by diffuse and mutual obligations and expectations based on ascribed statuses. Goals and values of the group are more valued than the goals and values of a single individual; the personal is merely one part of the social, making the group the main unit of analysis (e.g., Triandis, 1995). Furthermore, it has been proposed that differences on the individualism-collectivism dimension might systematically influence cognition, motivation and behavior of people (Fiske et al., 1998; Markus & Kitayama, 1991; Oyserman et al., 2002).

Individualism is often conceptualized as the opposite of collectivism (e.g. Hui, 1988), especially when European-American and East Asian cultural frames are contrasted (e.g., Kitayama, Markus, Matsumoto, & Norasakkunkit, 1997; Yamaguchi,

1994). Thus, Western societies represent a more individualistic mindset, whereas a collectivistic mindset is more prototypical for Eastern societies. Therefore, theories have to be tested in Eastern societies such as South Korea in order to gain support for their universality.

In a similar vein, Berry, Poortinga, Segall, & Dasen (2002) give the following definition of cross-cultural psychology: “Cross-cultural psychology is the study of similarities and differences in individual psychological functioning in various cultural and ethno-cultural groups; of the relationships between psychological variables and socio-cultural, ecological and biological variables; and of ongoing changes in these variables” (p. 3). Thus, the first goal for cross-cultural psychology is the testing of the applicability of obtained psychological knowledge and theories in other cultural setting.

This point of view was further emphasized by Segall, Dasen, Berry and Poortinga (1999), who have stressed the importance of testing the cross-cultural generality of existing principles before claiming their universality. The first goal has been called by Berry and Dasen (1974) the “transport and test goal”. It implies the application of present hypotheses, research questions and findings to other cultural contexts in order to test their validity and utility. However, such an approach is not very sensitive in detecting psychological phenomena that may be unique and relevant to other cultures.

To resolve this problem, Berry and Dasen (1974) suggested the second goal of cross-cultural psychology that pursues the exploration of other cultures and the search for cultural particularities in psychological variations which might be absent in our bounded cultural experience. Thus, if a common finding to Western culture can not be replicated in another cultural setting, the reasons for failure to replicate and generalize should be determined, and alternative (perhaps culture-specific) explanations should be allowed for.

In the scope of the present study the first goal of cross-cultural psychology – the transport goal - was adopted. This is especially important given a scarce empirical base for the evidence of universality of behavior change models applied to non-Western cultures. In the context of physical activity, first studies yielded supporting evidence for the contention of generality. Shin, Yung, Pender, and Jang (2005) found in a sample of South Korean adults suffering from a chronic disease that there was a positive relationship between the commitment to an exercise plan and the perceived

benefits and barriers of exercise as well as perceived exercise self-efficacy. Similar results have been reported for South Korean adolescents (Y.-H. Kim, 2004) and Chinese undergraduate students (Callaghan, Eves, Norman, Chang, & Lung, 2002). However, these studies used a cross-sectional design, limiting the interpretation of the results. Therefore the applicability of the HAPA-Model to the South Korean sample across two health promoting (low-fat nutrition and physical activity) and two addictive (alcohol consumption and smoking) behaviors will be investigated longitudinally in the present dissertation.

2.3 HEALTH AND LIFESPAN PSYCHOLOGY

Another important factor that might limit the universality of social-cognitive health behavior models, such as the HAPA, is a difference in the age of the participants. The idea that health and health behaviors may have different meanings at different points in the life span is often not taken into account (cf. Siegler, 1989). Penny, Bennett, and Herbert (1994) stated that “there has been surprisingly little recognition within health psychology of the potential contribution of lifespan developmental psychology to inform our understanding of issues of health and illness. Yet it can be argued that health and illness are directly related to developmental processes, with morbidity and mortality showing distinct patterns across the lifespan” (p.1). In the following, a short overview over the postulates of lifespan developmental psychology and their transferability to health psychology will be given. In a second step, the literature on age-related differences in health behaviors will be reviewed. Lastly, shifts in motivational focus over the life span will be discussed.

2.3.1 A Lifespan Perspective on Health

The life span perspective is not a specific theory per se, but rather “the coordinated integration of various age-based developmental specializations into overarching, cumulative framework of ontogenesis” (Baltes, Lindenberger, & Staudinger, 2006). Several meta-theoretical propositions characterize this perspective and three of them that bear special relevance for the present dissertation will be discussed in some detail. These meta-theoretical propositions are: 1) Development is a lifelong process; 2) Development always consists of the joint occurrence of gain (growth) and loss (decline), therefore development is characterized by

multidimensionality and multidirectionality; 3) There are lifespan changes in the allocation of resources to distinct functions of development: functional allocation involves a shift from the allocation of resources for growth (more typical in childhood) toward an increasingly larger share allocated to maintenance and regulation of loss (Baltes, 1987; Baltes, Lindenberger, & Staudinger, 1998; Baltes et al., 2006).

2.3.1.1. Development as a Life Long Process

The first proposition of lifespan psychology conceptualizes development as a life long process. Thus, development is seen by Baltes (1997) as the outcome of a permanent and active process of the individual's interactions with changing contextual influences such as age-graded changes of the genome and historical societal changes. Development occurs at multiple levels. Not only does psychological functioning change with age, but also the contexts (and their associated risk and resources) and the functional consequences (evaluative criteria) of development change with age (Baltes, 1987, 1997; Baltes et al., 2006).

Applying the first proposition to the domain of health, the following conclusions can be drawn. Physical health undergoes lifelong development and change, i.e. health-related change processes can occur at any point in the life course, from conception to death (Penny et al., 1994; Spiro, 1999). As people age, they experience changes both in physical appearance, e.g. the appearance of the skin, loss of bone density and height, and in major biological systems. The major biological systems of the body begin to decline during one's twenties and thirties (Hoyer & Roodin, 2003). One of the most noteworthy declines occurs in the circulatory (cardiovascular) system. Old age (70+) is usually accompanied by increased morbidity with a greater number of health problems and chronic illnesses (Steinhagen-Thiessen & Borchelt, 1999). Moreover, a large body of research has demonstrated that the increasing functional limitations in old age are not necessarily related to declines in individuals' self-related psychological functioning (self-esteem, perceived control, subjective well-being) (Bengtson, Reedy, & Gordon, 1985; Lachman, 1986; Ryff, 1989). One reason for maintenance of positive psychological functioning might be an age-related shift in evaluation criteria that designates what constitutes "good health" to a more flexible definition of "good health".

