Self-Perceptions of Aging and Health

Domain-Specificity, Changeability, and New Approaches to Health Promotion Interventions for Older Adults

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Abstract

Self-perceptions of aging (SPA) are an important resource for health in later life. A large body of research has demonstrated that more positive SPA are beneficial for various health-related outcomes, such as self-rated, functional, physical and mental health, as well as for health behaviors. However, there are further, ongoing issues in SPA research addressed in the present dissertation. At first, recent findings point out that SPA are domain-specific and that individuals hold both positive and negative SPA. However, international studies have shown that negative SPA predominate. Second, given the detrimental effects of having more negative SPA, the promotion of more positive SPA for better health in older age seems warranted. And third, given low activity levels among older adults, research calls for taking a lifespan perspective in the promotion of physical activity (PA) for older adults. The aim of the present thesis was to address these issues, by having a closer look at the multidimensional nature of SPA, the changeability of SPA, and a lifespan perspective in the promotion of PA among older adults.

In study 1 it was investigated whether are they positive or negative SPA that dominate among the German population, and whether SPA has changed in Germany over the last two decades. Using representative data for Germany (n = 4,295), results showed that adults in Germany aged 40 years and older hold both positive, gain-related SPA and negative, loss-related SPA. In particular, older adults and those with lower education are groups vulnerable to holding less gain-related and more loss-related SPA. Furthermore, cohort comparisons between four subsequent measurement waves (n = 15,558) suggested that SPA could change over an 18-year period and become more positive over time—mainly in older age.

Study 2 aimed at investigating whether it is possible to improve SPA among older adults via directly addressing them in an intervention. Study 2 tested the effectiveness of a randomized controlled trial intervention to promote more positive SPA among eighty-four community-dwelling older adults aged 65 years and older. The SPA intervention was embedded in a 12-week exercise program. Results showed an improvement of participants’ SPA in the intervention group in terms of holding more gain-related and less loss-related SPA after the program period. In the control group, participants’ SPA did not change. Furthermore, all participants profited from their participation in the exercise program in terms of better functional health at follow-up, but only participants in the intervention group showed an increase in mental health.

The aim of study 3 was to investigate the domain-specific relationship between SPA and PA. Furthermore, it was investigated whether this relationship depended on a person’s
perceived residual lifetime. Results using longitudinally data (n = 2,367) demonstrated that there was a domain-specific relationship between the gain-related domain and moderate kinds of PA and the loss-related domain and a more vigorous kind of PA. Furthermore, it was found that the relationship between SPA and PA depended on perceived residual lifetime.

The findings of this thesis showed that SPA are complex and multidimensional. This supports a domain-specific investigation of SPA, their changes, and the relationship they have with outcomes. Furthermore, it was shown that SPA are changeable at the individual level via an intervention as well as at the societal level over decades. In addition, from a lifespan perspective, SPA have emerged as a promising approach in the promotion of PA among older adults, as well as the consideration of the perceived residual lifetime. This knowledge could now be implemented in healthpromotion interventions for older adults for maintaining good health, autonomy, and quality of life in older age and may help older adults to realize their potentials and opportunities in an aging society.
Zusammenfassung

Altersbilder und Gesundheit

Bereichsspezifität, Veränderbarkeit und neue Ansätze für Interventionen zur Gesundheitsförderung bei älteren Menschen


Studie 1 untersuchte einerseits, ob positivere oder negativere Altersbilder in der deutschen Bevölkerung überwiegen. Andererseits wurde betrachtet, inwiefern sich Altersbilder über die letzten zwei Jahrzehnte in Deutschland gewandelt haben. Anhand von repräsentativen


Die Befunde der vorliegenden Dissertation verdeutlichen, dass Altersbilder komplex und multidimensional sind. Dies spricht für eine bereichsspezifische Betrachtung und Untersuchung von Altersbildern und deren Veränderbarkeit sowie deren Beziehungen zu

Die Ergebnisse dieser Dissertation zeigen eine Reihe an Implikationen auf, die nun in Interventionen zur Gesundheitsförderung bei älteren Menschen realisiert werden können, sodass ältere Erwachsene Gesundheit, Autonomie und Lebensqualität so lange wie möglich aufrechterhalten und ihre Potenziale und Möglichkeiten in einer alternden Gesellschaft realisieren können.
List of Publications for the Cumulative Dissertation

This thesis is based on the following three studies:


Further empirical work that is addressed in the dissertation:


1. General Introduction and Theoretical Background

As people grow older, life changes and one faces new challenges regarding aging. Due to demographic change and longer life expectancy, the number of people aged 65 and older will continue to increase in the next decades (Statistisches Bundesamt, 2019). Becoming older is often accompanied with increased vulnerability to a large range of adverse outcomes, for example, chronic conditions, health problems, and serious health events such as falls and fractures, or the diagnosis of a severe illness. Data from the German Ageing Survey (DEAS) showed that 65.5% of people between 55 and 69 years old and even 82.1% of people between 70 and 85 suffer from multimorbidity (Wolff, Nowossadeck, & Spuling, 2017), that is, having two or more co-existing chronic conditions. Chronic conditions and health problems can increase the risk for dependency on others, loss of autonomy, and various impairments in functioning and quality of life, but also result in higher use of the health care system (e.g., Barnett et al., 2012; Makovski, Schmitz, van den Akker, Zeegers, & Stranges, 2018; Ryan, Wallace, O’Hara, & Smith, 2015; Salive, 2013).

A body of research has shown that regular physical activity (PA) is one of the most important health behaviors for the prevention and management of diseases in older age (e.g., Booth, Roberts, & Laye, 2012; Knight, 2012; Taylor, 2014; Warburton, Nicol, & Bredin, 2006). However, despite the benefits for health, the majority of older adults do not meet the recommended level of health promoting PA of 2.5 hours per week. In Germany, 51.7% of men and 63.5% of woman are affected (Finger, Mensink, Lange, & Manz, 2017). Furthermore, 53.9% of older adults between 70 and 85 years old are active less than 1–3 times per month or are never active at all (Spuling, Ziegelmann, & Wünsche, 2017). Therefore, the activity rates of older adults have to be improved so that older individuals profit from the beneficial effects of PA for their health.

