5. DISCUSSION

The present study was designed to test the applicability of a social-cognitive model to different behaviors (health promoting versus addictive) in a non-Western culture and for different age groups. The HAPA-Model (Schwarzer, 2004) was used as a theoretical framework to approach these topics. Current health behavior models, such as HAPA, implicitly presume that behavior can be predicted on the basis of core social-cognitive variables irrespective of behavior type and participants' social-cultural background or age.

Most of the social-cognitive models of behavior change do not make a difference with regard to the quality of prediction for different behaviors (cf. Schwarzer, 2004). However, it is evident from 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. Therefore, the first goal was to examine the moderating role of behavior type – health promoting vs. addictive behaviors in predicting health behaviors. Lower intention-behavior consistency was expected for addictive behaviors (smoking and alcohol consumption) than for health promoting behaviors (healthy nutrition and physical activity).

Secondly, health behavior models were so far mostly tested with Western samples raising the question of whether these models are also predictive in Eastern societies. In the context of physical activity, first studies yielded supporting evidence for the contention of generality (Callaghan, et al., 2002; Y.-H. Kim, 2004). However, these studies used a cross-sectional design, limiting the interpretation of the results. Another research question therefore was to examine whether the HAPA could be applied successfully to a non-Western culture, with South Korea chosen as an example.

The third goal was to examine whether the HAPA-model can be generalized to different age groups. Previous research has demonstrated that with increasing age: a) health becomes one of the most important life goals (Hooker & Kaus, 1994; Nurmi, 1992; Staudinger et al., 1999), b) perceived vulnerability for diseases increases (Renner et al., 2000) and c) performance of health behaviors becomes more likely (Breuer, 2005; U.S. Department of Health and Human Services, 1999; Prochaska et al., 1986). These age-related changes suggest changes in motivation across adulthood

(Freund & Baltes, 2000; Heckhausen, 1999; Lockwood et al., 2005). In line with previous research and theoretical considerations, it was reasoned that there will be structural differences in the interplay of social-cognitive variables in predicting health behavior. In other words, it was expected that the importance of different health cognitions for intention formation would vary depending on age.

The subsequent discussion of results is organized around these three main research questions. In the following, the central findings of the present study are summarized and embedded into previous research. In the second section the limitations of the present study are discussed. The chapter closes with general conclusions and an outlook.

5.1 SUMMARY OF MAIN FINDINGS AND THEIR RELATIONSHIP TO PREVIOUS RESEARCH

This section starts with the discussion of the moderating role of behavior type in behavior prediction. In the second step, the applicability of the HAPA-model to a South Korean sample will be addressed. Lastly, the applicability of the HAPA-Model to different age groups is elaborated on. The age-differences in health cognitions, health behaviors and behavioral patterns will be discussed. An overview of the central research questions and main findings is depicted in Table 42.

Table 42: Overview of central research questions of the present study

Research Questions/Hypotheses of the present study	Supported by results?
Test of universality of the HAPA-Model across cultures:	
Q1: It is expected that HAPA is applicable to a South Korean sample	Partially
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).	Partially
Role of past behavior by behavior prediction:	
Q3: It is hypothesized that past behavior will significantly predict future behavior and 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.	Yes
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 be less physically active.	Partially
Q5: It is expected to find distinct **life style patterns**. Older adults are expected to belong to a more favorable life style cluster.	Yes
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,	Yes
- 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,	Partially
- score lower on physical activity-relate intention and score higher on nutrition, alcohol, and smoking-related intention and planning scales,	Partially

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 ones.	Partially
- No age differences are expected in the volitional phase and in the relationship between action self-efficacy and intention.	Yes
Q8: It is postulated that the structural differences between non-intenders and indenters should not mirror age-related structural differences.	Yes

5.1.1 Applicability of the HAPA-Model to Different Types of Health Behaviors

A main hypothesis of the present study was that HAPA is applicable to different types of health behaviors. It was further assumed that intention-behavior consistency will be lower for addictive behaviors than for health promoting behaviors. Moreover, the amount of explained variance in addictive behaviors will be lower than for health promoting ones. This prediction was based (see section 2.1.5) on a consideration that addictive behaviors in comparison to health promoting behaviors are more driven by physiological forces and therefore are more difficult to keep under personal control (DiClemente et al., 1995; Shiffman et al., 1997; Witkiewitz & Marlatt, 2004).

The findings of the present study partially supported the hypothesized relationships. The HAPA-model was confirmed for nutrition behavior and to a lesser degree for physical activity, whereas the model was found to be less applicable to addictive behaviors such as smoking and alcohol consumption (see sections 4.2.2, 4.3.2, 4.4.2, 4.5.2). According to Cohen's classification of effect size (Cohen, 1992) the small amount of variance in intentions and behavior was accounted for by the model for addictive behaviors (4%, and 3% of the variance was explained with regard to alcohol-related intention and behavior while 7% and 5% with regard to smoking-related intention and behavior). In contrast, 12% and 27% of the variance in these variables were accounted for in the model for nutrition behavior, respectively. Only a modest amount of variance could be explained in physical activity-related intention and behavior with 6% and 9%, respectively. Thus, the first assumption of applicability of the HAPA-Model to different health behaviors could only be

confirmed for nutrition behavior. A significant but only modest amount of variance could be explained in physical activity related intention and behavior. Only a statistically non-significant amount of variance could be explained in alcohol and cigarette consumption. As predicted, both the amount of explained variance in behavior and behavior-intention consistency was lower for addictive behaviors than for health promoting behaviors. However, in the case of physical activity this was only true for the subgroup of older adults. Age-related differences in motivation to be physically active will be discussed in section 5.2.3.

Considering the relationships between social-cognitive variables as suggested by the HAPA-Model, in the motivational phase, risk perception and outcome expectancies were only predictive of the intention to adopt healthier nutrition. Action self-efficacy was predictive of intentions to adopt all four behaviors.

