Subjective Residual Life Expectancy in Health Self-Regulation

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Applying socioemotional selectivity theory to the domain of health, we examined the interplay of social-cognitive predictors of physical exercise in two groups of people who perceived their remaining lifetime as either expansive or limited (based on subjective longevity ratings). Individuals (N = 370) who were prescribed physical exercise were assessed at discharge from orthopedic rehabilitation as well as 6 and 12 months later. Multigroup structural equation modeling showed differences in latent means, interrelations of predictors, and amount of explained variance. Individuals who perceived their time as limited reported a less favorable profile on social-cognitive variables and less exercise goal attainment. We give first insights on how health self-regulation differs in these groups, and we discuss avenues for intervention based on socioemotional selectivity theory. In contrast to chronological age, subjective life expectancy can be targeted by intervention.

FUTURE time perspective is seen as primary motivational space in human self-regulation (Brandstätter & Rothermund, 2003) and is reflected in estimates of subjective life expectancy. This is in line with the notion that proximity to death might be a more important variable than distance from birth for the determination of adult age variance (Bosworth, Schaie, Willis, & Siegler, 1999). It is also in line with the essential premise of socioemotional selectivity theory (SST; Carstensen, Isaacowitz, & Charles, 1999). According to SST, individuals monitor the temporal course of their lives, and as they grow older and perceive their remaining time as more limited, they focus more on the present and less on the distant future. An expansive time perspective is assumed to lead to a preference for goals aimed at optimizing the future, whereas a limited time perspective is assumed to be related to a preference for emotionally meaningful goals, given their more immediate payoffs (Lang & Carstensen, 2002). This priority change has been demonstrated in areas ranging from social networks (e.g., Carstensen et al.), to memory and attention (e.g., Carstensen & Turk-Charles, 1994), to health-related information seeking (Löckenhoff & Carstensen, 2004). Whereas the study by Löckenhoff and Carstensen (2004) gives detailed information on how individuals select their goals in the health domain according to SST, our study addresses both goal setting and goal pursuit in the health domain.

In the context of health behaviors, it has been demonstrated that a longer subjective life expectancy is associated with health behaviors, such as performing regular physical exercise (Ross & Mirowsky, 2002). It remains unclear, however, whether the levels of social-cognitive predictors of health behaviors (e.g., Schwarzer, 1992), such as risk perception, outcome expectancies, self-efficacy, intention, and planning (see Figure 1), and the longitudinal interplay of those predictors differ among individuals who vary in subjective life expectancy.

Predicting Health Behavior Change

Changing health behaviors, such as commencing regular physical exercise, involves an initial motivation process that results in forming an intention, and in subsequent self-regulation processes that address the pursuit of these goals (Ziegelmann & Lippke, in press). In the motivation phase, according to the health action process approach (HAPA; Schwarzer, 1992), risk perceptions, outcome expectations, and perceived self-efficacy contribute jointly to the development of an intention to change (see Figure 1). After forming an intention, people enter the volition phase, in which they pursue their goal by planning, trying to act, investing effort, possibly failing, and finally recovering or disengaging. The HAPA posits that progressing through this phase consists of movement from one subphase to the next, which is facilitated by self-efficacy. Specifying implementation intentions with specific cues and associated actions (i.e., action plans on when, where, and how to perform the behavior) can bridge the gap between intentions and behavior (Gollwitzer, 1996; Lippke, Ziegelmann, & Schwarzer, 2004; Ziegelmann, Lippke, & Schwarzer, 2006).

Future Time Perspective

Future time perspective has been operationalized in various ways: perceived time left in life measured by number of years in life remaining (subjective life expectancy; Brandstätter & Rothermund, 2003; Mirowsky, 1997); perceived time left in life measured by the Future Time Perspective scale (Lang & Carstensen, 2002); the partitioning of human experience into past, present, and future temporal frames (Zimbardo & Boyd, 1999); and regarding the extent to which people consider distant versus immediate consequences of behaviors (Strathman, Gleicher, Boninger, & Edwards, 1994).