Research has tried to identify the personal resources that help older adults to maintain good health, autonomy, and quality of life in older age. A considerable number of studies have found that the view of how individuals perceived their own aging, so-called self-perceptions of aging (SPA), affected health-related outcomes in later life. More positive SPA are associated with better health and more engagement in health behaviors, whereas more negative SPA are related to worse health-related outcomes (Westerhof et al., 2014; Westerhof & Wurm, 2018; Wurm, Diehl, Kornadt, Westerhof, & Wahl, 2017). To date, there is a large body of evidence on the relevance of SPA for health and health-related outcomes, but there are further issues that research regarding SPA has yet to address. After an overview of the theoretical background
regarding SPA and their importance for health-related outcomes and underlying mechanisms (Chapter 1), the issues addressed in the present dissertation are described in Chapter 2, followed by the methods and main results of the three studies. Chapter 3 provides a general discussion of the findings and implications for designing health-promotion interventions for older adults.

1.1 Self-Perceptions of Aging and Their Importance for Health-Related Outcomes

Individuals view age and aging in different ways. SPA are part of a broader conceptualization of individual views on aging, which is an umbrella term for a variety of constructs. Individual views on aging include views on age and aging in general (age stereotypes) and views on one’s own aging (Wurm et al., 2017). While age stereotypes are societally shared views, the latter comprise individual conceptions, expectations, and perceptions of one’s own age and aging. The present thesis focuses on perceptions of one’s own aging, the so-called SPA.

In general, individual views on aging have an effect on how people perceive age and aging, what they expect from age and aging, as well as how they interact with older adults. For example, people tend to communicate with older adults in accordance to their age stereotypes (Hummert, Shaner, Garstka, & Henry, 1998). Furthermore, holding views that are too negative could result in discriminatory behavior towards older people, for example, in the health care system or work context (Voss, Wolff, & Rothermund, 2017). The manner in which individuals perceive aging also determines their cognitions, behavior, or intentions. For SPA, there is a lot of evidence that SPA predict health-related outcomes over time and especially in older age (for an overview see Warmoth, Tarrant, Abraham, & Lang, 2016; Westerhof et al., 2014; Westerhof & Wurm, 2018; Wurm et al., 2017). For example, it was found that more positive SPA were associated with a broad range of health dimensions, such as better physical health (Wurm, Tesch-Römer, & Tomasik, 2007), physical functioning (Levy, Slade, & Kasl, 2002; Sargent-Cox, Anstey, & Luszcz, 2012), mental health (Freeman et al., 2016), cognitive performance (Robertson, King-Kallimanis, & Kenny, 2016; Seidler & Wolff, 2017), and self-rated health (Beyer, Wolff, Warner, Schütz, & Wurm, 2015; Wurm, Tomasik, & Tesch-Römer, 2008). Furthermore, it was found that SPA predict the course of a disease, i.e., recovery after diseases (Levy, Slade, May, & Caracciolo, 2006), or health care use, i.e., overnight hospitalization (Sun, Kim, & Smith, 2017). Finally, SPA are also associated with mortality (Kotter-Grühn, Kleinspehn-Ammerlahn, Gerstorf, & Smith, 2009; Sargent-Cox, Anstey, & Luszcz, 2014). For
example, Levy, Slade, Kunkel, and Kasl (2002) found that individuals with more positive SPA lived 7.5 years longer than individuals with less positive SPA.

This considerable body of empirical findings has proved the importance of more positive SPA for health-related outcomes in older age. The next chapter gives an overview of mechanisms in an attempt to explain how SPA affect health-related outcomes. This knowledge helps us understand these effects as well as being useful for the design of health-promotion interventions that might improve and maintain health among older adults.

1.2 Underlying Mechanisms Between Self-Perceptions of Aging and Health

Stereotype embodiment theory (Levy, 2009) proposed a theoretical framework with physiological, behavioral, and psychological pathways, which may explain how SPA are linked with health-related outcomes.

The psychological pathway assumes that psychological mechanisms link SPA and health. That is, those with more positive SPA may also have more psychological resources, which in turn lead to better health. For example, Levy, Slade, and Kasl (2002) found that perceived control partially mediates SPA and physical functioning. In another study, Levy, Slade, Kunkel, et al. (2002) showed that will to live partially mediates SPA and longevity. A study by Wurm, Warner, Ziegelmann, Wolff, and Schüz (2013) showed that in the case of a serious health event, older adults with more negative SPA are less likely to use self-regulation strategies for promoting a healthy lifestyle (selection, optimization, and compensation), which in turn predicted worse levels of self-rated health and life satisfaction.

SPA may also operate via a physiological pathway: negative SPA function as a personal vulnerability to react negatively to stressful events. This may increase the likelihood of stress and inflammatory responses, which in turn can contribute to illnesses and worse health. For example, Bellingtier and Neupert (2016) showed that older adults with more negative SPA reported increased emotional reactivity to daily stressors, whereas persons with more positive SPA reported consistent levels of negative affect across the study. Levy, Moffat, Resnick, Slade, and Ferrucci (2016) found a stress-buffering effect of more positive SPA among older people over time. People with more negative SPA showed a 44% increase in cortisol levels across 30 years. Levy and Bavishi (2016) showed that C-reactive protein, a marker of cumulative stress-related inflammation, partially mediates positive SPA and longer survival over six years, which also supports the physiological pathway.
The behavioral pathway proposes that SPA affect health outcomes by influencing health behaviors. Evidence regarding the behavioral pathway showed that SPA is a driving force for preventive health behavior, especially among older adults. Those older adults who had more positive SPA were more likely to participate in more preventive health behaviors, such as lower alcohol consumption, healthy diet, exercise, medication compliance, seatbelt use, lower tobacco use, as well as regular doctor visits (Levy & Myers, 2004), higher levels of PA (Sarkisian, Prohaska, Wong, Hirsch, & Mangione, 2005), greater willingness to seek health care (Sarkisian, Hays, & Mangione, 2002), or being more likely to have received a physical examination in the previous two years (Meisner & Baker, 2013).