2.3.1.2 Development as Joint Occurrence of Gains and Losses

The second proposition states that throughout life, development always consists of the joint occurrence of gains and losses, both within and across domains of functioning (Baltes et al., 1998). Therefore, development is described as multidimensional (involving different domains of functioning) and multidirectional (involving gains and losses), whereby different domains may exhibit gains and losses simultaneously.

An application of this life span proposition to the health domain implies that multidimensionality and multidirectionality can also be ascribed to health. Thus, health as a construct has many facets, levels, and dimensions. Spiro (1999) postulated a “hierarchical model of domains of health”. He distinguished three levels that can be further differentiated: “disease”, “illness”, and “functional status”. The first level, disease, is based on definitions made by clinicians, e.g. diagnosis of coronary heart disease. The second level, illness, is based on people’s self-reported symptoms, e.g., headache. Lastly, the third level, functional status, consists of people’s self-reports about their general health status, usually assessed with a single item, where people are asked to estimate their health in general. The different levels might depict different developmental trajectories, e.g., people’s reports about their health status will not necessarily agree with more objective measures such as laboratory tests, physician diagnoses, or administrative records (Kaplan, 1990). Thus, whereas objective health status might dramatically decline with age, subjective estimates of health do not necessarily follow this path (Borchelt, Gilberg, Horgas, & Geiselman, 1999).

2.3.1.3 Shift in Allocation of Resources from Growth towards Maintenance and Regulation of Loss

The third proposition states that there are lifespan changes in the allocation of resources: functional allocation involves a shift from the allocation of resources from growth (more typical in childhood) towards an increasingly larger share allocated to maintenance and regulation of loss. Because of age-related changes in the distribution of resources the relative amount of gains decreases and the relative amount of losses increases (Baltes, 1987; Heckhausen, Dixon, & Baltes, 1989). Successful development, at a very broad level, has been defined as the relative maximization of gains and the minimization of losses (Baltes & Baltes, 1990; Rowe & Kahn, 1987).

As a consequence, the allocation of available resources into developmental tasks changes with age. Relatively more resources are directed towards maintenance/recovery and regulation of losses (e.g., maintaining adequate functioning at lower levels) rather than growth (e.g., approaching higher level of functioning; (Brandtstadter & Greve, 1994; Dixon & Backman, 1995; Staudinger, Marsiske, & Baltes, 1995)

Health is one of the prominent domains where the ratio of gains and losses shifts towards losses starting in middle age and continuing into old age (Heckhausen, 2001). Thus, with increasing age more resources should be devoted to the domain of health in order to counteract age-related losses. The question of how age-related changes, in both functional health and the dynamic of gains and losses, affect people's motivation and investment of resources toward health will be further elucidated.

Before the above question can be approached the meta-theoretical propositions need to be embedded in a more specific theoretical framework in order to apply them to particular developmental phenomena. For this purpose an action-theoretical conceptualization of the model of selection, optimization and compensation was chosen and is elaborated next (Freund & Baltes, 2000).

2.3.2 The Theory of Selection, Optimization and Compensation

The selection, optimization, and compensation (SOC) theory (Baltes & Baltes, 1990; Freund & Baltes, 2000) allows a description of motivational processes from a lifespan perspective (Freund, 2006). The SOC theory postulates that successful development across the life span is facilitated through processes aimed at maximizing gains and minimizing losses. These processes are selection, optimization and compensation. Selection refers to the process of selecting a limited number of options (goals, domains of functioning) from the pool of available alternatives. The second process, optimization, is defined as the acquisition and application of resources in order to achieve an optimal level of functioning or desired outcomes. The process of compensation addresses the management of developmental losses. Substitution of means or use of external aids are typical examples for the compensation of loss and decline (Freund & Baltes, 2000).

An action-theoretical approach to development (Boesch, 1991; Brandtstädter, 1998; Gollwitzer & Bargh, 1996) posits that through setting and pursuit of personal

goals an individual shapes its own development. Thus, a more concrete action-theoretical conceptualization of SOC comprises both processes of *goal setting* (selection) and *goal-striving* (optimization and compensation) (Freund & Baltes, 2000). Thus, the action-theoretical conceptualization of selection is setting goals. Processes of optimization and compensation are both facilitative for goal pursuit. The process of optimization contains the employment of means aimed at goal achievement. These means might contain aspects that are important for successful goal pursuit such as forming intentions, outcome expectancies and self-efficacy beliefs. Compensation also requires investment of resources in order to preserve a given level of functioning when faced with loss in goal-relevant means. Thus, the means that are applied might be the same as in case of optimization, but they fulfill a different purpose. Selecting, pursuing and maintaining personally relevant goals is an integral aspect of successful development. In the next sections the age-related differences in setting and pursuing health-related goals will be further elaborated.

2.3.3 Age-Related Changes in the Importance of Health Goals

Goals and goal-directed actions play an important role in the active “management” of life because goals structure and direct attention, emotions, and behaviors into particular pathways (Emmons, 1996; Freund, 2001). The content of goals a person selects at a certain age is tightly linked with theories about normative development. Within most societies there are age-related expectations with regard to the kind of goals an individual has to pursue, e.g. for childbearing. These expectations are evolved from and reflect biological, societal, and historical influences (Heckhausen, 1999; Neugarten, Moore, & Lowe, 1965).

Health becomes an increasingly important life goal with advancing age (Heckhausen, 1997; Hooker & Kaus, 1994; Nurmi, 1992; Staudinger, Freund, Linden, & Maas, 1999). Nurmi (1992) asked a sample of 19 to 64 year-old participants to write down the kinds of goals they have when they think about the future, and to write down things they were afraid of or worried about. The percentage of participants reporting health as their future goal increased linearly over the age groups (starting with 7.9% of all young adults 19-24 years old over 19.5% of 25-34 years old and 26.9% of 35-44 years old to 50% of 45-54 years old and ending with 72% of all 55-64 years old). The same picture emerged with regard to worries in the domain of health.