The first two approaches yield the information necessary to investigate the tenets of SST empirically, as only these two assess perceived time left in life. Because of an overlap in item content with constructs such as planning, our study assesses the extension of future time directly, rather than the extension of future time perspective measured by the Future Time Perspective scale (Lang & Carstensen, 2002), by asking about the perception of remaining years in life.
Future Time Perspective and Health Behaviors

On the basis of assumptions from SST, we argue that it should make a difference in health self-regulation when individuals vary in their perceptions of remaining lifetime. Different perceptions of one’s remaining lifetime might be related to social-cognitive predictors (e.g., a high or low level of self-efficacy as a result of a limited or expansive time perspective). Limitations in perceived lifetime have been discussed as a challenge to health behavior change (Leventhal, 2002) and are related to risk behaviors, such as poor nutritional habits (Ross & Mirowsky, 2002). In more general terms, Mirowsky (1997) has demonstrated that greater subjective life expectancy is positively related to sense of control, which partly accounts for the negative association of age and sense of control. In this line, we argue that individuals with a more limited time perspective should also have lower levels of self-efficacy. As it has been shown that individuals who engage in risk behaviors report lower subjective life expectancies (Ross & Mirowsky), those individuals seem to be aware of their risk status; this, in turn, should be reflected in higher levels of risk perception.

SST assumes that people who perceive their future as being open ended should prioritize goals that optimize their future (e.g., adopting a health behavior), whereas those who have a more restricted future time perspective should maximize emotionally meaningful goals (e.g., maintaining a close relationship). For individuals with limited future time perspective, SST predicts an emphasis on emotionally relevant aspects and a reallocation of processing resources away from negative toward positive aspects of situations. This is known as the positivity effect (Löckenhoff & Carstensen, 2004). As engaging in a health behavior is not necessarily an emotionally relevant goal, we would predict that individuals with a more limited time perspective would report lower levels of exercise intentions and exercise behavior, anticipate less positive and more negative outcomes, and invest less self-regulatory effort (i.e., planning) in this domain.

In the following paragraphs, we examine the potential longitudinal interplay of social-cognitive variables from the viewpoint of SST. Regarding the positivity effect, we argue that outcome expectancies and risk perception are emotionally meaningful; positive outcome expectancies have a positive emotional valence, and negative outcome expectancies and risk perception have a negative emotional valence. In line with SST, Löckenhoff and Carstensen (2004) have demonstrated that there is an age-associated focus on emotional information that is accompanied by systematic age differences in preference for positive over negative material (i.e., a negativity effect for younger adults and a positivity effect for older adults). As chronological age is systematically linked to time left in life (Lang & Carstensen, 2002), we also derive our hypotheses about the association of time left in life and the social-cognitive predictors from the age-associated findings of Löckenhoff and Carstensen.

Thus, regarding intention formation, we assume that compared with individuals with a more expansive future time perspective, those who have a more limited future time perspective are more strongly guided by positive outcome expectancies. For negative outcome expectancies and risk perception, the opposite pattern is expected. We have argued that individuals with a more limited future time perspective should be less motivated to pursue a goal that optimizes their future (e.g., adopting a health behavior) and thus should also invest less self-regulatory effort (i.e., planning) in this domain. But what can we assume regarding the interplay of intention, planning, and behavior in individuals with different time perspectives? “Older persons limit their experiences to those that are familiar, predictable, and positive” (Fung, Abeles, & Carstensen, 1999, p. 361), which in turn requires careful planning and fosters sense of control. In this line, we speculate that despite lower levels of intention and planning, those persons with a more limited future time perspective will more strongly rely on planning (which allows them to perform the behavior in situations that foster their sense of control), whereas those with a more expansive time perspective might rely more on recalling their intentions to translate their intentions into action. Thus, among those who harbor a limited future time perspective, the relationship between intention and behavior should be mediated by planning to a greater extent than among those with a more expansive time perspective.

Hypotheses

In this study, we investigated the relationships in the HAPA, comparing persons with a more expansive future time perspective (expansive time group) with those who have a more limited future time perspective (limited time group).

Regarding the group differences in latent means of social-cognitive predictors as well as goal attainment, we hypothesized that, compared with the expansive time group, the limited time group would report lower levels of positive outcome expectancies, self-efficacy, intention, planning, and exercise goal attainment, as well as higher levels of risk perception and negative outcome expectancies.