The interplay of volitional variables partly corresponded with theoretical assumptions. Coping self-efficacy was a significant predictor of nutrition behavior, physical activity and alcohol consumption, but due to lower statistical power (the *n* of the subsample of smokers was smaller than the *n* of the subsamples in the analysis for other behaviors) failed to reach significance to predict cigarette consumption. Contrary to the theoretical assumptions of the HAPA-Model and in contrast to previous studies (Lippke et al., 2004a; Orbell, Hodgkins, & Sheeran, 1997; Rise, Thompson, & Verplanken, 2003; Sniehotta et al., 2005) planning was a non-significant predictor of the other three behaviors, with the exception of nutrition behavior.

When past behavior was included in the HAPA-model, it was a significant predictor of the future behavior and added to the amount of the explained variance. However, as predicted, the relationship between social-cognitive variables and subsequent behavior remained stable after inclusion of past behavior into the model. The significant path from past behavior to future behavior points to the relative stability of the behavior over time, but gives no additional information about the mechanisms that contribute to the maintenance or to behavior change (see also Ajzen, 2001; Bandura, 1997).

The results of the present study are consistent with previous findings (see e.g. Riese & Kovac, 2006; Mugraff, DcDermontt, & Walsh, 2003) showing that low percentage of variance was explained in e.g. alcohol consumption, when intention was assessed as quitting intention. The current results also correspond with the ones

obtained by meta-analyses (Godin & Kok, 1996; Randall & Wolff, 1994; Webb & Sheeran, 2006). The meta-analyses were calculated on the basis of different studies with different samples and they all came to the conclusion that the type of behavior influences the degree of intention-behavior consistency and the variance explained in intentions and behavior. To my knowledge, the present study is the first study that investigates the quality of the prediction of different types of health behavior using the same sample and thus makes the comparability of the prediction quality across different domains more reliable. Moreover, by assessing alcohol-, and smoking-related intention as quitting intentions and alcohol-, and smoking-related self-efficacy as quitting self-confidence this study makes the comparability of the HAPA-model across different behavior types possible. The present findings imply that health behavior is not a unitary construct that can be equally well predicted by the same set of variables regardless of the behavior type.

Until now there has been no study that has systematically described health behaviors on the basis of underlying dimensions and examined the impact of different dimensions of health behaviors on the quality of the prediction of health behaviors. One of the few attempts to specify dimensions that health behaviors might vary on was undertaken by Renner and Schwarzer (2003b) (but see also Bishop, 1994 p. 79-80). They distinguished between six dimensions of health behaviors: a) voluntary; consciously undertaken by the individual vs. involuntary; unconsciously undertaken by the individual; b) avoidance of harmful activities vs. engagement in protective activities; c) undertaken without medical assistance vs. needs professional medical assistance; d) vital vs. non-vital; e) occasional; instable vs. habitual; stable; f) simple vs. complex, multifaceted. The four behaviors under present study could differ, for example, on the dimension “avoidance of harmful activities vs. engagement in protective activities”. The present results suggest that systematic study of the impact of different dimensions of health behaviors on the quality of behavior prediction is meaningful. A deeper understanding of the functions that different health behavior can fulfill and how this affects the predictability of behavior is needed. On the basis of the function of health behavior additional variables might be included in the model and some can be left out. For example, Witkiewitz and Marlatt (2004) summarized intrapersonal determinates of relapse and among others mentioned craving, dependence and emotional states. Thus, in the case of addictive behaviors the

measures of physiological and psychological dependency or craving can be included in the model.

5.1.2 Applicability of the HAPA-Model to a Non-Western Country

Another main hypothesis of the present study was the applicability of the HAPA to a South Korean sample. The generalizability of the HAPA-model is warranted when the results obtained in the Western samples match the results obtained with an Eastern sample, e.g. the South Korean one (cf. Berry et al., 2002). The results regarding nutrition behavior obtained in a South Korean sample widely match the results from a previous study done with a German sample (Schwarzer & Renner, 2000). A somewhat different picture emerged with regard to physical activity. In two studies investigating applicability of the HAPA-Model to physical activity with Western samples, (Lippke et al., 2004a; Sniehotta et al., 2005) not only could a larger amount of variance in physical activity (18% and 24% vs. 9%) be accounted for but also all three health cognitions (risk perception, outcome expectancies and self-efficacy) were predictive of intention, whereas in the South Korean sample only self-efficacy was. To my knowledge, the predictive utility of the HAPA-model for addictive behaviors in Western-samples was only tested in one study by Murgraff et al. (2003). HAPA constructs accounted for 21% of explained variance in single-occasion drinking behavior. However, self-efficacy was the only significant predictor of the subsequent behavior. Thus, although much less variance in the drinking behavior was explained in the present study the pattern of relationship between HAPA-variables was consistent with the Mugraff et al. study.

To summarize, the application of the HAPA-Model to a non-Western sample partly matched the results obtained with Western samples. Thus, a cross-cultural "transportability" of the model could be supported in general. However, two vivid discrepancies between the present study and previous research became apparent. In the motivational phase, risk perception and outcome expectancies were for the most part non-significant predictors of intention. However, the non-significant relationship between risk perception or outcome expectancies and intentions were predicted for the group of younger adults. Therefore the possible explanations for this discrepancy will be extensively discussed in Section 5.2.3. Also, in the volitional phase, contrary to the assumptions of the HAPA-Model, planning was a non-significant predictor for studied behaviors with one exception of nutrition behavior.