In conclusion, a large body of previous research has shown that more positive SPA are an important resource for health-related outcomes and that their relationship is partially mediated via behavioral, physiological, and psychological mechanisms. Based on this background, current issues in research regarding SPA are described in the following chapter.
2. Issues of the Present Thesis

Previous studies have focused on the investigation of SPA and their effects on health-related outcomes. The present thesis aimed at extending this research by addressing the following ongoing issues in SPA research.

2.1 The Unidimensionality vs. Multidimensionality of Self-Perceptions of Aging

At the beginning of investigations into SPA they were treated as a global construct and measured with a unidimensional continuum, ranging from positive to negative. A frequently used assessment is the Attitudes Toward Own Aging (ATOA) subscale of Lawton’s Philadelphia Geriatric Center Morale Scale (PGCMS; Lawton, 1975; Liang & Bollen, 1983). This subscale measures the individual, general evaluation of one’s own aging using 5 items, such as “Things keep getting worse as I get older”. Recent research has shown high predictive validity for this measure for a wide range of health-related outcomes (e.g., Levy & Myers, 2004; Levy, Slade, & Kasl, 2002; Moser, Spagnoli, & Santos-Eggimann, 2011; Sargent-Cox et al., 2012; Siebert, Wahl, & Schröder, 2016). Furthermore, a global measure is an economic and often used assessment in large-scale surveys and epidemiological studies. However, reducing the assessment of SPA to a generalized construct may be an oversimplification (Sargent-Cox et al., 2012). According to the principle of lifespan developmental theory and the heterogeneity of the aging process (Baltes, Lindenberger, & Staudinger, 2006), the consideration of SPA became more complex in the last decade with multidimensional assessments. For example, concepts such as Aging-related Cognitions (AgeCog; Steverink, Westerhof, Bode, & Dittmann-Kohli, 2001; Wurm et al., 2007) or Awareness of Age-Related Change (AARC; Diehl & Wahl, 2010) take into account that older people have multiple and distinct SPA, depending on domains. That is, the perception of age-related gains and losses coexist (multidirectionality) and can differ with regard to the domain (multidimensionality) over the entire lifespan. Having more positive SPA in a domain (e.g., with regards to opportunities for personal development) does not preclude also having more negative SPA in another domain (e.g., with regards to declines in health). For example, a person may associate their own aging with illness and having less energy but may also perceive older age as “late freedom” and full of further opportunities (Rosenmayr, 1983). Accordingly, positive SPA can be interpreted as more SPA in a gain-related domain, and respectively less SPA in a loss-related domain. Vice versa, negative SPA can be interpreted as less SPA in a gain-related domain, respectively more SPA in a loss-related domain.
Empirical findings support this domain specificity. It was shown that adults hold both positive and negative views, which vary by whether they refer to health, family, interpersonal, or work domains (e.g., Kornadt & Rothermund, 2015). Further empirical results are also in line with the assumption that positive and negative SPA are not only the ends of one continuum. Brothers, Miche, Wahl, and Diehl (2015) found that age-related losses were a stronger mediating variable between subjective aging measures and two health and well-being outcomes (physical functioning and satisfaction with life) than age-related gains. Hence, authors concluded that negative SPA tend to exert a stronger influence on outcomes than positive ones, which also supports the multidimensionality of SPA.

Based on these findings, within the present dissertation, SPA are treated as multidimensional construct. Two widespread domains were used to assess SPA in all studies: the gain-related domain, ongoing development as well as the loss-related domain, physical losses (see Study 1 for further description). Although empirical findings show that individuals associated both positive and negative aspects with aging, international studies found that a general more negative view regarding age and aging dominate in Western societies (e.g., Kite, Stockdale, Whitley, & Johnson, 2005; Löckenhoff et al., 2009). This raises the question, which SPA are held in Germany and whether are they positive or negative SPA that dominate among the German population? These questions were investigated as the starting point of the present dissertation (study 1), using a representative sample. SPA in studies 2 and 3 were also considered using the gain- and a loss-related SPA domain to examine whether a domain-specificity of SPA is more recommendable in investigating changes in SPA and the relationship with outcomes than a unidimensional consideration.

2.2 The Changeability of Self-Perceptions of Aging

As mentioned in Chapter 1.1, previous findings emphasize the importance of more positive SPA for health in older age. In light of findings that negative and mostly loss-related views predominate (e.g., Kite et al., 2005), and that in particular more negative SPA tend to exert a stronger influence on outcomes than positive ones (Brothers et al., 2015), the need for positively changing SPA seems warranted (Kotter-Grühn, 2015; Westerhof et al., 2014).

The changeability of SPA could be investigated on the societal as well as on the individual level. For example, based on computational linguistics and a database of 400 million English words, Ng, Allore, Trentalange, Monin, and Levy (2015) found that age stereotypes have become more negative over the last two centuries. Similar results were found in terms of
a shift from more positive to less positive words describing the old (Mason, Kuntz, & McGill, 2015). This showed that views on age and aging in general are changeable, and becoming negative. However, to date, no study has investigated such a societal change for SPA over longer time periods in Germany, neither whether they have changed, nor, if so, in which direction.