Regarding the group differences in the longitudinal interplay of social-cognitive variables, we hypothesized that intention formation in the limited time group would be more strongly guided by positive outcome expectancies than would intention formation in the expansive time group. For negative outcome expectancies and risk perception, the opposite pattern was expected. Further, we hypothesized that, in the limited time group, the relationship between intention and behavior would be mediated by planning to a greater extent than would the
Participants and Procedure

METHODS

relationship between intention and behavior in the extensive

Participants and Procedure

After providing informed consent, 639 persons were recruited at the end of a 3-week course of outpatient orthopedic rehabilitation (baseline). There were two postal follow-up assessments at 6 months (Wave 1; n = 498, or 77.9%) and 12 months (Wave 2; n = 373, or 58.4%) after discharge. The final longitudinal sample on which we based our analyses consisted of 370 participants who provided data for all three measurement points. No significant differences were revealed when we compared participants who were lost at follow-up with those who completed the whole study on baseline social-cognitive variables (i.e., risk perception, positive and negative outcome expectancies, self-efficacy, intentions, and planning). The participants had a mean age of 48.2 years (range = 18–80); 62.2% were women, 72.4% were living with a partner, and 70.5% were employed (see Table 1 for further information).

The participants were referred to the rehabilitation center because of musculoskeletal diseases, such as joint diseases, disk disorders, and injuries. All were recommended to engage in regular physical exercise after discharge.

Measures

Except where noted otherwise, we took the following items from Fuchs (1996) and adapted them to the rehabilitation context.

Risk perception.—We measured risk perception at baseline with three items (Cronbach’s α = 0.87), such as, “Com-

Exercise self-efficacy.—At baseline, we measured exercise self-efficacy (Scholz, Sniehotta, & Schwarzer, 2005) with five items (Cronbach’s α = 0.71), such as, “I am able to exercise at least twice per week for at least 20 minutes.”

Positive outcome expectancies.—At baseline, positive outcome expectancies included six items (Cronbach’s α = 0.76), such as, “If I would engage in physical exercise on 2 or more days, for at least 20 minutes, then I would be doing something good for my health.”

Negative outcome expectancies.—We assessed negative outcome expectancies with the same item stem followed by six items (Cronbach’s α = 0.70), such as, “… then I do not have enough time for other things.”

Exercise intentions.—We assessed exercise intentions at Wave 1 with five items (Cronbach’s α = 0.70), such as, “I intend to exercise for 20 minutes or longer on at least 2 days per week on a regular basis.”

Action plans.—We measured action plans at Wave 2 with five items (Cronbach’s α = 0.96), such as, “I already planned precisely when I will perform my physical activities.”

Physical exercise goal attainment.—We measured goal attainment for physical exercise with the following two items (Cronbach’s α = 0.66) at Wave 2: “In the past 6 months, how often have you managed to be physically active for at least 20 minutes per week on 2 or more days?” and “To what extent have you met your goals to be physically active?”

Subjective physical and mental health.—We assessed subjective physical and mental health with the Short Form-12 (Ware, Kosinski, & Keller, 1996).

Risk factors.—We determined the number of risk factors, such as high blood pressure, substance use, and being overweight, and the number of diagnoses from medical records.

Subjective residual life expectancy.—We measured subjective residual life expectancy (Brandstädter & Rothermund, 2003) with the answer to the following statement: “I might reach the age of ______” (6-month test–retest reliability, rα = .77).

We excluded participants who did not respond to the subjective life expectancy item (nonresponders; n = 57 or 15.4%) from the analyses. In previous studies (Keith, 1981–1982), up to 49% of participants provided no estimates of residual life expectancy. Allowing for analyses within SST, we subdivided individuals who provided an estimate of residual life expectancy (n = 313) by median split into an expansive time group (n = 152; range 32–112 years left to live) and a limited time group (n = 161; range 1–31 years left to live). Compared with the expansive time group, the limited time group was more likely to have a partner and less likely to have