One possible explanation for low predictive power of the planning construct might lie in the way of its assessment. Most of the previous studies have introduced the concept of planning/implementation intentions experimentally. In an experimental setting planning interventions in different behavioral domains were facilitative for behavior change (Orbell et al., 1997; Verplanken & Faes, 1999). In the present study no planning intervention was carried out but the participants were asked to indicate whether they already have concrete plans to change certain behaviors. Previous studies using the planning construct in the survey context yield more inconsistent results. Several studies found that the introduction of the planning construct improved the prediction of health behaviors when compared to motivational variable alone (Lippke et al., 2004a; Rise et al., 2003; Sniehotta et al., 2005), but the effect sizes were rather small. Other studies did not find a significant relationship between planning and health behavior (Murgraff & McDermott, 2003; Rhodes, Blanchard, Matheson, & Coble, 2006). Moreover, the participants in the Lippke et al. and Sniehotta et al. studies were rehabilitation patients that were excessively trained on how to remain physically active after discharge also via planning. Thus, they might have already gained the planning competences and built the crucial link between situational cues and behavior during the rehabilitation-program. In the present study, however, participants had to rely on their own planning competence and might have answered the planning items in a superficial manner without really building a crucial link between situational cues and behavior.

The only exception constituted nutrition-related planning that was predictive of nutrition behavior beyond the effect that motivational and other volitional variables had on nutrition behavior. The experimental studies in the domain of healthy eating (Armitage, 2004; Kellar & Abraham, 2005; Verplanken & Faes, 1999) attest a positive effect of implementation intention on subsequent changes in nutrition behavior (but see Jackson et al., 2005). To my knowledge there has been so far no cited study that used spontaneous measure of implementation intentions in the domain of nutrition. Thus, the present study proved that a spontaneous measure of nutrition-related implementations intentions might be useful for predicting behavior. Contrary to the experimentally induced measures, a spontaneous measure can be easily employed in the large surveys.

Why did a spontaneous measure of nutrition-related planning outperformed the planning measures in other behavior domains? One potential reason for the

stronger association might lie in the function of the nutrition behavior. Hunger is indeed a biological need that can be relieved through food intake (Conner & Armitage, 2002). In the case of nutrition behavior the target of behavior change is, in contrast to other health behaviors, not the abdication of food but rather the choice of low-fat and high fiber products. Thus, eating is usually performed by people a couple of times every day. Moreover, people might have developed the nutrition-related planning competence by e.g., compilation of the shopping lists. For example, in the study by Thomas & Garland (2004) 67% of the participants claimed to have a written grocery shopping list on their last trip to supermarket. Probably because of this "training effect" it might have been easier for the study participants to activate nutrition-related plans rather than plans for other behaviors.

Another explanation for the low planning-behavior consistency might lie in the semantic ambiguities in the measurement of planning construct. Semantic ambiguities between intention and planning may make the measurement domains of these constructs similar even if the two constructs are conceptually different. Rhodes et al. (2006) evaluated the discriminant validity of motivational items (e.g. exert effort; try hard), intention items (e.g. intend, plan) and implementation intention/planning items (e.g. specific plans) in the physical activity domain. Motivational items and planning showed discriminant validity, but intention could not be discriminated from either construct. The semantic ambiguity between intention and planning items is somewhat problematic when the separation between measurement of motivation and planning is desirable. Hence, it leads to measurement redundancy and this can affect the structural coefficients in the model. In the present study, however, the correlations between intention and planning across different behaviors were in the range of ($.17 \leq | r | \geq .31$) and therefore the lack of discriminant validity can be ruled out.

5.1.3 Applicability of the HAPA to Different Age Groups

One central hypothesis of the present study was that there will be mean and structural differences with regard to health behaviors and health cognitions between different age groups. The results for the age-related mean differences in health behaviors and health cognitions will be discussed next.

5.1.3.1 Age-Related Mean Differences in Health Behaviors

On the basis of the assumptions that with age, the importance of health (Hooker, 1992; Nurmi, 1992) and a perceived vulnerability for diseases (Renner et al., 2000) both increase, it was postulated that middle aged/older adults will be more inclined to engage in health promoting behaviors, with the exception of physical activity. Middle aged/older adults were also expected to have an overall more favorable lifestyle behavior than younger adults. Moreover, a positive age trend was expected with regard to domain specific health cognitions. Due to age-related losses in physical functioning, older adults were expected to score lower on physical-activity related health cognitions than younger adults.

In accordance with previous findings, older adults were for the most part inclined to engage in health promoting behaviors to a greater degree than younger adults (see section 4.1.1): In line with that prediction middle aged/older adults consumed more low-fat and high fiber foods than younger adults. The predicted negative trend for physical activity was also supported by the data. However, young women were relatively inactive in comparison with younger men and did not differ from middle-aged/older women. As hypothesized, a lower percentage of middle aged/older men were smokers. Since barely any women in the study were current smokers, no age-differentiated effects were calculated. Contrary to previous findings (Liang et al., 1999; Prohaska et al., 1985; Satre & Knight, 2001) there were no age differences with regard to alcohol consumption. However, there was a floor effect because both age groups consumed on average only moderate amounts of alcohol. In line with previous findings (Satre & Knight, 2001; Yoon et al., 2004) women consumed a lower amount of alcohol than men. Thus, as will be discussed further, the present sample was positively selected with regard to alcohol consumption in comparison with the general population**.** Therefore, the results concerning the age-differential aspects of alcohol consumption should be replicated with a more representative sample.

5.1.3.2 Age-Related Differences in Behavior Patterns

A further focus of interest was to determine whether older adults display an overall favorable health lifestyle. Since no evidence could be found in favor of the unidimesionality of health behaviors (see Table 13) a person-centered approach was

adopted to study age-differences in the co-occurrence of health behaviors (Bergman, 1998; Bergman & Magnusson, 1997; Magnusson, 2000). The present results support the idea of the distinct health lifestyles (Cockerham et al., 1997). Three groups of people were identified via Latent Class Analysis (see section 4.1.3): 1) a group of participants that were likely to have modest nutrition habits, be physically inactive, not to consume alcohol regularly and not to smoke, 2) a group of people that were likely to have modest nutrition habits, be physically inactive, not to consume alcohol on a regular basis but were very likely smoker, and 3) a group of people with an overall favorable profile. The group composition widely matched those described by Petterson et al. (1994) and Berrigan et al. (2003). Both studies reported clusters of people with similar characteristics as in the present study, indicating that health behaviors are not independent of each other but co-occur in a meaningful way. Petterson et al. (1994) distinguished between seven and Berrigan et al. between over ten behavior profiles, whereas in the present study only three distinct profiles were found. However, both studies used very large (cf. Petterson et al., N = 5,484) or nationally representative samples (N = 15,425) whereas the present study was positively selected with regard to health behaviors and therefore the range on possible behavior configurations might not have been fully captured.