On the other hand, and more relevant for designing health-promotion interventions for older adults, the changeability of SPA could also be investigated at the individual level via interventions. A greater number of intervention studies have tried to improve different views on age and aging among younger and middle-aged adults, whereby a distinction must be made between younger and older adults. Intervention studies among younger or middle-aged adults are primarily designed for persons that work with older people, such as medical students or health care professionals, in the context of lectures and training (e.g., Bardach, Gayer, Clinkinbeard, Zanjani, & Watkins, 2010; Eskildsen & Flacker, 2009). The aim of such interventions is to improve the treatment of older adults in general, or regarding specific groups (e.g., geriatric patients), or to avoid age discrimination. Used strategies focus on providing information about age and aging or experiences with aging, (e.g., using simulation devices or fostering contact with older persons) in order that participants increase their awareness of aging, older people, and their own stereotypes. Contrary to younger and middle-aged adults, older individuals already have experience with their own age and aging. Therefore, the challenge is to change perceptions regarding one’s own aging, with the aim that older adults profit from having more positive SPA as it impacts positively on their health. Among older adults, there are a small number of intervention studies in the context of health-promotion that tried to improve different views on aging constructs. In sum, findings demonstrate that psychological interventions, priming, or PA could change views on aging. However, a closer look into the different views on aging constructs and empirical evidence from randomized controlled trial (RCT)-studies among older adults showed that changes via an intervention were only successful in addressing age stereotypes (Wolff, Warner, Ziegelmann, & Wurm, 2014) or in indirectly addressing SPA through age stereotypes (Levy, Pilver, Chung, & Slade, 2014). Klusmann, Evers, Schwarzer, and Heuser (2012) assumed that PA could change SPA anyway even without an SPA intervention. Other studies found intervention effects on SPA, but these should be interpreted with caution because they were conducted without a control group or with only a quasi-experimental design (Brothers & Diehl, 2017; Sarkisian, Prohaska, Davis, & Weiner, 2007).
In sum, the questions remain open as to whether SPA are changeable and whether they can be improved by directly addressing them in an intervention. Therefore, the general societal changeability of SPA over almost two decades in Germany is addressed in study 1, the improvement of SPA among older adults via an intervention with RCT-design is investigated in study 2.

2.3 A Lifespan Perspective in the Promotion of Physical Activity for Older Adults

Regular PA is a key factor for health in older age (e.g., Booth et al., 2012; Knight, 2012; Warburton et al., 2006). However, as outlined in the introduction, a large number of older people are not engaged enough in PA or remain sedentary. A systematic review by French et al. (2014) found that effective PA interventions for younger adults, for example using self-regulatory techniques such as goal setting or planning, may not be effective for older adults. Therefore, it is suggested a lifespan perspective be taken for the promotion of health behaviors among older adults, i.e., interventions that take into account specific challenges of aging in general or age-specific factors and barriers for PA (Warner, Wolff, Ziegelmann, Schwarzer, & Wurm, 2016; Ziegelmann & Knoll, 2015).

Due to findings that SPA are also linked with preventive health behaviors (Levy & Myers, 2004), SPA seems to be a promising approach for the promotion of PA among older adults. Previous findings by Beyer et al. (2015) supported the longitudinal relationship between unidimensional SPA and PA and the mediating role of PA in the relationship between SPA and health (behavioral pathway, see Chapter 1.2). However, a deeper investigation of this relationship could reveal a comprehensive understanding of the underlying associations. For example, Wurm, Tomasik, and Tesch-Römer (2010) investigated the role of gain-related SPA in predicting PA in terms of walking and doing sports over time. Older adults with more gain-related SPA reported more walking but did not do more sports over time, compared to those with less gain-related SPA. Furthermore, Meisner, Weir, and Baker (2013) examined the associations between SPA in general as well as domain-specific SPA and different kinds of PA in a cross-sectional study. They found significant associations between PA and SPA in a physical health domain, but not with SPA in the mental health or in the cognitive domain. More precisely, SPA in the physical health domain was only associated with strenuous sport and recreational PA, but not, for example, with muscle strength and endurance training. These results suggest that only specific domains of SPA may be predictive for specific kinds of PA.
Furthermore, findings of the study by Wurm et al. (2010) also showed an interaction effect of gain-related SPA and health: even older adults with worse health walked just as regularly as those with better health, in the case of more gain-related SPA. This showed that the relationship between SPA and PA is more complex and may depend on further factors, especially age-specific PA barriers such as poor health (Moschny, Platen, Klaaßen-Mielke, Trampisch, & Hinrichs, 2011). The question arises, from a lifespan perspective which other factors may play a role in the relationship between SPA and PA? The perception of aging throughout the aging process may be inevitably associated with perceptions of restrictive lifetime and the finitude of life. Therefore, a further factor may be the perception of time. In health psychology, the consideration of time frame plays a prominent role for engagement in health behaviors, for example, short- and long-term involved costs and the future consequences of health behaviors (e.g., Hall, Fong, & Cheng, 2012; Kovač & Rise, 2007; Sansbury, Dasgupta, Guthrie, & Ward, 2014; Sansone et al., 2013). The most widely used concept of time perception from a lifespan perspective may be the concept of future time perspective (FTP) as part of socio-emotional selectivity theory (Carstensen, 2006; Carstensen, Isaacowitz, & Charles, 1999). This theory assumes that a person’s perceived time horizon plays a role in motivation and setting the priorities of goals over their lifespan. Individuals select and pursue goals in accordance with whether they perceive their remaining personal lifetime as expansive or limited. An expansive FTP leads to a preference for long-term goals aimed at optimizing the future. Individuals with a limited FTP tend to prefer short-term goals with emotional value. Hence, socio-emotional selectivity theory predicts motivational shifts that occur with increasing age when time is perceived as more and more limited. Originally formulated as lifespan theory with focus on social changes and social behavior, recent studies have shown that a longer time perspective motivates health behaviors, whereas a shorter time perspective acts as a barrier for engagement in health behaviors (e.g., Ross & Mirowsky, 2002; Stahl & Patrick, 2012).

Given these findings, SPA as well as time perception seem to be promising approaches in the promotion of PA among older adults, from a lifespan perspective. Therefore, the domain-specific relationship between a gain- and a loss-related SPA domain and two kinds of PA, as well as the role of a person’s perceived residual lifetime, plays in engagement in PA was investigated in study 3.
2.4 Summary of Studies

In the following, the methods and main results of the three studies in the present dissertation are summarized. A detailed description of the SPA assessment, which was similar in all studies, is given in study 1.