In the study by Lachman, Lewkowicz, Marcus, and Peng (1994) young, middle-aged and older adults were confronted with different life course issues, themes and concerns and were asked to rate their importance for each of the three age periods. Again health, as one of the life course issues, gained importance as a function of age.

Another possible way to study changes in the content of personal goals over the life span is by looking at people's possible selves. Possible selves are the embodiments of one's life goals. They include positive images of self in the future, or hoped-for selves, as well as negative images of self, or feared selves (Cross & Markus, 1991; Hooker & Kaus, 1992, 1994; Markus & Nurius, 1986). They function as a motivator of current behavior (Markus & Nurius, 1986).

The question is whether the content of possible selves changes over the life span. Cross and Marcus (1991) studied the variation of content of possible selves as a function of age. Study participants had to generate their hoped-for and feared possible selves. Age differences emerged with regard to hoped for possible selves: there was a linear age-related increase in the frequency of naming physical functioning as an aspect of the hoped-for possible self. In a different study a frequency of spontaneously generated possible selves by young adults was compared with those of older adults (Hooker, 1992). Not only did older adults list more health-related possible selves than younger adults, but they did so in equal percentages with regard to hoped-for and feared health-related possible selves. In order to determine if health-related possible selves begin to emerge as most important starting in the middle age, Hooker and Kaus (1994) compared the possible selves generated by middle aged and younger adults. They also made an additional distinction between "real" health concerns and concerns about physical attractiveness that were confounded in the study by Cross and Marcus (1991). In Hooker and Kaus' study middle aged adults reported significantly more health-related possible selves than younger adults did. However, both young and middle aged adults who constructed health-related possible selves had a tendency to form a negative rather than a positive image of future selves in the domain of health. The authors speculated that older adults experiencing their health being relatively intact adjust their health-related possible selves to be both hoped-for and feared ones. Whereas young and middle aged adults have predominately health-related feared selves, and that is probably a reflection of the common stereotypes of age as a time of health decline.

The idea that with age, health and other age-related concerns become increasingly integrated into one's images of self can only be fully supported by longitudinal data. The study by Frazier, Hooker, Johnson, and Kaus (2000) provides the first empirical evidence for this assumption. Using a five-year longitudinal sample of older adults, they investigated how the content of possible selves changes with time. Intraindividual changes emerged in the domain of health and physical-related possible selves, with the former becoming more important over time. Similar results were also obtained in the Berlin Aging Survey (Smith & Freund, 2002). Studies that encompass changes in possible selves over the entire life span are still missing.

The results of the studies using possible selves show that health is not simply a vague global concern for the majority of older adults, but rather a very concrete concern that may motivate current behavior. There is some evidence that possible selves do motivate current behavior. For example, using a sample of older adults Hooker and Kaus (1992) found that having a possible self in the realm of health was more strongly related to reported health behaviors than was a global measure of health values. Hooker and Kaus (1994) could replicate this finding using a sample of middle aged and younger adults. One possible mechanism of how the health goal might be translated into health behaviors is by time and energy investment in this domain. The concept of Personal Life Investment captures this idea.

Personal Life Investment (PLI) is defined as "the amount of energy and effort (in terms of both acting and thinking) that people invest in central life domains" (Baltes et al., 2006, p.635). Personal Life Investment reflects a subjective estimation of intensity with which a person is engaged in pursuing goals in a specific life realm (cf. Hyland, 1988). PLI does not capture the investment into specific personal goals but rather measures the investment of energy, time and resource into entire life domains that contain a sum of different goals at all levels of the goal hierarchy. The distinct feature of PLI is that it measures what the person actually does in service of the goal. Thus, goal investment not only reflects a person's desires and values, but it is also sensitive to the necessities posed by specific goals, with goals that require more effort to be achieved also receiving a larger share of energy investment.

The development of PLI in ten life domains (health, cognitive fitness, independence, well-being of one's own family, relationship with friends, sexuality, hobbies, one's occupation or similar activities, thinking about one's life, and one's death and dying) has been investigated across the life span. Cross-sectional evidence

from a sample ranging from 25 to 65 years demonstrated that the investment pattern across these ten life domains changes over the life span (Staudinger & Fleeson, 1997). Life investment into health increased continuously over the examined age range. Health was ranked ninth in the group of 25 to 35 years old, fifth in the group of 35 to 55 years old and second in the group of 55 to 65 years old. In the Berlin Aging Survey (70 to 103 years) health was the domain with the highest life investment (for similar results see also Staudinger & Schindler, 2007).

It can be concluded that regardless of the assessment of the goal content, the same picture emerged with regard to importance placed on health. Thus, health becomes increasingly important over the life span starting at middle age. Contextual influences associated with middle age make health a more salient concern than it may have been earlier in the life span. It is in midlife that individuals begin to personally or vicariously, by observing their peers, experience life-threatening health episodes (e.g. heart attacks or cancer diagnosis). It is also in midlife that aging parents' health problems are a concern to adult children (Wallston & Smith, 1994).

2.3.4 Age-Related Changes in Goal Pursuit

Following Hooker and McAdams' (2003) model of personality a distinction can be made between personal goals ("personal action units") and motivational processes ("self-regulatory processes"). In a similar vein Freund and Ebner (2005) argue that personal goals (referring to *what* the person wants to achieve, maintain, or avoid) and motivational processes (referring to *how* a person sets, pursues, maintains and abandons goals) constitute the "self" in general and the "aging self" in particular. As already argued, health becomes increasingly important indicating what an aging person wants to achieve or maintain respectively. The question that will be discussed next is how the increasing importance placed on health might affect a person's motivation to perform health behaviors.

From a lifespan perspective, the "aging self" can best be described in terms of motivational changes (including both personal goals and motivational processes) that occur along with age-related changes in internal and external resources (Brandtstadter, 1998; Freund & Ebner, 2005). What are the internal and external resources and what are the age-related changes they undergo? The resource definition suggested by Freund and Riediger (2001) is adopted here. They distinguish between

naturally finite resources (e.g. time, money etc.) and characteristics of a person that influence the efficiency of using these finite resources (e.g. self-efficacy, self-esteem etc.). With advancing age the likelihood of developmental losses increases: development of chronic and acute illnesses, impairment in the cognitive mechanics, death of social partners (for a summary see Freund & Riediger, 2003). Accumulation of losses inevitably leads to the depletion of resources.