Corresponding to the previous studies (Berrigan et al., 2003; Petterson et al., 1994) older adults were more often members of the cluster with overall favorable health behaviors profile than of the other two clusters, whereas younger adults were less often members of the cluster with an overall favorable profile than of the other two clusters. Thus, older people not only scored better on a single health behaviors but have an overall favorable health lifestyle. Although the age-group composition varied, there were younger and older participants in each of the three clusters. In other words, chronological age was a strong but not perfect predictor of having an overall favorable health behavior pattern. This leads to the question concerning which specific experiences or life circumstances contribute to the establishment of a healthy lifestyle.

Also of interest is to know whether having a certain lifestyle affects motivation for behavior change. This is speculative but, for example, people in cluster I might have a different motivation to be e.g. physically active than people in cluster II. The former might think that since they do not have “bad health habits” there is no need for active health promotion. Whereas the participants in cluster II might feel more under

"pressure to change". The present study leaves these questions open, but does give direction for further research.

5.1.3.3 Age-Related Differences in Health Cognitions

Age-differences in the domain specific health beliefs (see section 4.1.2) corresponded in general with the behavior profiles in different age groups. The effect sizes of the following age-differential effects were rather small, so the following interpretation of results should be taken with caution. In accordance with previous findings (Prohaska et al., 1985; Renner et al., 2000), middle aged and older adults perceived themselves to be more vulnerable for cardio-vascular diseases than younger adults. Thus, people seem to realistically adopt their perceived vulnerability to the age-related increase in risk for cardio-vascular diseases.

With advancing age, participants acknowledge more positive consequences of restrained eating and moderate alcohol consumption. Both age groups acknowledge, to an equal degree, the benefits of physical activity and quitting smoking for their health and life quality. Thus, it seems that the positive consequences of physical activity and non-smoking for health are very vivid in the general public awareness, whereas positive consequences of restrained eating and moderate alcohol consumption are attributed to health mainly by middle aged/older participants.

The results for nutrition-related outcome expectancies are in line with those obtained by Renner et al. (2000). The age-related inclination toward healthy nutrition is also reflected in age differences in nutrition related outcome expectancies. However, the present findings regarding alcohol-related outcome expectancies contradict those reported by Satre and Knight (2001). One possible reason for this discrepancy lies in the way the outcome expectancies were operationalized in these two studies. In the present study alcohol-related outcome expectancies assessed the positive outcomes for health that a person will experience after limiting alcohol consumption. In the Satre and Knight (2001) study, positive outcome expectancies measured the positive outcomes of alcohol consumption such as sociability, tension reduction, courage and sexuality etc. Therefore, it is not surprising that older adults scored lower on such a measure of outcome expectancies, because older adults possess better e.g., emotion-regulation skills (Gross et al., 1997) and don't have to rely on alcohol to e.g., reduce tension.

This inconsistency in the findings reveals a more general problem in this area of research, namely the inconsistent operationalization of health beliefs, which makes the comparison of the studies difficult. A similar problem emerges by comparing the present results with regard to physical activity-related outcome expectancies with results of the previous studies. For example, Netz and Raviv (2004) used the net measure of physical activity-related outcome expectancies (positive outcome expectancies minus negative outcome expectancies) and reported an age-related decline in outcome expectancies. However, it remains unclear whether positive outcome expectancies declined with age and/or negative outcome expectancies increased.

In line with previous findings, (M. A. Clark et al., 1999; Kviz et al., 1995; Renner et al., 2000) middle aged/older participants were more motivated to adopt health promoting behaviors than younger adults. They expressed higher intentions to adopt low-fat nutrition and to quit smoking. The age-differential effect of an intention to limit alcohol consumption was restricted to middle aged/older men in comparison with younger men. This is not surprising considering the very low amounts of alcohol consumed by women. They did not have a need for change, because they were already performing this behavior according to the WHO recommendations (WHO, 2001). Contrary to expectations (cf. Ziegelmann & Lippke, 2007), older adults also showed a slightly stronger intention to be physically active than younger adults. This may be due to the relatively good health status of the present sample compared to the sample of orthopedic rehabilitation patients studied by Ziegelmann and Lippke. The participants might have not experienced severe functional constrains that would challenge their performance of physical activity. Thus, the present findings suggest that older adults in a relatively good health condition are more strongly motivated to engage in a healthier life style than younger adults. Moreover, the stronger intention of older adults to engage in health promoting behaviors reflects their personal goal structure and the age-related increase in importance placed on health (cf. Nurmi, 1992) on a more concrete level (Carver & Scheier, 1998).

The results obtained by Renner at al. (2000) with regard to nutrition related self-efficacy could be replicated in the present study. Thus, middle aged/older adults had greater confidence in their ability to adopt healthy nutrition habits than younger adults. Contrary to the expectancies and previous findings (cf. Netz & Raviv, 2004; Wilcox & Storandt, 1996), older adults also reported greater confidence to be

physically active than younger adults. The usual explanation for the age-related decline in self-efficacy is the internalization by older people of the common age stereotypes. Part of this negative age stereotype is the assumption that older adults are less physically capable than younger adults (Rodin, 1986; 1989; Netz & Raviv, 2004). It might be the case that the negative age stereotypes are more common in western societies and not in the Eastern ones (Levy & Langer, 1994; Levy, 1999). There is some evidence showing that in the countries where the majority of people share Confucian beliefs older adults are honored and respected (Ikels, 1991). The absence of the negative age stereotypes might have affected the self-efficacy judgments of the older adults in this sample. Older adults further reported higher confidence of quitting smoking than younger adults. However, they did not differ in the level of alcohol-related self-efficacy beliefs from younger adults. Thus, present findings support the notion that the strength of self-efficacy beliefs might vary by domain (Lachman & Weaver, 1998) and that healthy older people with no or few functional limitations might maintain a high level of efficacy in certain domains into old age.