2.4.1 Study 1: Getting Older – Gain or Loss?

The aim of study 1 was to investigate using representative data whether are they positive or negative SPA that dominate among the German population, and whether SPA has changed in Germany over the last two decades, based on representative data. Data of the DEAS were analyzed to investigate SPA in general, as well as separated by age group, gender, and education. The DEAS is a nationwide representative survey and investigates the living situation of community-dwelling adults aged 40 years and older. The survey consisted of a computer-assisted personal interview as well as a paper and pencil questionnaire. Since 1996, every six years a new baseline sample is drawn, stratified by age, sex, and place of residence. The ongoing cohort-sequential design allows the examination of individual changes, but also social changes over almost 20 years. In this study, only the baseline samples and thus the social change were investigated to find out which SPA are held in Germany and how they have developed over time.

SPA were assessed in the questionnaire using a scale on the aging-related cognition of ongoing development and physical losses (AgeCog Battery; Steverink et al., 2001; Wurm et al., 2007), starting with the words “Ageing means to me . . .”. The subscale ongoing development refers to the gain-related domain of SPA, associating aging as a time of continued personal growth and development, assessed by four items. The items are “Ageing means to me that I continue to make plans.”; “Ageing means to me that I can still learn new things.”; “Ageing means to me that I can still put my ideas into practice.”, and “Ageing means to me that my capabilities are increasing.”. Participants could answer on a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree). The items are averaged and dichotomized into disagree (values < 2.5) or agree (values > 2.5). Conversely, the dimension physical losses addresses individuals’ perceptions related to physical decline and represents the loss-related domain. The four items are “Ageing means to me that I cannot take as much on as before.”, “Ageing means to me that I cannot make up for my physical losses.”, “Ageing means to me that I am less energetic and fit.”, and “For me, getting older means that I am less healthy.”. The items are answered on the same 4-point scale, averaged and dichotomized into disagree (values < 2.5) or
Figure 1. Percentage of individuals with SPA physical losses and SPA ongoing development, for a) age groups and b) level of education. SPA = self-perceptions of aging. Adapted from Altern im Wandel. Zwei Jahrzehnte Deutscher Alterssurvey, p. 351.

agree (values > 2.5). The agreement or disagreement with the gain- and the loss-related domain were analyzed for all participants as well as for differences among age groups (40–54 years, 55–59 years, 70–85 years), level of education (low, middle, high) and gender (male, female). For comparing the same age groups in investigating age differences in change over time, seven age groups (42–47 years, 48–53 years, 54–59 years, 60–65 years, 66–71 years, 72–77 years, 78–83 years) were used, according to time intervals between the measurement waves.

In 2014, 4,295 participants between 40 and 85 years responded to the questions. Results showed that 73.1% agreed that they associated aging with ongoing development, 64.8% with
physical losses. There were no differences in SPA found between men and women, both perceived their aging similarly. However, there were significant differences in SPA found for age group and level of education. With increasing age, the percentage of participants who agreed with the gain-related domain SPA ongoing development decreased: 81.5% of individuals between 40 and 54 years associated aging with ongoing development, among individuals between 70 and 85 years only 59.0% agreed (see Figure 1a). The percentage of individuals who agree with the loss-related domain increased over the age groups: whereas 60.2% of individuals between 40 and 54 years associated aging with physical losses, 73.5% of individuals between 70 and 85 years agreed with it. SPA are also associated with level of education. Individuals with a high level of education more often reported gain-related (80.2%)

![Figure 2](image-url)  
**Figure 2.** Percentage of individuals with a) SPA ongoing development and b) SPA physical losses, for age groups, in 1996, 2002, 2008, and 2014. SPA = self-perceptions of aging. Adapted from Altern im Wandel. Zwei Jahrzehnte Deutscher Alterssurvey, pp. 352-353.
and less often loss-related SPA (62.9%), compared to individuals with a low level of education (gain: 50.8%; loss 70.3%; see Figure 1b).

To investigate SPA development in Germany over the last 20 years, DEAS data from 1996, 2002, 2008, and 2014 (n = 15,558) were analyzed. Over time, individuals agreed more often with the gain-related and less often with the loss-related SPA domain. However, this positive social change differed between age groups (see Figure 2). The change was more momentous among older than younger age groups. Interestingly, the social change between 2008 and 2014 emerged especially among older adults. For the age group between 72 and 77 years, the percentage who agreed with SPA ongoing development significantly increased from 55.8% to 61.5%, and for individuals between 78 and 83 years it increased almost 10% from 40.6% to 49.3% (see Figure 2a). The percentage who agreed with SPA physical losses significantly decreased from 67.7% to 63.7% among individuals between 66 and 71 years and from 84.5% to 77.2% for individuals between 78 and 83 years (see Figure 2b).

In sum, results showed that adults in Germany aged 40 years and older hold both positive, gain-related SPA and negative, loss-related SPA. However, older individuals, who may have gained experiences with aging (e.g., in terms of physical declines and less opportunities), perceived their own aging as less gain-related and more loss-related than middle-aged adults. Furthermore, individuals with a lower level of education also reported more negative SPA. They may also have had fewer opportunities to use the potential of older age because of a worse health status, lower life expectancy, or less financial resources as compared to individuals with a higher level of education. Hence, older adults and those with lower education are groups vulnerable to holding less gain-related and more loss-related SPA and they, in particular, stand to benefit from the promotion of more SPA. Therefore, the target groups of the next two studies comprise older adults, aged 65 years and older, with the age of 65 years as a marker for older age, equivalent to retirement. Furthermore, cohort comparisons between four subsequent measurement waves suggested that SPA could change over an 18-year period and become more positive over time—mainly in older age. Hence, study 1 answered the question whether positive or negative SPA dominated among the German population and whether they changed over time.
2.4.2 Study 2: Are Self-Perceptions of Aging Modifiable?

Study 2 aimed at investigating whether it is possible to improve SPA via directly addressing them via intervention among older adults. Therefore, study 2 tested the effectiveness of an RCT-intervention to promote more positive SPA among community-dwelling older adults aged 65 years and older, that are identified in study 1 as being the vulnerable group for having more negative SPA. The SPA intervention was embedded in a 12-week exercise program to compare the effects of the SPA intervention with only performing exercises. Furthermore, given the associations between more positive SPA and better health, it was also explored at a follow-up whether participants in the intervention group benefitted more from their participation in the exercise program, in terms of better health than the control group.