How do age-related changes in resources affect motivation? The primary motivation in early adulthood is directed toward acquisition of new skills and resources. The emphasis on the protection of resources becomes more crucial with advancing age than the accumulation and generation of resources (Baltes, 1987, 1997; Brandtstadter, 1999; Staudinger et al., 1995). Thus, motivation across adulthood shifts from a gain orientation toward a maintenance orientation and loss avoidance. After middle age, people turn to maintaining performance and healthy functioning when confronted with loss and decline (Freund & Baltes, 2000; Heckhausen, 1999).

The scarce empirical evidence pertaining to the shift in motivation is presented next. Heckhausen (1997) requested young, middle-aged, and older adults to list five of their most important personal hopes, plans, and goals for the next five to ten years. The answers were coded by independent raters with regard to whether they reflected attempts to avoid losses or to strive for gains. The young adults generated significantly more gain-striving goals in comparison with middle aged and older adults, and older adults mentioned significantly fewer gain-striving goals than middle aged adults. Conversely, the young adults reported fewer loss-avoiding goals in comparison with middle-aged adults. In turn, older adults generated significantly more loss-avoiding goals in comparison with other age groups. Interestingly, the decrease in the gain striving goal orientation and the increase in loss-avoiding goal orientation were already present in middle adulthood.

A categorization of goals as reflecting approach versus loss-avoidance motivation can serve only as a distal indicator of goal orientation. A more direct and comprehensive assessment of goal orientation was used by Ogilvie, Rose, and Heppen (2001). In two studies, adolescents, middle aged and older adults were asked via interview to describe their personal projects and, more importantly, to indicate reasons for their involvement in them. Independent raters classified the answers as belonging to one of four motivational categories: the motivation to acquire (i.e., the desire to obtain a future positive outcome), the intention to keep (i.e., the desire to

avoid losing an existing positive condition), the desire to cure an existing negative condition, and the motivation to prevent a negative outcome. All three age groups reported the desire to acquire as the most frequent reason for goal involvement: However, its prevalence showed a stepwise decline in the middle-aged and older groups. There were significant age differences in the proportion of “keep motives” between all age groups, indicating a stepwise progression over the three age groups. Contrary to expectations, the motivation to cure an existing negative condition did not show a consistent pattern of results across two studies (it was only raised in the middle-aged group in one study but not in the other). The intention to prevent a negative outcome showed no significant relationship to age.

The studies by Heckhausen (1997) and by Ogilvie et al. (2001) have one limitation: the categorization of goal orientation by independent raters might be less reliable than the ratings done by the persons themselves. Moreover, these studies used an exclusive categorization of goals as being either growth-, maintenance-, or loss-oriented. Thus, the possibility of inclusive goal categorization was not tested (Freund & Ebner, 2005). The study by Ebner et al. (2006) overcomes these shortcomings and additionally tests the assumption of inclusiveness of goal categorization. Young and older study participants were asked to evaluate each of their personal goals separately with respect to three dimensions of goal orientation: growth (i.e., orientation toward the improvement or achievement of new skills), maintenance (i.e., orientation toward maintaining functioning), and prevention of loss (i.e., orientation toward prevention of undesired outcomes and losses). The results supported the notion of independency of the three dimensions. For example, the goal “engaging in an exercise program” can simultaneously fulfill different functions: improving one’s appearance (growth), staying fit (maintenance) and not becoming overweight (prevention of loss). Moreover, the primary orientation of younger adults was toward growth, whereas older adults’ goals were equally oriented toward maintenance and loss prevention.

Further, age-related differences in goal orientation were investigated at the level of goal selection *behavior*. Participants were asked to indicate their behavioral preferences for approaching a physical training task and a cognitive task, respectively. Two options were given: a task could be either approached by improving functions (i.e., orientation toward growth) or by maintaining functions and preventing losses (i.e., goal orientation toward maintenance-prevention of loss). In the domain of cognitive functioning younger adults more frequently selected goals oriented toward

growth, whereas older adults selected equally frequent maintenance and prevention of loss goals and growth-oriented goals. In the domain of physical functioning older adults selected more often goals oriented toward maintenance and loss prevention than growth-oriented goals. Moreover, in order to test the assumption that the depletion of resources is responsible for the motivational shift, an extra condition was adopted. When participants were told that growth goals were more resource demanding than the maintenance-prevention of loss goals, both age groups showed a primary orientation toward maintaining functioning and counteracting losses.

Reviewing the above, the empirical evidence suggests a motivational shift in goal selection as well as changes in how the goals are pursued as a result of age-related changes in internal and external resources (Brandtstadter, 1998). After having theoretically explored the age-related changes in goal selection and goal pursuit, age trajectories in the domain of interest will be more closely looked at. Thus, age-related changes in health behaviors and specific self-regulatory variables proposed by the HAPA-model will be reviewed next.

2.3.5 Age-Differences in Health Behaviors and Behavior Patterns

Not only does health become increasingly important over the life span, but people invest more effort to maintain good health by adhering to a healthier lifestyle. The results of the 1990 National Health Interview Survey of Disease Prevention and Health Promotion (NHIS-DPHP) point in that direction (Rakowski, 1997). Over 8,000 persons aged 65 and over, as well as over 10,000 persons aged 45 to 64 and another 13,500 persons aged 30 to 44 answered questions about their health behaviors. The prevalence of health impairing habits, i.e. smoking and alcohol consumption decreased over the life span. The nutrition behavior improved with increasing age. However, people become less physically active as they age (Breuer, 2005; Prohaska, Leventhal, Leventhal, & Keller, 1986; Rakowski, 1997; U.S. Department of Health and Human Services, 1999). Similar results were obtained with other convenience samples (Liang, Shediac-Rizkallah, Celentano, & Rohde, 1999; Prohaska et al., 1985; Pronk et al., 2004). These are cross-sectional studies and therefore age-related changes cannot be disentangled from cohort effects, and the conclusion with regard to age-related changes in health behaviors should be made with caution. However, there is first evidence that these findings hold true longitudinally. Mulder, Ramchor,

Sanderman, Boume, & van den Heuvel (1998) investigated the stability and change of lifestyle behavior among 1400 men over four years. Age was related to both the frequency of performance of lifestyle behaviors and to changes in lifestyle behaviors. Overall it can be stated that except for physical exercise, older men (> 60) differed from younger men (< 40) in having a healthier lifestyle. As for alcohol consumption and diet, it was found that men older than 50 years progress over time towards a healthier lifestyle. In addition, for men older than 60, it was found that they change towards the unhealthier physical activity pattern.