Table 1. Sample Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total (N = 370)</th>
<th>Expansive Time Group (n = 152)</th>
<th>Limited Time Group (n = 161)</th>
<th>χ² or F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronological age</td>
<td>48.2 (11.7)</td>
<td>40.6 (9.7)</td>
<td>54.1 (8.8)</td>
<td>166.6***</td>
</tr>
<tr>
<td>SF12 physical</td>
<td>37.4 (9.5)</td>
<td>37.9 (9.3)</td>
<td>37.5 (9.6)</td>
<td>0.08</td>
</tr>
<tr>
<td>SF12 psychological</td>
<td>50.4 (10.8)</td>
<td>51.7 (9.9)</td>
<td>50.2 (11.3)</td>
<td>1.5</td>
</tr>
<tr>
<td>No. of diagnoses</td>
<td>2.4 (1.6)</td>
<td>2.0 (1.3)</td>
<td>2.7 (1.7)</td>
<td>14.5***</td>
</tr>
<tr>
<td>No. of risk factors</td>
<td>1.2 (1.2)</td>
<td>0.9 (1.0)</td>
<td>1.3 (1.2)</td>
<td>8.9**</td>
</tr>
<tr>
<td>Rehabilitation due to accident (%)</td>
<td>9.7</td>
<td>15.8</td>
<td>4.3</td>
<td>10.2**</td>
</tr>
<tr>
<td>Women (%)</td>
<td>62.2</td>
<td>65.8</td>
<td>54.7</td>
<td>3.6</td>
</tr>
<tr>
<td>Years of education</td>
<td>14.1 (5.3)</td>
<td>13.9 (5.0)</td>
<td>14.9 (5.8)</td>
<td>2.2</td>
</tr>
<tr>
<td>Living with partner (%)</td>
<td>72.4</td>
<td>64.5</td>
<td>80.1</td>
<td>8.8**</td>
</tr>
<tr>
<td>Employed (%)</td>
<td>70.5</td>
<td>74.3</td>
<td>68.9</td>
<td>0.9</td>
</tr>
<tr>
<td>German native speakers (%)</td>
<td>96.2</td>
<td>95.4</td>
<td>97.5</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Note: Values are means followed by standard deviations (in parentheses) or percentages.

*p < .05; **p < .01; ***p < .001.

*p > .05; **p < .01; ***p < .001.

"Higher scores indicate better health. Regression weights and a constant were added to transform scores to have a mean of 50 and a standard deviation of 10 in the 1998 general U.S. population.

*p < .01; **p < .001.

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been in rehabilitation as the result of an accident. In addition, the limited time group had a higher chronological age and a higher number of diagnoses and risk factors than did the expansive time group (see Table 1 for the whole sample as well as the two subsamples, and the results of analysis of variance or chi-square analyses).

**Data Analysis**

Using structural equation modeling with latent variables, we tested the structural model depicted in Figure 1 within the overall data set. First, we examined whether the single-sample models were adequate for both groups. Second, we tested the invariant measurement and the factorial structure of the psychometric instruments. Items comprising a particular instrument should operate equivalently across the different groups, and factor loadings and covariances should be invariant. We estimated the following models in this study: Model 1 was an unrestricted model, which was a noninvariant, unconstrained model; Model 2 was a measurement-equivalent model, with equal factor loadings across subsamples; Model 3 had Model 2 constraints plus equal factor variance and covariances; Model 4 had Model 3 constraints plus equal paths; and Model 5 had Model 4 constraints plus equal factor residuals (“fully constrained”). We then examined the most parsimonious model that nonsignificantly varies from the unrestricted model in comparing the paths and the latent means (Byrne, 2001). For the test of significant paths and significant differences across the subgroups, we used one-tailed tests because the hypotheses were directional. We performed structural equation modeling by using AMOS 4.01.

**Missing values treatment.**—In the questionnaires of the final longitudinal sample (N = 370), 86% of the participants answered all items of the HAPA, and no item had more than 5% missing values. We imputed missing values by using full information maximum likelihood estimation (Byrne, 2001).

**RESULTS**

**Adequacy of the Two Single-Sample Models**

To examine whether the single-sample models were adequate, we tested the structural model separately in both subsamples. As a precondition for further analyses, the model may work well in the multisample analyses only if the hypothesized model is adequate for both subsamples. Goodness-of-fit indices for both subsamples are shown in Table 2.

In practical terms, the hypothesized model represented the data well. Although the chi-square value was statistically significant, the other fit indices showed good or moderate model fit with $\chi^2/df \leq 2$, Tucker–Lewis Index > 0.95 and Comparative Fit Index > 0.95, and the root mean square error of approximation (RMSEA) = 0.05–0.08.

**Testing for the Multigroup Invariant Factorial Structure of the Measuring Instruments**

Given that the model offered a reasonable fit within the two samples, we carried out multisample structural equation modeling with latent variables to study which parameter could be considered invariant across samples. A sequence of nested models ranged from the unconstrained multisample model (Model 1) with the estimated parameters free to vary across subsamples to more parsimonious nested models. These nested models included different levels of equality constraints. We specified the constrained models with equal factor loadings (Model 2), equal factor loadings and factor covariances (Model 3), equal factor loadings, covariances, and variances (Model 4), and equal factor loadings, covariances, variances, and factor residuals (Model 5).