Eighty-four community-dwelling older adults between 66 and 88 years ($M_{\text{age}} = 76.8, SD = 5.29$) were randomly assigned to a group-based exercise program with ($n = 46$) or without ($n = 38$) SPA intervention. The exercise program comprised a one-hour group training session per week with exercises targeted at improving balance, strength, endurance, flexibility, and reducing fear of falling. Overall, there were seven groups with 10–14 participants. Additionally, participants in the intervention group received four SPA intervention units at regular intervals over the program period (week 2, week 5, week 8, and week 11), each with a duration of 20–30 minutes (see Figure 3). Used intervention strategies were: providing information about age and aging, a technique to change negative automatic thoughts about aging, and thinking about positive aspects of aging. These strategies were taught during the SPA intervention units and were to be practiced between units.

![Figure 3. Design of the study. Interv. I, II, III and IV = intervention-unit I, II, III, IV. Adapted from Beyer, Wolff, Freiberger, & Wurm (2019), p. 667.](image-url)
SPA were assessed in terms of a gain- and a loss-related domain (ongoing development and physical losses) at baseline (T1), after the first half of the program (T2), directly after the program (T3), and in a follow-up four weeks later (T4). SPA were measured using the AgeCog Scales ongoing development and physical losses (Steverink et al., 2001; Wurm et al., 2007; see also Chapter 2.4.1). For both SPA scales, items were averaged, such that higher values indicated a greater agreement. That is, higher scores in SPA ongoing development indicated more gain-related SPA, higher scores in SPA physical losses, more loss-related SPA.

Intervention effects on health were evaluated in terms of physical performance and mental health. The Short Physical Performance Battery (SPPB; Guralnik et al., 1994) was conducted at T1 and T4 to objectively assess physical performance (comprising balance, gait speed, and leg strength), ranging from 0 (low mobility) to 12 (high mobility) points. Mental health in terms of depressive symptoms was also measured using the 15-item German version of the Center of Epidemiological Studies Depression Scale (CES-D; Hautzinger, 1988) at T1 and T4. Higher values indicated more frequent depressive symptoms and worse mental health. Furthermore, all analyses were controlled for participants’ age, gender, level of education, and health status, as well as for trainer effects, partnership, and whether the allocation to intervention or control condition was randomized. The grouping variable (intervention group vs. control group) was entered as predictor of latent change scores between different time intervals. Significant group effects on change in SPA and health can be interpreted as intervention effects. To shed more light on the processes of change, SPA were assessed four times during the whole study. Setting different measurement occasions as reference points allowed evaluation of short and longer-term changes in both SPA domains over the program period.

For SPA ongoing development (see Figure 4), results showed an increase in the intervention group as compared to the control condition over the program period ($B_{T1-T3} = 0.35, SE = .14, p = .01$). Further investigation showed a significant increase only between T2 and T3 ($B_{T2-T3} = 0.34, SE = .13, p = .01$), whereas no significant change occurred during the first weeks of the study period between T1 and T2. Furthermore, the level of SPA ongoing development differed between both groups at T3 ($B = 0.27, SE = .13, p = .03$): in the intervention group, after the exercise program participants held more gain-related SPA than participants in the control group. However, results showed a significant decrease in SPA ongoing development between the end of the exercise program and the follow-up ($B_{T3-T4} = -0.37, SE = .16, p = .02$) in the intervention group as compared to the control condition.
For SPA physical losses results showed a decrease in the intervention group as compared to the control group over the program period ($B_{T1-T3} = -0.29$, $SE = .14$, $p = .03$; see Figure 5). Similar to findings regarding the gain-related domain, the significant decrease occurred only in the second half of the exercise program between T2 and T3 ($B_{T2-T3} = -0.34$, $SE = .14$, $p = .02$), whereas no significant effect was found between T1 and T2 ($B_{T1-T2} = -0.01$, $SE = .16$, $p = .96$). However, the level of SPA physical losses did not differ between both groups after the program period at T3 ($B = -0.06$, $SE = .17$, $p = .74$). After the exercise program, no significant changes in the intervention or control group were found.

**Figure 4.** Manifest means of SPA ongoing development, for group and measurement occasion. SPA = self-perceptions of aging.

**Figure 5.** Manifest means of SPA physical losses, for group and measurement occasion. SPA = self-perceptions of aging.

Results for health in terms of physical performance showed no significant differences between the intervention group and control group, that is, both groups developed similarly over time ($B_{T1-T4} = 0.02$, $SE = .19$, $p = .92$). In the unconditional latent change model (without the group variable as predictor), it was found that all participants showed an improvement in physical performance ($B_{T1-T4} = .31$, $SE = .26$, $p < .01$), independent of the group. For mental health, there was a decrease in depressive symptoms only in the intervention group between T1
and T4 ($B_{T1-T4} = -0.38, SE = .14, p < .01$). Furthermore, the level of depressive symptoms differed between both groups at follow-up four weeks after the end of the exercise program ($B = 0.31, SE = .11, p < .01$). That is, participants in the intervention group reported significantly fewer depressive symptoms at follow-up as compared to participants in the control group.

In sum, results showed an improvement of participants’ SPA in the intervention group in terms of holding more gain-related and less loss-related SPA after the program period. In the control group participants’ SPA in both domains did not change. All participants profited from their participation in the exercise program in terms of better functional health at follow-up, but only participants in the intervention group showed an increase in mental health. Hence, study 2 demonstrated that SPA are improvable, but that an explicit intervention is needed. Furthermore, addressing age-related constructs such as SPA may enrich health-promotion interventions for older adults in terms of improved health at follow-up.

### 2.4.3 Study 3: There is Still Time to be Active

The aim of study 3 was to investigate the relationship between SPA and PA in a more detailed domain-specific way. Furthermore, it was investigated whether this relationship depended on a person’s perceived residual lifetime to reveal a comprehensive understanding of the underlying associations in this relationship.