Whereas much is known about the prevalence of single health risk factors and their associations with demographic characteristics, e.g., age, only a modest amount of literature addresses the relationship among multiple health behaviors or the cluster of such behaviors and their demographic correlates e.g., age. In general, the risk of most chronic diseases increases with an increasing number of risk behaviors. Individuals with multiple risk behaviors amount to a substantial cost factor within a public health care system (Berglund et al., 1996; Leigh & Fries, 1992).

The identification of how the various health behaviors are interrelated has a long tradition in the area of epidemiology. One view is that of *unidimensionality*. It implies that an individual with a good health practice (or poor health practice) would probably act similarly across all health behaviors. An underlying general “trait of prevention” is assumed that would explain all health practices. Only little empirical evidence could be found to support the unidimensional view on health behavior interrelation (Langlie, 1979; Williams & Wechsler, 1972). Contrarily, the view of *multidimensionality* assumes that certain health behaviors (e.g., smoking and drinking) tend to occur together while others might be independent (Johnson, Nichols, Sallis, Calfas, & Hovell, 1998; Sobal, Revicki, & DeForge, 1992). A stronger relationship between health compromising behaviors than between health promoting behaviors has been found (Johnson et al., 1998; Perkins, Rohay, Meilahn, & Wing, 1993; Rosal et al., 2001).

There is an extensive body of research on the bi-variate relationships between health behaviors. Smoking has been linked with low activity levels (Klesges, Eck, Isabell, Fulliton, & Hanson, 1990), poor diet (Morabia & Wynder, 1990; Subar, Harlan, & Mattson, 1990), and high alcohol consumption (Rosal et al., 2001). However, studies do not consistently find strong relationships between health behaviors other than smoking. Although the multidimensional view on health

behaviors implies the study of behavior patterns rather than the study of bivariate relationships between health behaviors, only very few studies have done so. Thus, less research has focused on the question: can individuals be grouped by similarities in health behavior patterns? Do distinct health lifestyles exist?

Cockerham, Rütten and Abel (1997) define health lifestyles as “collective patterns of health-related behavior based on choices from options available to people according to their life chances. These life chances include age, gender, race and other relevant variables that impact on lifestyle choices. The behaviors generated from these choices can have either positive or negative consequences on body and mind but nonetheless form an overall pattern of health practices that constitute a lifestyle” (p. 338). Thus, the concept of lifestyle provides a useful method of linking health behaviors in a meaningful descriptive term.

There seems to be a discrepancy between the theoretical conceptualization of health lifestyle as the way of grouping people according to similarities in behaviors and attitudes that relate to their health and its empirical realization that focuses on single behaviors (cf. Abel, 1991). In order to preserve the theoretical validity of the lifestyle concept, the empirical study of health lifestyles should apply a method of statistical analysis that would cluster people into distinct groups on the basis of selected lifestyle characteristics. Thus, with respect to the theoretical validity, clustering methods such as cluster analysis or latent class analysis, based on persons rather than variables, appear more appropriate (see Abel, 1991). Thus, the study of lifestyle patterns should be embedded in the tradition of person-centered approach to research. The person-centered approach refers to a holistic view on individual functioning and development. Magnusson and Allen (1983) summarized the essence of the person-centered approach in the following way: “The person oriented approach to research (in contrast to variable centered approach) takes a holistic and dynamic view; the person is conceptualized as an integrated totality rather as a summation of variables” (p. 372). Many previous studies, however, have focused their analysis on similarities or underlying structures of lifestyle variables using a variable-centered approach (cf. Harris & Guten, 1979; Johnson et al., 1998; Liang et al., 1999; Perkins et al., 1993). Within the scope of the variable-centered approach, the relationships between single variables are under consideration. Yet, they will tell the researchers little about the prevalence and the variation of lifestyle groups in society.

There are, however, a couple of studies that focus on grouping individuals by their similarities in health behavior patterns (Berrigan, Dodd, Troiano, Krebs-Smith, & Barbash, 2003; Patterson, Haines, & Popkin, 1994). Petterson et al. (1994) identified seven health behavior patterns on the basis of four behavior variables (nutrition, physical activity, smoking and alcohol consumption) via cluster analysis: health promoting lifestyle, good diet lifestyle, fitness lifestyle, passive lifestyle, drinking lifestyle, smoking lifestyle and hedonic lifestyle. Moreover, the Petterson et al. study is one of the rare studies that examine the cluster of health behavior over the life span. The results of this study suggest that being older was characteristic of the good diet cluster (having a good diet, being sedentary, being a non-smoker and consuming little alcohol), while the youngest ages were more frequently in the fitness (poor diet, physically active, moderate alcohol and cigarette consumption) or hedonic lifestyle (fair diet, moderately active, heavy alcohol and cigarette consumption) clusters. Similar results were obtained by Berrigan et al. (2003). The mean age was generally higher in behavior patterns that included adherence to more public health recommendations. Moreover, the prevalence of adherence to all five recommendations (low fat diet, fruit and vegetable consumption, regular physical activity, moderate drinking and no smoking) increased with age and the prevalence of nonadherence to all five decreased.

To summarize, as people age they adopt health as one of their central life goals and a healthier lifestyle. Thus, there is not only an age-related improvement in single health behaviors but also in their co-occurrence.