For the expansive versus limited time group, we obtained the following results: The first two constrained models were tenable, with practical fit indices showing good model fit (e.g., RMSEA = 0.04–0.05). In addition, for the first two models the chi-square difference was not significant. This indicates that Models 2 and 3 account as well for the sample’s variance-covariance as Model 1 does. Models 4 and 5 had good model fit, but they were significantly different from Model 1, suggesting that factor loadings, variances, and factor residuals were mostly sample specific. From a practical point of view, we could maintain that constraints of Model 3 were best. Subsequently, we based all analyses on this measurement equivalence model.

**Latent Mean Differences Between the Expansive Time Group and the Limited Time Group**

The expansive time group served as a reference group against which we compared the latent means of the limited time group. The limited time group had significantly lower levels of intention ($M = -0.32; p < .001$, one-tailed) and planning ($M = -0.21; p < .05$, one-tailed), as well as significantly lower levels of exercise goal attainment ($M = -0.11; p < .05$, one-tailed), than did the expansive time group. The expansive time group and limited time group did not differ on risk perceptions, positive outcome expectancies, negative outcome expectancies, and self-efficacy. As the age of the limited time group was significantly older than that of the expansive time group, we conducted a multivariate analysis of variance (MANOVA), using chronological age as a second factor (18–39 years, young; 40–54 years, middle aged; and 55–80 years, older). This replicated the group differences in intention, $F(1, 307) = 5.8, p < .05$, and goal attainment, $F(1, 307) = 4.0, p < .05$, but not in planning, $F(1, 307) = 0.9, ns$. The MANOVA also revealed that older adults reported significantly lower levels of risk perception, $F(2, 307) = 3.5, p < .05$, and negative outcome expectancies, $F(2, 307) = 8.2, p < .001$, than did younger and middle-aged adults. There were no significant interactions.

**Table 2. Goodness-of-Fit Indices for the Two Subsamples**

<table>
<thead>
<tr>
<th>Sample</th>
<th>$n$</th>
<th>$\chi^2$</th>
<th>$dfl$</th>
<th>$\chi^2/df$</th>
<th>$p$</th>
<th>TLI</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expansive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>time group</td>
<td>152</td>
<td>569.96</td>
<td>285</td>
<td>2.00</td>
<td>&lt; .001</td>
<td>.97</td>
<td>.98</td>
<td>.08</td>
</tr>
<tr>
<td>Limited</td>
<td>161</td>
<td>407.96</td>
<td>285</td>
<td>1.43</td>
<td>&lt; .001</td>
<td>.99</td>
<td>.99</td>
<td>.05</td>
</tr>
</tbody>
</table>
| **Note:** TLI = Tucker–Lewis Index; CFI = Comparative Fit Index; RMSEA = root mean square error of approximation.
Examining the Longitudinal Interplay in the Expansive Versus Limited Time Group

Finally, we tested the hypothesis that the paths (representing the longitudinal interplay) specified by the HAPA were unique across the two groups (see Figure 2).

In both groups, self-efficacy was significantly correlated with intention, but not with planning and exercise goal attainment. Positive outcome expectancies and risk perception were significantly related to intention only in the limited time group. In both groups, there was no significant relationship between negative outcome expectancies and intention. Furthermore, in both groups, intentions were significantly associated with action plans, and action plans were significantly related to exercise goal attainment. Only for the expansive time group there was a significant association between intention and exercise goal attainment. In addition, this was the only path coefficient for which a significant group difference emerged: The path from intention to goal attainment was significantly higher in the expansive time group than in the limited time group (see Figure 2). We replicated the differences in path coefficients in multiple regression analyses, controlling for group differences in sociodemographic and medical data.

The explained variances were quite similar across the two groups, ranging from 35% to 38% for intentions, 21% to 24% for planning, and 30% to 38% for goal attainment (see Figure 2), indicating that for both groups the HAPA is a reasonable framework.