Data came from the DEAS. People were included if they participated in 2008 (T1) and/or in 2011 (T2) and were aged 65 years or older at T1. In total, data of 2,367 participants between 65 and 93 years ($M_{age} = 73.0, SD = 5.61$) were analyzed, 57% of the sample were male. SPA were measured using the AgeCog Scales ongoing development and physical losses (Steverink et al., 2001; Wurm et al., 2007; see also Chapter 2.4.1). Items were reverse coded and used to build a latent variable. Higher values in SPA ongoing development can be interpreted as more positive, gain-related SPA, higher values in SPA physical losses as more negative, loss-related SPA. The difference between the subjective life expectancy and the participants’ current age were used as perceived residual lifetime, as suggested by Ross and Mirowsky (2002). Furthermore, participants were asked “How often do you do sports such as hiking, soccer, gymnastics, or swimming?” and “How often do you go for walks?” to assess PA, ranging from 1 (daily) to 6 (never). Both items were reverse coded, higher values indicated more frequent engagement in doing sports and walking, respectively. All analyses were controlled for participants’ gender, level of education, health (in terms of number of chronic
conditions as well as functional health), partner status, and sample origin of the survey. The relationship between SPA and PA was investigated using a cross-lagged panel design in four separate models for both kinds of SPA and PA. It was tested whether SPA at T1 predicted PA at T2, after controlling for all covariates and PA at T1. For the moderation hypothesis, the perceived residual lifetime as well as the interaction term SPA x perceived residual lifetime were added to the models. Significant interaction effects using simple slopes for the mean of perceived residual lifetime, as well as 1 standard deviation below and above the mean, are depicted in Figure 6 and Figure 7.

Results showed domain-specific relationships for the gain-related domain SPA ongoing development and walking, as well as for the loss-related domain SPA physical losses and doing sports. For the gain-related domain, both SPA ongoing development ($B = 0.42$, $SE = .16$, $p = .01$) and the interaction term SPA ongoing development $x$ perceived residual lifetime significantly predicted walking over time ($B = -0.08$, $SE = .03$, $p = .02$). As shown in Figure 6, older adults who held more gain-related SPA were more active in terms of walking in general. Those who held less gain-related SPA were less active, unless they perceived a longer residual lifetime.

![Figure 6](image)

**Figure 6.** Interaction between SPA ongoing development at T1 and walking at T2, moderated by perceived residual lifetime. SPA = self-perceptions of aging. Adapted from Beyer, Wiest, & Wurm (2019), p. 811.

For the loss-related domain, doing sports was predicted by the perceived residual lifetime ($B = 0.06$, $SE = .03$, $p = .03$) and by the interaction term SPA physical losses $x$ perceived residual lifetime ($B = -0.05$, $SE = .02$, $p = .04$). Figure 7 shows that older adults with a longer perceived residual lifetime were more engaged in doing sports. In particular, those who
Figure 7. Interaction between SPA physical losses at T1 and doing sports at T2, moderated by perceived residual lifetime. SPA = self-perceptions of aging. Adapted from Beyer, Wiest, & Wurm (2019), p. 811.

perceived a longer residual lifetime and additionally held less loss-related SPA were more active.

In sum, results show that there was a domain-specific relationship between the gain-related domain and moderate kinds of PA and the loss-related domain and a more vigorous kind of PA. Furthermore, it was found that the relationship between SPA and PA depended on perceived residual lifetime. Hence, study 3 suggested that domain-specific SPA as well as the perceived residual lifetime are promising approaches in the promotion of PA among older adults.
3. General Discussion

The aim of the present thesis was to extend research in the field of SPA and their relationship with health-related outcomes by investigating ongoing issues in SPA research. In the following, findings on the role of domain-specificity, the improvement of SPA, as well as the importance of taking into account a lifespan perspective in the promotion of PA are summarized and discussed. Strengths, limitations, and directions for future research are critically reflected on in Chapter 3.4. Finally, practical implications for health-promotion interventions for older adults are revealed in Chapter 3.5.

3.1 On the Role of Domain-Specificity in Self-Perceptions of Aging

An ongoing issue in aging research is the question whether SPA should be considered as global and unidimensional or as multidimensional constructs. In all the studies included in this dissertation, SPA were treated as multidimensional and multidirectional constructs, exemplarily assessed with a gain-related domain regarding growth and ongoing development as well as a loss-related domain regarding physical declines and losses. It was shown that aging is associated with gains as well as losses among the middle-aged and older German population, which is in line with findings for the coexistence of age-related growth and decline and different perceptions regarding the domains (e.g., Kornadt & Rothermund, 2015; Westerhof & Wurm, 2015). However, it could not be demonstrated that SPA are predominately only negative among the German population, but rather that they are complex and multidimensional.

Interestingly, this dissertation revealed a range of domain-specific results which support the multidimensionality of SPA. At first, age and educational differences in the gain-related domain were more notable than in the loss-related domain. Furthermore, it was found that both gains as well as losses were modifiable via an intervention. However, the promotion of the gain-related domain was more successful. More considerable effects in the gain-related domain than in the loss-related domain were also found for the societal change in study 1, which is also in line with results that investigated longitudinal changes in SPA, influenced by population aging (Wolff, Beyer, Wurm, Nowossadeck, & Wiest, 2018). Furthermore, a different predictive relevance of the gain- and the loss-related SPA domain for a moderate and a vigorous kind of PA was found. These results showed that gain- and loss-related SPA were distinct dimensions and had a different predictive relevance. SPA ongoing development represents how many new goals and opportunities individuals perceived to have in their personal future. Findings regarding changeability of SPA demonstrated that in particular SPA in the gain-related domain
were modifiable. It may be easier paying attention to individual s’ potential and opportunities with aging among older adults, for example, in interventions. Conversely, SPA physical losses represent the physical health component in terms of restrictions and constraints. Those perceptions are more closely related to physical conditions, which may be less changeable. On the other hand, this domain should be considered in investigating outcomes that are also more related to physical conditions (e.g., doing sports), due to their greater predictive relevance.