A similar picture of age-differential effects emerged with regard to both types of planning (action and coping planning). Middle aged/older adults reported higher levels of nutrition-related and physical activity-related planning than younger adults. These results are in line with previous research (Scholz et al., in press; Ziegelmann et al., 2007). However, no age differences were observed with regard to alcohol- and smoking-related planning. It seems that better planning competence of the middle aged/ older adults is a domain specific skill and not a universal competence.

To summarize, middle aged/older adults were motivated more to engage in different kinds of health behaviors than younger adults. This is in line with Zanjani, Schaie and Willis (2006) who argue that older individuals might be more inclined to engage in positive health behaviors to prevent poor health outcomes, due to their higher probability of morbidity and even mortality compared to younger individuals. Moreover, middle aged and older adults had better self-regulation skills than younger adults even in the domain of physical activity in which their performance was worse than those of younger adults. This corresponds to previous research that has demonstrated that a strong sense of control is maintained over the life span (Lachman & Weaver, 1998), and that older adults have considerable adaptive potential to deal with decline and losses (Brandtstadter & Renner, 1990).

5.1.3.4 Structural Differences

The mean differences in health behavior and cognitions merely reveal whether certain individuals possess some self-regulative skills or perceived themselves as being at risk. Mean differences do not tell, however, what are the crucial constructs that facilitate intention formation and the performance of health behavior. It was hypothesized that there will be different sources of motivation to perform certain behavior as a function of age. This hypothesis was built on the theoretical considerations regarding a shift in goal orientation over the life span from growth orientation towards maintenance of functioning and avoidance of losses (Baltes et al., 1998; Ebner et al., 2006; Freund & Ebner, 2005; Nurmi, 1992). Age was expected to moderate the intention formation during the motivational phase. Health is a diminishing resource that middle-aged/older adults are supposed to maintain. Consequently, risk perception was expected to be more influential in older adults' intention formation than in younger ones' (Lockwood et al., 2005). In a similar vein, as people age, knowledge about contingencies between behavior and health outcomes gains in personal action relevance. Therefore, health-related outcome expectancies were expected to 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 performance of health behaviors, no age differences were expected in the volitional phase and in the relationship between action self-efficacy and intention.

As hypothesized, the present study demonstrates significant structural differences in the interplay of social-cognitive variables by the prediction of intention and no age-differences in the interplay of volitional variables by the behavior prediction (see sections 4.2.3, 4.3.3 and 4.4.3). Due to the small sample size of older smokers, structural differences between age groups could only be studied on the basis of nutrition behavior, physical activity and alcohol consumption.

Risk perception was a significant predictor for the intention to adopt a healthier diet and to be physically active in the middle aged/older adult group but not in the group of younger adults. The same pattern of results was obtained for the intention to limit alcohol consumption. However, the relationship between risk perception and intention to limit alcohol consumption did not reach significance due to a smaller sample of people who answered alcohol related items and thus a lower

statistical power. Thus, the basic contention that people become motivated to adopt health behaviors because they feel susceptible to illness and want to protect themselves against future harm might be predominantly applicable to middle-aged/older adults, and to a lesser degree for younger adults. This is consistent with the past research by Lockwood et al. (2005), which showed that older adults were more motivated to adopt health behaviors by the negative health models than younger adults.

The occurrence of age differentiating effects will probably depend on the type of health risks under study. In the present dissertation participants were asked how vulnerable they feel for getting cardiovascular diseases. Cardiovascular diseases are more prevalent in the second half of the life span (WHO, 2004) and thus are more proximal for people in middle and older adulthood. Whereas the peak of the age distribution of an HIV/AIDS diagnosis is around young adulthood and early middle aged adulthood (UNAIDS & WHO, 2006). Thus, one could expect a reversed age-differential effect in the case of risk perception for HIV infection and e.g., intention to use condoms. Thus, the effect of the perception of age-relevant risks on intention formation is something that should be studied systematically in future studies.

Outcome expectancies were predictive of the intentions to be physically active and to limit alcohol consumption in the group of middle aged/older adults but not in the group of younger adults. The predictive power of nutrition-related outcome expectancies did not differ between age groups. Both in the group of younger adults and in tendency in the group of middle aged and older adults were outcome expectancies predictive of intention to adopt a favorable nutrition. Recapitulating the above said, outcome expectancies, that target health consequences of certain behaviors, were predictive of intention in the middle aged/ older adult group. Thus, physical activity and limited alcohol consumption were likely performed in the older age group for health-related reasons, whereas in the younger adult groups these behaviors were probably performed for other reasons (e.g. socializing). These results are also consistent with previous findings that showed the increased consideration and importance of consequences of physical activity for health with increasing age (Trujillo, Brougham, & Walsh, 2004). Whereas younger adults claimed more often than older adults to exercise for appearance-related reasons (Trujillo, Brougham, & Walsh, 2004) or in order “to have fun” (Campbell, MacAuley, McCrum, & Evans, 2001). Interestingly, in both studies younger adults acknowledge health-related

consequences of exercising. However, it seems that the knowledge of benefits of physical activity for health does not motivate younger adults to actual behavior. The results with regard to the relationship between outcome expectancies and alcohol consumption are in line with the results obtained by Satre & Knight (2001). A significant association between outcome expectancies and alcohol consumption was only found in the subsample of older adults but not in the younger adults. Thus, along with different motives for quitting, younger adults might be more influenced by peers or context (Gardner & Steinberg, 2005; Gibbons, Gerrard, Reimer, & Pomery, 2006; Pasupathi, 1999) in their motivation to quit than by health-related considerations.