However, by looking at the health behavior or the behavior patterns we still cannot say whether a certain behavior is performed for health related reasons or not. Health-protective behavior is defined as “any behavior performed by a person, regardless of his or her perceived or actual health status, in order to protect, promote and maintain his or her health, whether or not such behavior is objectively effective toward that end” (Harris & Guten, 1979, p.18). In contrast, most empirical studies in public health and epidemiological research focus on behaviors which are defined by experts as having a substantial relationship to health (Renner, 2001). A person can engage in, for example, physical activity for health-related reasons but also for reasons of enjoyment or social recognition (Markland & Ingledew, 1997). The physically active person will still be rated by epidemiologists as performing health behavior. Thus, behavior or behavior patterns alone do not tell us much about the

motivation to perform a behavior or about the reasons for age-related differences in health behaviors. In the area of health psychology most of behavior change models, e.g. HAPA, are conceptualized for the prediction of motivation for and performance of health behaviors. Thus, they should do a better job in predicting subjectively perceived health behaviors than if the same behavior is performed for other reasons. The question is therefore whether there are age-related differences in the motivation structure to perform different kinds of (health) behaviors. These issues will be elaborated in the next step.

2.3.6 Age-Related Differences in Socio-Cognitive Variables

In the present study the applicability of the HAPA-Model will be tested across four different behaviors: nutrition, physical activity, alcohol and cigarette consumption. Thus, social-cognitive variables were assessed in a domain specific manner. Therefore the literature will be reviewed with regard to age differences in domain specific social-cognitive variables. When talking about age-differential effects of social-cognitive variables on motivation a distinction should be made between age-related mean differences in social-cognitive variables and age-related differences in the interplay of social-cognitive variables by prediction of intention and behavior. The age-related shift in motivation should effect the interplay of social-cognitive variables in the prediction of intentions in the first place.

Taking into account a shift in goal orientation over the life span, age is expected to affect the intention formation during the motivational phase. There is first empirical evidence that supports this assumption. Lockwood, Chasteen, and Wong (2005) recently observed that role models, suffering from negative health impacts due to an unhealthy lifestyle, exerted a more motivating effect on older adults than on younger ones. Older adults perceived themselves to be more vulnerable for cardiovascular diseases than younger adults (Renner et al., 2000) and risk perception was a significant predictor for intention to adopt a healthier diet in the group of older but not in the group of younger adults (Schwarzer & Renner, 2000).

With regard to outcome expectancies an inconsistent picture emerged. In the study by Wilcox and Storandt (1996) age was negatively related to physical activity-related outcome expectancies (see also Netz & Raviv, 2004). The same was true for age-differences in alcohol-related outcome expectancies (Satre & Knight, 2001).

However, Renner et al. (2000) report a positive age trend for nutrition-related outcome-expectancies. To my knowledge, there is only one study that explores age-differences in the strength of the association between nutrition-related outcome expectancies and intention to adopt healthy diet. Schwarzer and Renner (2000) showed that this relationship, although significant for both age groups, was stronger for younger adults than for older ones.

As people age, they are exposed to an increasing variety of personal and social conditions that challenge their sense of control and independence. The tendency for individuals with low perceived self-efficacy to engage in fewer health-promoting behaviors becomes stronger in older adults, mainly because physical decline is often viewed as an unalterable part of the aging process (Rodin, 1986, 1989). In the domain of physical activity, Wilcox and Storandt (1996) observed that age was negatively associated with self-efficacy (see also Netz & Raviv, 2004). This finding was replicated in the domain of smoking (Ho, 1998). However, in the domain of nutrition a positive association was found between age and self-efficacy (Renner et al. 2000). Moreover, no age differences in health-related control beliefs were found in a large national probability sample (Lachman & Weaver, 1998). These findings suggest that age-related decline in self-efficacy (physical-activity related self-efficacy) occurs mainly in a domain where experience of loss is more common (physical functioning), whereas in a domain where no losses occur high sense of self-efficacy is preserved into the old age (nutrition-related self-efficacy). Studies that explore the strength of the association between domain specific self-efficacy and intention e.g., to adopt healthy diet (Schwarzer & Renner, 2000) or reduce alcohol consumption (Engels, Wiers, Lemmers, & Overbeek, 2005) suggest that this relationship is stronger for older adult than for younger adults.

The studies investigating age-related differences in intention to adopt healthy behavior also yielded inconsistent results both across different behaviors and within one behavior. Renner et al. (2000) report a positive relationship between age and an intention to adopt a healthy diet. The same picture emerged for intention to quit smoking (M. A. Clark, Hogan, Kviz, & Prohaska, 1999; Kviz, Clark, Crittenden, Warneche, & Freels, 1995). However, Lichtenstein, Lando and Nothwehr (1994) found that older smokers express less interest in quitting compared to younger smokers. No association between intention to become physically active and age was found in the study by Hopman-Rock, Borghouts, and Leurs (2005). However, the age

groups investigated in this study consisted of middle aged and older adults. Ziegelmann and Lippke (in press) reported a negative age trend in exercise intentions. With regard to structural differences, two studies have found that older and younger adults were motivated to quit smoking by different health cognitions (M. A. Clark, Rakowski, Kviz, & Hogan, 1997; Kviz et al., 1995)

Although a couple of studies have shown the efficiency of planning interventions in the group of older adults (Liu & Park, 2004; Ziegelmann et al., 2006) as yet only one study (to my knowledge) has investigated age-related differences with regard to planning. Scholz, Sniehotta, Burkert and Schwarzer (in press) reported a higher level of coping planning in the group of older adults in comparison with younger adults.

The life span propositions and their effect on motivation and health behaviors over the life span form the background for the present dissertation. The thesis aims to shed some light, at a general level, on universality of a health behavior change model, the HAPA, with regard to cultural and life span contexts. In the next section the specific research questions and hypotheses will be elaborated in more detail.

2.4 RATIONALE FOR THE PRESENT STUDY

South Korea has experienced a dramatic shift in the leading causes of death from infectious and parasitic disease to cardiovascular disease and cancer. This transition results among other factors from life-style changes and reveals the increased need for health promotion. Determinants of the reasons why people engage in health-promoting behaviors are described by social-cognitive health behavior models. Current health behavior models, such as HAPA, implicitly presume that behavior can be predicted on the basis of core social-cognitive variables irrespective of participants' social-cultural background, behavior type, or age. However, health behavior models were so far mostly tested with Western samples, raising the question of whether these models are also predictive in Eastern societies. The very few studies that tested the applicability of social-cognitive health behavior models to Eastern societies used a cross-sectional design, limiting the interpretation of the results. Thus, the first goal of this dissertation was to test the applicability of HAPA-model in an Eastern culture (South Korea) that has a morbidity and mortality pattern comparable to Western countries using a longitudinal sample.