To investigate to what extent the relationship between intention and goal attainment is mediated by planning, we examined a model without the potential mediator (i.e., planning), according to Baron and Kenny (1986). This model also showed good model fit, RMSEA = 0.05, but it explained less variance in goal attainment (i.e., 23% to 25% instead of the 30% to 38% of the model with planning), indicating that planning is a crucial variable in the HAPA. In the model without planning, we found an association of $\beta = 0.36$, $p < 0.01$, one-tailed, in the limited time group, and $\beta = 0.46$, $p < 0.01$, one-tailed, in the expansive time group between intention and goal attainment. Including the mediator (i.e., planning) in the model (see Figure 2) thus reduces the path coefficients from intention to goal attainment from $\beta = 0.36$, $p < 0.01$, one-tailed to $\beta = 0.12$, ns in the limited time group (rendering the coefficient insignificant) and from $\beta = 0.46$, $p < 0.01$, one-tailed to $\beta = 0.39$, $p < 0.01$, one-tailed in the expansive time group. Thus, according to Baron and Kenny, there seems to be mediation of planning in both groups, although more so in the limited time group.

DISCUSSION

Our study investigated the relationships in the HAPA (Schwarzer, 1992) among 370 individuals varying in future time perspective who were assessed at the end of their orthopedic rehabilitation and 6 and 12 months later. We operationalized future time perspective in terms of extent of remaining lifetime (expansive time group vs limited time group), which allows for analyses within SST (Carstensen et al., 1999). Groups differed significantly in their latent means on intention, planning, and exercise goal attainment. Regarding the interrelations of social-cognitive variables, the groups differed significantly only in regard to the extent to which the relationship between intention and behavior was mediated by planning. Amounts of explained variance were quite similar across the groups, indicating that, for both groups, the HAPA is a reasonable framework.

In terms of differences in latent means, the limited time group had significantly lower levels of intention and planning as well as lower levels of exercise goal attainment than did the expansive time group, which is in line with our hypotheses based on SST. Group differences on intention and goal attainment remained significant after we controlled for chronological age, but the group difference on planning did not. The hypothesized higher level of risk perception, however, was not supported in the comparison between the limited time group and the expansive time group. As the limited time group had higher levels of objective risk factors compared with the expansive time group, it seems that high levels of risk factors do not necessarily translate into high risk perceptions, which can be interpreted as a positivity effect. Contrary to our hypotheses, there were also no significant differences in both positive and negative outcome expectancies between the two groups. One might speculate that the lower levels of intention in those with a limited time perspective are not due to a less favorable pattern of outcome expectancies but probably only to a focus on more emotionally meaningful goals. Also contrary to our hypotheses, there were no significant differences in exercise self-efficacy. In the present study, we employed a measure of exercise self-efficacy rather than a measure of general control. This might be the reason why we were unable to replicate the finding that there is a positive relationship between residual life expectancy and sense of control (Mirowsky, 1997) on which our hypotheses regarding differences in self-efficacy were based. According to SST, one would not necessarily expect age differences in self-efficacy regarding a behavior but rather a motivational preference for a specific behavior (e.g., intention
to exercise). Within the framework of SST, the finding that persons with a less expansive future time perspective report lower levels of exercise intention and goal attainment than those with a more expansive time perspective can be interpreted in a way that individuals with a more expansive future time perspective prioritize goals that optimize their future (i.e., engaging in a health behavior), whereas those with a less expansive time perspective do not.

Regarding the interplay of the social-cognitive predictors, both groups showed that the translation of intentions into behavior takes place by means of a mediation of planning. This indicates the existence of a volitional process that is shared for both future time perspective groups. However, as expected, in those persons with a limited future time perspective, the relationship between intention and behavior was mediated by planning to a greater extent than in those with a more expansive time perspective. This was the only significant group difference regarding the interplay of variables. The use of planning to translate goals into behavior seems to be an adaptive strategy for individuals who have limited future time perspective. On the one hand, planning is known to elicit behavior more or less automatically, thus saving resources by not requiring much effort (Gollwitzer, 1996). On the other hand, careful planning can limit a person to familiar and predictable situations for enacting the behavior, which should foster a sense of control (Fung et al., 1999).

To summarize, persons in the limited time group reach their exercise goals by planning, whereas those in the expansive time group have to rely on both planning and recalling their intentions. Although such a pattern as it was found in the limited time group should facilitate health behavior change, one has to bear in mind that the individuals in the limited time group had lower levels of intention and planning, which might explain why they have lower levels of goal attainment than do individuals in the expansive time group.