There was no age-differential effect of nutrition-related outcome expectancies on intention. One potential reason for this might be the confundation between two motives for adopting favorable nutrition habits: appearance reasons and health-related reasons. Both kinds of expectations were covered by the nutrition-related outcome expectancies items. Thus, nutrition-related outcome expectancies might have unfolded its motivational impact in the age groups through different pathways.

The mediating function of planning between intention and behavior in the middle aged/older adults group supports further the notion that older adults were performing behaviors (nutrition and physical activity) for health-related reasons. They transformed their intention into concrete plans, whereas younger adults were performing these two behaviors only if they felt confident enough to carry them out. Interestingly, in the case of alcohol consumption no mediation effects were found in both age groups. It may be the case that alcohol consumption in South Korea is an immanent part of social life (Sharpe et al., 2001) and therefore the intention and plans to limit alcohol consumption are easily overridden by social pressure regardless of age.

As expected, no age-differential effects were found with regard to self-regulatory constructs such as self-efficacy and planning. Thus, regardless of the motivation to initiate behavior, people of all ages need self-regulatory skills to carry it out.

In the present study middle aged/older adults built stronger intentions to engage in health promoting behaviors. Therefore the age differences could be attributable to the stage of change that the participants were in and not to the age-related changes in motivation. To rule out such alternative hypotheses the structural differences between nonintenders and intenders were investigated. No structural

differences between nonintenders and intenders were found between those groups. Thus, the structural differences were attributable to shift in motivation over the life span and not to the stage of change study participants were in.

Previous applications of the HAPA model to e.g., physical activity were conducted with rehabilitation patients, whereby participants were predominantly middle-aged or older adults. In the study by Sniehotta et al. (2005), for example, participants were on average 59 years old. Likewise, in the Lippke et al. study (2004), the average age was 47 years. In the application of the HAPA-Model to nutrition behavior in the Schwarzer and Renner (2000) study the average age amounted to 43 years. In contrast, the average age of the participants in the present study was 32 and thus much lower than in the previous studies. Moreover, in the present study a better behavior prediction was achieved in the subsample of the middle aged/older adults (with the exception of nutrition behavior) than in the subsample of younger adults. The present results suggest that the HAPA model might be less applicable in a relatively young and healthy sample as compared to rehabilitation patients with an explicit medical recommendation to improve their fitness. To put it differently, the target of health behavior change models is the prediction of health behavior. However, it seems that younger adults perform certain behaviors for reasons other than health-related ones. If behavior is not driven by health-related motives then there is no need for separate health behavior theory. Hence behavior can be predicted using general social psychology theories. The results of the present study showed that health-related components of the HAPA-model failed to predict intentions in the younger adults group and thus question the utility of the behavior change models for this age group for the four behaviors under study.

5.2 CONCLUSIONS AND LIMITATIONS OF THE PRESENT RESEARCH

Three conclusions can be drawn from the results of the present study. The first conclusion is that in general the HAPA can be applied to non-Western cultures. However, this global statement needs some further qualifications. Thus, two limitations of the generality of the social-cognitive models e.g., HAPA should be considered. One of them concerns the quality of behavior prediction for different types of behaviors and constitutes the second conclusion from the present study. The quality of behavior prediction varies as a function of behavior type. In the present

study health promoting behaviors such as nutrition and physical activity were better predicted by the HAPA-Model than health impairing behaviors such as alcohol and cigarette consumption. Another limitation of the generality of the HAPA-model concerns its applicability to different age groups and constitutes the third conclusion that can be drawn from the present study. Considering the insights from life-span psychology, it seems reasonable to adjust current health behavior models to the uniqueness of different age groups. Middle-aged/older adults might be more strongly driven by a health-preventive goal orientation, aiming at maintaining health and decreasing health risks, as compared to younger adults. Therefore, health behavior change models targeting behaviors that are viewed as health-related only by people of certain age might be particularly applicable to this age group.

5.2.1 Limitations to the Conclusions about Quality of Prediction across Different Health Behaviors

There are several limitations that are specific for each of the three investigated issues that will be elaborated next. The first conclusion drawn from the present study pertained to the insufficient prediction quality of addictive behaviors (alcohol and cigarette consumption). It was argued that due to considerable difficulty to keep addictive behaviors under personal control (DiClemente et al., 1995) and thus to augment the likelihood of self-regulatory failure, a lower percentage of variance can be principally explained in addictive behaviors when compared to health promoting behaviors. As was reviewed in section 2.1.5 the amount of explained variance in addictive behaviors in previous studies was lower if intention was assessed as quitting intention and self-efficacy was assessed as quitting self-confidence. In the present study, lower amounts of variance were explained in addictive behaviors than in health promoting behaviors. Moreover, the amounts of explained variance in addictive behaviors were lower than those in comparable Western samples.

Moreover, the HAPA-model might be more suitable for predicting quitting behavior and not an addictive behavior itself. Unfortunately, this assumption could not be tested within the scope of the present dissertation due to a small statistical power. For example, only nine smokers quit smoking during the study. This is not surprising considering the fact that the present study was not designed as a behavior intervention study. Therefore, only marginal if any changes in health behaviors could

be expected from the intervention that consisted only in providing a self-help information regarding benefits of a life style changes (cf. Dijkstra, De Vries, & Roijackers, 1999; McBride et al., 1999).

Further, the behavior type explanation for lower amounts of explained variance in addictive behaviors might be confounded with a culture-specific anchoring of the alcohol and smoking behaviors. For instance, alcohol consumption is widely accepted socially in South Korea and men are even encouraged to drink alcohol or to smoke (Sharpe et al., 2001; Kim & Seldon, 2004). Hence, both social pressure and for collectivistic cultures characteristic willingness to comply with social expectations (Markus & Kitajama, 1991) put alcohol and smoking consumption under control of social/environmental factors to an even greater degree than in the Western samples. Therefore, in future studies the moderating function of behavior type and culture-specific factors should be disentangled. One possibility is to include measures of individualism and collectivism and to perform a multiple group comparison with extreme groups. Another option is to include measures of social norms as a direct path on behavior into the model, in order to explore how that will change the amount of explained variance.