Another factor that might limit the universality of social-cognitive health behavior models, such as the HAPA, is the behavior type – health promoting vs. addictive behaviors. Most of the social-cognitive models of behavior change do not make a difference with regard to the quality of prediction for different behaviors. However, it is evident from the meta-analyses of different behaviors (Godin & Kok, 1996; Randall & Wolff, 1994; Webb & Sheeran, 2006) that the type of behavior influences the degree of intention-behavior consistency. So far health behavior change models were predominantly applied to health promoting behaviors. Fewer studies were devoted to addictive behaviors. Moreover, to my knowledge, there are no studies that investigate the difference in the quality of behavior prediction across different behaviors using the same sample. Thus, the second objective of the present study was to examine the quality of behavior prediction across different behaviors.

Moreover, the role of past behavior in the prediction of health behaviors will be investigated. Previous research showed that past behavior is often the best predictor of future behavior (Bagozzi & Kimmel, 1995; Norman & Smith, 1995). It was argued that the predictive power of past behavior results in the stability of behavior. The reason for stability may reflect the fact that whatever factors determined the behavior in the past continue to exert their influence in the present (Ajzen, 2002). Thus, cognition may always precede behavior, as theoretically surmised (Ajzen, 1991), but because of its temporal instability cannot always outperform the predictive power of past behavior. Therefore past behavior may not possess theoretical merit in the TPB or HAPA but add predictive value statistically. Thus, it is hypothesized that past behavior will significantly predict future behavior and this will add to the explained variance in the future behavior. However, the relationship between social-cognitive variables and future behavior will remain significant after inclusion of past behavior in the prediction equation.

Another important factor that might limit the universality of social-cognitive health behavior models, such as the HAPA, is a difference in participants' age. As reported above previous research showed that there are age related-changes regarding the importance placed on health (Hooker & Kaus, 1994; Nurmi, 1992; Staudinger et al., 1999), perceived vulnerability for diseases (Renner et al., 2000) and performance of health behaviors (Breuer, 2005; U.S. Department of Health and Human Services, 1999; Prochaska et al., 1986). Moreover, there is a shift in motivation across adulthood from gain orientation toward maintenance orientation and loss avoidance

(Freund & Baltes, 2000; Heckhausen, 1999). In a similar vein, Lockwood et al. (2005) recently observed that role models suffering from negative health impacts due to an unhealthy lifestyle exerted a more motivating effect on older adults than on younger ones. However, neither theoretical considerations of life span psychology nor empirical findings regarding age-related changes in goal content and motivation have been so far embedded in the behavior change frameworks. Therefore, the forth objective of the present study was the investigation of the moderating role of chronological age in predicting the motivation to adopt health behaviors.

Finally, since the risk of chronic disease increases with an increasing number of risk behaviors the interrelationship between different health behaviors was of interest. The interrelationships between different health behaviors will be investigated using the concept of health lifestyle proposed by Cockerham et al. (1997) as theoretical background. The theoretical concept of lifestyle assumes a differentiation between groups of people and demands methods that help to identify those groups, e.g. latent classes analysis. There are only a few studies that focus on grouping individuals by their similarities in health behavior patterns (Berrigan et al., 2003; Patterson et al., 1994). Distinct health behavior patterns could be found. Moreover, age-related differences in the composition of behavior patterns were reported (Berrigan et al., 2003; Patterson et al., 1994). Thus, the goal of the present study was to identify distinct patterns of health behaviors and age-differences in the composition of health behavior patterns.

To summarize, five objectives are addressed in the present study: a) Test the universality of HAPA-model across cultures; b) Test the universality of HAPA-model across behaviors; c) Investigate the role of past behavior by behavior prediction; d) Test the universality of HAPA-model across age groups; e) identify distinct patterns of health behaviors and age-differences in the composition of health behavior patterns. The research questions and hypotheses of this study are structured around the five objectives and are outlined in more detail in the next section.

2.5 RESEARCH QUESTIONS AND HYPOTHESES

In the following section, the detailed research questions and hypotheses will be elucidated (for an overview see Table 2).

2.5.1 Is HAPA Applicable to a South Korean Sample?

The first research question pertains to the applicability of the HAPA-model to a South Korean sample. In the scope of this dissertation the so called transport goal of cross cultural psychology was adopted (Berry & Dasen, 1974). Thus, the utility of the HAPA-model for the prediction of health behaviors will be tested in another cultural setting in order to test its cross-cultural validity and applicability. The prediction is that HAPA is applicable to a South Korean sample.

2.5.2 Does the Quality of the Prediction of Health Behaviors Vary as a Function of Behavior Type: Health Promoting vs. Addictive Behaviors?

The second objective of the present dissertation was to examine the quality of behavior prediction as a function of behavior type. From previous research it is evident that the type of behavior influences the degree of intention-behavior consistency (Godin & Kok, 1996; Randall & Wolff, 1994; Webb & Sheeran, 2006). Because addictive behaviors are more difficult to keep under personal control, the intention-behavior consistency should be lower for addictive behaviors than for health promoting ones. However, empirical evidence contradicts this assumption. One reason might be the assessment of intention as continuation intention (I intent to smoke in the next month) and not as quitting intention. However, if intention is assessed as quitting intention a lower intention-behavior consistency is expected for addictive behaviors in comparison with health promoting behaviors.

2.5.3 The Role of Past Behavior

The third objective of the study was the investigation of the role of past behavior. Previous research showed that past behavior is often the best predictor of future behavior (Bagozzi & Kimmel, 1995; Norman & Smith, 1995). It was argued that past behavior is itself a product of previous social-cognitive-behavioral processes (Ajzen, 1991, Bandura, 1997). However, due to the temporal instability of social-cognitive variables, the last cannot always outperform the predictive power of past behavior. Therefore past behavior may not possess theoretical merit in the TPB or HAPA but add predictive value statistically. Thus, it is hypothesized that past behavior will significantly predict future behavior and this will add to the explained

variance in the future behavior. However, the relationship between social-cognitive variables and future behavior will remain significant after inclusion of past behavior in the prediction equation.