Contrary to our hypotheses, risk perception contributed to forming intentions in the limited time group. Thus, in terms of risk perception, there was no positivity effect in the comparison between the limited and the expansive time groups. However, the notion of a positivity effect in individuals with a more limited time perspective was supported in terms of positive outcome expectations: Whereas the path from positive outcome expectations to intention was significant for the limited time group, it was nonsignificant for the expansive time group (however, there were no significant path coefficient differences between these two groups). Although this is not a strong support of a positivity effect, we must stress that outcome expectancies and risk perception do not necessarily represent emotional information in the current study. This is important to note, as the positivity effect refers to a developmental pattern regarding preferences for positive or negative emotional material (Carstensen & Mikels, 2005). In our view there are two possibilities to provide a more stringent test of the positivity effect in this context. The first possibility is to operationalize outcome expectancies and risk perception in such a way that they contain emotionally meaningful information. The other possibility might be that the positivity effect only emerges for those individuals for which engaging in physical activity is an emotionally meaningful goal.

Finally, we would like to discuss how time perspective interventions could affect health self-regulation, and which critical elements should be contained in such interventions. First, one has to decide whether it makes sense and whether it is ethical to alter perceptions of future time perspective. One has to acknowledge that certain time-perspective-related or age-related goal changes are proactive and might lead to adaptive outcomes. Thus, there are instances in which we should accept people’s time perspective and resulting goal changes (Fung, Rice, & Carstensen, 2005).

If there is reason to believe that, despite a number of risk factors or illnesses that are already manifested, the lifetime of an individual can be increased through certain health behaviors, it might be an avenue of intervention to expand the time perspective in individuals who perceive their time left in life as limited. It might be helpful to stress the notion of plasticity (i.e., that risk factors can be reduced by relevant action and gains in life span can be achieved this way). The notion of plasticity might help this group of individuals to translate a risk perception into an intention and might also result in a more favorable balance of positive and negative outcome expectancies. Encouraging those people with a more limited time perspective to engage in long-term thinking about health behaviors is also an avenue for intervention.

In a time perspective intervention, Hall and Fong (2003) enhanced long-term thinking about physical activity, which in turn increased levels of this health behavior. Such interventions might even make an impact on subjective life expectancy, because a goal-setting intervention increased health behaviors as well as subjective life expectancy (Alexy, 1985). As people differ in the weight they attach to short- and long-term outcomes (Orbell, Perugini, & Rakow, 2004), rather than manipulating the time perspective, it might be worthwhile to raise the awareness of short-term outcomes in persons with a limited time perspective in order to motivate them to change their behavior. Within the SST framework, it might be useful for those with a more limited future time perspective to link health behaviors to emotionally meaningful goals (e.g., maintaining a close relationship). One possible way of communicating this in an intervention would be to phrase this as a positive outcome expectancy, which in turn should guide intention formation that is due to the positivity bias.

There are some potential limitations in this study. First, the data on exercise levels are based on self-reports and thus might be biased. However, there is evidence for the validity of physical exercise self-reports (Miller, Freedson, & Kline, 1994). Second, for the structural equation models, larger sample sizes would have been favorable.

Previous research has demonstrated that subjective life expectancy is related to an engagement in health behaviors (Ross & Mirowsky, 2002) and that it differs in terms of health-related information seeking (Löckenhoff & Carstensen, 2004). However, the present study gives first insights into how the architecture of intention formation, planning, and enactment of health behaviors varies in groups of people with different perceptions of future time perspective, and it also discusses avenues for intervention.

Forthcoming research might also consider the use of future time perspective scales (e.g., Lang & Carstensen, 2002) in addition to subjective residual life expectancy to gain more
insight about the nature of future time perspective in the nonestimator group. In addition, time perspective might be considered as an outcome of health behavior change rather than only as a predictor, because individuals might reflect on their current health behaviors when making judgments about their future. Furthermore, low expectations regarding residual life expectancy may reflect a realistic coping mechanism for individuals with immobile health conditions (Sarkisian, Hays, Berry, & Mangione, 2002).

In conclusion, in contrast to chronological age, perceptions of future time can be targeted by interventions that might be particularly beneficial for individuals with a more limited future time perspective. In addition, when changing the future time perspective does not seem to be an alternative, those persons with a limited time perspective might benefit from emotionally tailored support and information that meets their focus on emotionally meaningful goals.

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REFERENCES


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