5.2.2 Limitation to the Conclusions about Applicability to a Non-Western Culture

The second research question pertained to the applicability of the HAPA-Model to a non-Western sample. The present dissertation is based on the data from a South Korean sample. In general, the overall model fitted the data for health promoting behaviors and the results were comparable to the results previously obtained from the Western samples. This leads to the conclusion that the HAPA-model reflects a pattern of relationships that might be universal and could serve as a template to understand health behavior change in various cultures. However, this conclusion remains tentative as long as it has not been complemented by a direct cross-cultural comparison of two or more samples via multiple group comparison of the model (van de Vijver & Leung, 2001; van de Vijver & Leung, 1997).

More concretely, the cross-cultural equivalences of the HAPA constructs should be assured. Van de Vijver and Leung (1997) distinguished between four different types of equivalence: construct, structural, measurement unit and scalar

(Butcher & Han, 1996; van de Vijver & Leung, 2001). Constructs equivalence is warranted if a construct exhibits the same meaning in different cultures. Structural equivalence refers to the similar internal structures (factor structure) and similar relationship with other variables of an instrument in different countries. Instruments show the measurement unit equivalence, if their measurement scales have the same unit of measurement but a different scale origin. Thus, the usage of the scale might be the same but shifted e.g., upwards in one sample by the same amount. Only scalar equivalence allows the direct comparison of means, hence the measurement instrument is on the same ratio scale in different cultural groups.

In the present study so-called monocentered measurement instruments of HAPA-constructs were used. Monocentered instruments utilize instruments of a single, usually Western cultural background (van de Vijver & Leung, 2001). Although a panel of local experts screened and adapted the originally German instruments to the common South Korean understanding some incompatibility might still have remained. The structural equivalence was not tested empirically by comparison of factor loadings between cross-cultural samples. However, all HAPA instruments under study showed the hypothesized factor structure giving the first hint of the structural equivalence of the constructs. All in all, the insufficient construct or structural equivalence might have caused next to the demographic composition of the present sample a lower amount of explained variance in health behaviors when compared to Western samples. Thus, in the future studies a cross-cultural invariance of the HAPA-constructs (all four equivalences) should be tested by directly comparing the latent means and covariance structures of the constructs in two different samples e.g., Western and non-Western (T. D. Little, 1997) and by cross-validation of the HAPA constructs.

One of the main goals of the present dissertation was to test the universality of the HAPA-Model across cultures. Following Hofstede (2001) (see also Bond, 1988) it was assumed that South Korea is a vivid representative of a collectivistic culture and hence differs from more individualistic Western countries. However, this assumption was not tested empirically. Thus, the standing of the present sample on the dimensions of individualism and collectivism was not assessed directly. Therefore, the conclusion about the applicability of the HAPA-Model to non-Western samples cannot be generalized to all collectivistic countries. Especially considering the fact that in the recent meta analysis by Oyserman, Coon, and Kemmelmeier (2002) the

differences on the dimensions of individualism and collectivism between Americans and Japanese or South Koreans were rather small. However, this result might be attributed to the divergent assessment of individualism and collectivism across studies.

Nevertheless, one of the strengths of the study lies in the systematic sampling that was used on a particular taxonomy of cultures (e.g. individualism-collectivism). In the present study a South Korean sample was chosen with the goal of maximizing cultural differences in order to provide an optimal test of the generalizability hypotheses.

5.2.3 Limitations to the Conclusions about Age-Differential Effects

In order to investigate age-differential effects, the present sample was divided in two age groups: younger and middle-aged/older adults, using 35 years as cut-off. It was not further differentiated between middle aged and older adults, because it was assumed that around the age of 35 considerable physical changes as well as changes in subjective health conception and goal structure occur (Hoyer & Rodin, 2003; Nurmi, 1992; Cross & Markus, 1991). It was further argued that it is young adults who might differ from middle aged and older adults in their health related cognitions, such as risk perception (see Renner et al., 2000). Thus, both middle aged and older adults place more importance on health goals and share a higher perceived vulnerability for diseases, and in this respect differ more from younger adults than from each other. The assumption that there will be no structural differences in the social cognitive variable in the prediction of health behavior between middle aged and older adults was theoretically derived. But due to the small subsample of older adults, this could not be tested empirically in the present study but should be considered in future research.

Moreover, the present findings of structural differences in the motivation to adopt health behavior between age groups might not be applicable to the group of very old adults. In the last decade a distinction was made in the gerontological literature between third (young-old age, ranging from 60-79) and fourth age (old-old age, starting with 80) (Baltes, 1997). Based on the growing evidence from the studies of very old people, e.g., BASE (Baltes, Mayer, Helmchen, & Steinhagen-Thiessen, 1996; Crimmins, Hayward, & Saito, 1996), Baltes (1997) concluded that the findings on advanced age differ dramatically from those on young-old age. For instance,

Crimminis et al. (1996) calculated that the percentage of the inactive years of the remaining lifetime due to dysfunctionality is 20% for 70 year-old women, whereas for 90-year olds, almost 60% of the remaining lifetime is marked by dysfunctionality. In this study, dysfunctionality or inactivity was measured by indicators of everyday competence and independent living. On the basis of different domains of functioning including psychological and cross-disciplinary measures collected in the scope of the BASE-study, Smith and Baltes (1997) (see also Gerstorf, Smith, & Baltes, 2006) distinguished via cluster analysis ten different profiles of psychological functioning ranging from "good profile" to "very poor profile". The oldest-old appeared much more frequently in undesirable clusters than the younger-old. Thus, people in the "fourth age" are at much greater risk for dysfunctionality than the ones in the third age. This pattern of major increase in risk for very old people concerns not only declines in physical functioning but also declines in psychological functioning in such domains as intelligence, personality, and social behavior. Due to age-related increase in dysfunctionality, there might be another shift in motivation between young-old and old-old. In the present study only ten participants (0.4%) were older than 79 years. Hence the question of the applicability of the HAPA-model to the very old people and of how the motivational and volitional structure of old-olds might differ from young-old remains open and should be subject of future research.