2.5.4 Are there Age-Differences in the Structure of Social-Cognitive Variables in Predicting Health Behaviors?

The fourth objective of the present dissertation is to test the universality of HAPA-Model across different age groups. Based on the theoretical and empirical considerations reviewed throughout section 2.3, age-differential effects were expected. The second objective was approached in two steps. In the first step age differences were investigated by looking at the mean differences in social-cognitive variables and health behaviors. This was done in order to replicate the findings on age-related differences in health cognitions and health behaviors obtained in Western samples. Hence, age-related differences in health cognitions and behaviors build among other theoretical considerations an empirical foundation for the assumption of age-differential affects in the motivation to adopt healthy behaviors. In the second step, structural differences in the interplay of social-cognitive variables in predicting health behaviors were investigated. The detailed hypotheses with regard to mean and structure differences are summarized below.

In order to investigate age differences two age groups were built: a group of young adults (16-35) and a group of middle aged/older adults (36-90). The age cut-off of 35 years was chosen for several reasons. Empirical studies from different fields suggest that around this age marked physical changes as well as changes in subjective health conceptions and in goal structures occur (Hoyer & Roodin, 2003; Nurmi, 1992). It is important to note that these physical changes do not imply that people actually feel ill or have suffered from certain diseases. It is assumed that people notice these physical changes (e.g., decline in muscle strength) and, therefore, they become more aware of their susceptibility towards disease, which might induce changes in subjective health conceptions and goals. Following this conception and these findings, it is assumed that younger adults might differ from middle-aged and older adults in their health-related beliefs, such as risk perceptions. In a previous sample with 524 German volunteers first evidence for this reasoning was found (Schwarzer & Renner, 2000). Thus, the main focus is on differences between younger adults, who usually

perceive themselves as comparably invulnerable (Renner et al., 2000) and who are less conscious about health-related issues than middle-aged or older adults. Although middle-aged adults might additionally differ from older adults (older adults [+65 years] on average suffer more frequently from chronic diseases), middle-aged as well as older adults share a higher health awareness and vulnerability, and in this respect they might differ from younger adults. From this perspective, examining differences between younger adults and middle-aged/older adults is of particular theoretical interest.

2.5.4.1 Age-Related Mean Differences in Health Behaviors

Similar age trends that were observed in Western samples were expected in the South Korean sample with regard to health behaviors. It was expected that older adults will have more favorable nutrition habits, will be more likely not-consumer of alcohol and cigarette but will be less physically active than younger adults.

2.5.4.2 Can Distinct Behavior Patterns Be Identified?

The fifth objective of the study is the identification of distinct patterns of health behaviors. In line with previous studies, it is expected that older adults will show an overall favorable life style pattern with the exception of physical activity.

2.5.4.3 Age-Related Mean Differences in Health Cognition

It was expected that older adults will perceive themselves to be more vulnerable for cardiovascular diseases than younger adults (Renner et al., 2000). Since an inconsistent empirical picture emerged with regard to age-differences in health cognitions, the following theoretical deliberation was adopted for the hypotheses building. Age is associated with losses in the functional domain and as people age maintenance of health becomes the most important life goal. Accordingly, intention to adopt favorable health behaviors along with its prerequisites such as outcome expectancies and self-efficacy should have a positive age trend. The positive age trend was expected in all behavior domains with the exception of physical activity. Physical activity is a domain with increasing losses that are often viewed as an unalterable part of the aging process (Rodin, 1986; 1989). Therefore a negative age trend was

expected with regard to outcome expectancies, self efficacy and intention in the domain of physical activity. Planning is predicted to show a positive relationship with age.

2.5.4.3 Structural Differences

Taking into account a shift in goal orientation over the life span from growth orientation towards maintenance of functioning and avoidance of losses (Baltes et al., 1998; Freund & Ebner, 2005), age is expected to affect the intention formation during the motivational phase. Consequently, risk perception might be more influential in older adults than in younger ones. In a similar vein, health-related outcome-expectancies might contribute more to intention building in the group of older adults than in the group of younger adults. Since self-regulatory skills are needed regardless of motives that lead to execution of health behaviors, no age differences are expected in the volitional phase and in the relationship between action self-efficacy and intention.

Since it was expected that older adults will show a stronger intention to adopt different health behaviors it may be that the age differences in the structure of the social cognitive variables are attributable to the differences in the strength of intentions. Therefore the sample will be divided in two groups: the group of nonintenders and the group of intenders. The HAPA-model will be calculated for both groups. It is postulated that the structural differences between nonintenders and intenders do not mirror age-related structural differences.

Table 2: Overview of central research questions of the present study

Test of universality of the HAPA-Model across cultures:

Q1: It is expected that HAPA is applicable to a South Korean sample

Test of universality of the HAPA-Model across different types of behavior:

Q2: Lower intention-behavior consistency is expected for addictive behaviors (smoking and alcohol consumption) than for health promoting behaviors (healthy nutrition and physical activity).

Role of past behavior by behavior prediction:

Q3: It is hypothesized that past behavior will significantly predict future behavior and will add to the explained variance in the future behavior. However, the relationship between social-cognitive variables and future behavior will remain significant after inclusion of past behavior in the prediction equation.

Test of universality of the HAPA-Model across age groups:

Q4: Age differences are expected with regard to health **behaviors**. Older adults compared with younger adults are expected to:

- have better nutrition behavior and lower alcohol and cigarette consumption, but to less physically active.

Q5: It is expected to find distinct **life style patterns**. Older adults are expected to belong to a more favorable life style cluster.

Q6: Age differences are expected with regard to **health cognitions**. Older adults compared with younger adults are expected to:

- perceive themselves as being more vulnerable for diseases,
- score lower on physical activity related outcome expectancies and self-efficacy scales, but higher on nutrition, alcohol, and smoking-related outcome expectancies and self-efficacy scales,
- score lower on physical activity-related intention and score higher on nutrition, alcohol, and smoking-related intention and planning scales,

Q7: Age differences in the interplay of social-cognitive variables in predicting health behaviors are expected:

- A stronger association between risk perception, outcome expectancies and intention is expected in the group of older adults than in younger adults.
- No age differences are expected in the volitional phase and in the relationship between action self-efficacy and intention.

Q8: It is postulated that the structural differences between nonintenders and intenders should not mirror age-related structural differences.