5.2.4 Methodological Limitations Imposed by Sample Characteristics and Employed Measures

The present study was conducted using a sample of volunteers from Seoul and Kyungki-do, South Korea. In order to draw conclusions about the generalizability of results of the present study, the sample was compared with regard to the distribution of health behaviors to other representative (if available) or other large South Korean samples. On the basis of the results from the National Nutrition Survey of 1995 (Inoue et al., 2000) 1.5% of the population was classified as obese (BMI > 30) and this percentage was lower than in the present study (cp. 2.2%). A lower percentage of the present study participants (13.4%) were classified as overweight (BMI 25-29) compared to 20.5% that were identified on the basis of National Nutrition Survey. Fat-derived energy intake could not be calculated with present data. However, on average present study participants reported moderate adherence to a low fat and high

fiber diet, with M = 2.4; SD = .90 on a four point scale. Thus, the present sample composition reflects only partially the nutrition behavior on the population level.

With regard to physical activity, Lee and Suh (2002) ascertained that only 11% of participants exercised regularly to the point of perspiring using a subsample from the National Health and Health Behavior Surveys (NHHBS). Despite a similar assessment method the physical activity participation rate in the present study (47%) deviates substantially from the national representative sample. Although, similarly to the representative sample men in the present study (59%) also reported exercising more regularly than women did (34%), the absolute percentage was much higher than in the representative study (14% for men versus 8% for women). Thus, the present sample was considerably more physically active than the general South Korean population.

A similar picture emerged for alcohol and cigarette consumption. According to the results of the 1998 Korean National Health and Nutrition Examination Survey 82% of men and 52% of women were consuming alcohol (Yoon et al., 2004). In the present study, however, only 25% of the participants reported consuming alcohol on a regular basis: 32% of men and 17% of women confirmed consuming alcoholic beverages regularly. With regard to cigarette consumption present study participants also reported much lower rates than those of the general population. For example, according to Lee and Suh (2002) the prevalence of smoking adds up to 67% for men and 7% for women. In the present study the prevalence of smoking was 26% for the total sample, with 48% for men and 4% for women.

Thus, in the present study fewer participants were overweight, more participants were physically active and fewer participants consumed alcohol and cigarettes when compared to representative samples. The present sample is characterized by being positively selected from the general population. Therefore, the generalizability of the results of the study is constrained. Nevertheless, the strength of the current study lies in the use of a sample drawn from a general South Korean population instead using student samples which is done in the majority of studies.

A further restriction to the external validity of the study might be a relatively high attrition rate of 48.7% between two waves that might have led to systematic sample bias. The longitudinal sample differed on a number of socio-demographic variables such as e.g., age, education and income from the drop-outs. However, drop-out analysis showed that the study participants that took part in both waves of the

study for the most part did not differ systematically in the core social-cognitive and behavioral variables from the participants that only took part in the first wave of the study. The difference discovered between participants who did versus did not continue pertained only to the differences in intentions and behaviors. The continuers had lower intentions to adopt a healthier lifestyle, to be physically active and to reduce alcohol consumption. They were also slightly physically active and consumed slightly less cigarettes than drop-outs. However, these differences were relatively small (all of them were much smaller than half of the standard deviations of respective variables). Thus, participants probably did not abstain from the study because they were, for example, less self-efficacious or had poorer health behaviors.

Furthermore, the criterion variables (nutrition behavior, physical activity, cigarette and alcohol consumptions) are self-reported, and there is no direct possibility to examine the validity of these self-reports. However, there is evidence that indicates that self-reports for several of the behaviors under study are generally reliable and valid (for physical activity see Miller, Freedson, & Kline, 1994; for smoking see Dolcini, Adler, Lee, & Bauman, 2003; Heatherton, Kozlowski, Frecker, Rickert, & Robinson, 1989).

5.3 OUTLOOK

In the preceding section a number of ways were suggested in which the research of the present study could be carried out further. This concluding section briefly sketches the more general implication this dissertation has for theory development and for behavior change interventions.

It was demonstrated that applying the insight from the life span psychology to processes described by health behavior theories brings about new perspectives. Different developmental tasks a person is confronted with in different phases of his or her life (Havighurst, 1948; Levinson, 1978; Neugarten et al., 1965) find reflection in the changing importance an individual places on health depending on the life phase (Nurimi, 1992). The present study extended previous research and has shown (see also Schwarzer & Renner, 2000) that not only involvement in health behaviors, self-regulative competences and willingness to take up health behaviors change over the life span but also the factors that motivate people to adopt health behaviors. Thus,

understanding of human development should be expanded to health psychology theory building. Penny et al. (1994) proposed already more than a decade ago that:

"...assumptions of developmental psychology have considerable utility for enhancing our understanding of many of the concerns of health psychology. Issues pertaining to health status, health promotion and disease prevention, health and illness behavior, individual differences and health, assessment and treatment of acute illness, and management of chronic disorders may be clarified through the application of the concepts and theories of developmental psychology" (p. 4)

One might think about the development of age-tailored theories of behavior change. Another possibility is to create age-group specific measures of health cognitions (cf. Ajzen & Fishbein, 1980). For example, outcome-expectancies might target age-relevant outcomes such as health for middle aged and older adults and appearance or fun for younger adults. In general, the unification and age-adequateness of measurement instruments in this field might lead to a better prediction of health behaviors and explain the inconsistency in results.

Another area that might profit from the synthesis of the life span approach and traditional behavior change theories is behavior interventions. Application of age-tailored interventions might be both more effective and cost saving when compared to conventional interventions (Michie & Abraham, 2004). The results of the present study suggest, for example, that younger adults probably would not profit from risk communication intervention in contrast to middle aged/older adults. Whereas people of all ages might profit from trainings targeting domain-specific self-efficacy beliefs. These theoretical assumptions should be tested via age-tailored interventions studies.