Altogether, the consideration of different domains allows a more detailed examination of SPA, their changes, and the relationship they have with outcomes. This reflects the growing support for taking a domain-specific approach to the study of SPA.

3.2 On the Improvement of Self-Perceptions of Aging

A wide range of evidence has emphasized the important role of more positive SPA for older adults. However, to date no study has demonstrated the changeability of SPA. Therefore, this thesis investigated, whether SPA are changeable in terms of a societal change over time and whether it is possible to improve SPA via directly addressing them in an intervention. First of all, a societal change was found in both SPA domains over almost two decades. That is, from 1996 to 2014, more individuals in Germany aged 40 years and older agreed with the gain-related domain and less individuals agreed with the loss-related domain. Interestingly, this improvement varied depending on the age groups. Whereas SPA among middle-aged adults remained relatively stable over time, the societal change occurred in particular among older adults. This shows that SPA are definitely changeable over time, in particular among the older age group. Hence, SPA are not invariable construct.

The improvement of both SPA domains at the individual level via an SPA intervention was also shown. The target group was adults aged 65 years and older, a risk group for holding more negative SPA, but also a group in which SPA showed an improvement over time (see study 1). This dissertation extends previous research (e.g., Levy et al., 2014; Sarkisian et al., 2007; Wolff et al., 2014) by showing direct intervention effects on SPA. Furthermore, all participants profited from the exercise program in terms of better physical performance at follow-up, but in addition participants in the intervention group also reported better mental health. That is, participating in an SPA intervention might also have effects on health. Furthermore, results demonstrated that to change SPA an explicit SPA intervention seems to be necessary. This contradicts the opposite findings of Klusmann et al. (2012). Due to the well-known associations between SPA and PA (see also Chapter 2.3), performing PA could also
affect SPA (Klusmann et al., 2012), maybe depending on their domain. Study 3 also revealed domain-specific relationships between SPA and different kinds of sports. Intervention effects in the other direction in terms of views on aging on PA could be demonstrated, for example, by Wolff et al. (2014).

To take up the issue of domain-specificity (Chapter 3.1), there was an improvement in both SPA domains, however, the improvement in the gain-related domain was more successful in terms of significant group differences between intervention and control group after the exercise program. That is, the SPA intervention may rather promote paying attention to the perception of opportunities and growth during aging, and less to physical aspects. It might be a greater challenge to weaken the loss-related domain via an intervention, in particular among older adults who experienced first physical declines and losses, than pointing out potential opportunities and gains.

For a better understanding of improvement in SPA, the interventional level should be abandoned. Interestingly, the societal change over almost two decades (study 1) showed similar domain-specific effects. There was a more considerable improvement in the gain-related domain than in the loss-related domain over time. Reasons for this positive long-term change over two decades may include a more positive representation of older people in media, politics or society, or medical and technological improvements, which all encourage a better perception of aging, but also experiences with age and aging in an aging society. Besides individual factors, the context in which an individual lives should also be considered. Context can be investigated as indicated above in terms of different life domains, such as health or employment, or on a broader macro level, such as regions or countries. Factors on the macro level may also affect changes in SPA. For example, culturally or socially shared beliefs according to demographic change may play a role for individual SPA in an aging society. Population aging is a concern for many countries around the world (United Nations, 2017). Germany will also continue to experience an increase in the proportion of people aged 65 or older throughout the coming decades (Statistisches Bundesamt, 2019). This population aging seems to be associated with individual health such as cognitive performance over time (Smith, Desai, Slade, & Levy) but also with increasingly negative views on aging. For example, North and Fiske (2015) found that an increase in the proportion of people aged 65 and older in a country is associated with more negative attitudes toward aging and the aged. The consequences of population aging for SPA were investigated by Wolff et al. (2018). In this study we tested, whether indicators of district-specific population aging (e.g., population development between 1995 and 2008,
average age of population in 2008) longitudinally affected SPA ongoing development and SPA physical losses over a 12-year period. This was investigated using three-level latent change models with data from the DEAS (n = 8,199, 40-85 years at baseline) from two measurement occasions (1996 and 2008). Four different districts in their pace of population aging were identified in a cluster analysis and compared in their prediction of SPA over time. It was found that individuals living in districts with fast population aging reported more negative SPA in 2008 in the gain- as well as in the loss-related domain, whereas those in districts with slow population aging showed a more positive change, but only in the gain-related domain. These results suggest that SPA may be shaped by population aging within a country in terms that individuals hold more negative SPA in districts with faster population aging. Furthermore, the context may also explain domain-specific effects. The pace of population aging in districts may be associated, for example, with the formation or adaptation of an “age-friendly” infrastructure, the accessibility of health care services, opportunities for volunteering or leisure programs for older adults. A slower pace in population aging may be related to a better adaptation, which in turn may shape the perception of having more opportunities in later life. However, this may not affect the loss-related, physical domain.

Altogether, results regarding changeability of SPA showed that SPA are changeable at the individual level via an intervention as well as at the societal level over decades. Furthermore, it was demonstrated that an SPA intervention can enrich health-promotion interventions for older adults in terms of better health. Due to the beneficial effects of more positive SPA on health, SPA should be implemented in interventions for older adults, but they are also, for example, contextually shaped.

3.3 On the Importance of a Lifespan Perspective for Physical Activity

The third issue of this thesis was to adopt a lifespan perspective in investigating the promotion of PA among older adults, in terms of SPA and the perceived residual lifetime. Results revealed interesting domain-specific results for SPA and PA and showed that this relationship also depended on the perceived residual lifetime. For example, it was found that a longer perceived residual lifetime may compensate for the detrimental effects of more negative SPA for engagement in PA. For example, a person did more sports when he or she perceived more time left in life and additionally associated less physical losses and declines with aging. This person may believe that the engaging in sports will pay off over time and invest more in future goals, so that she or he can profit from the beneficial effects of PA. This also supports
assumptions from socioemotional selectivity theory. When time in life is perceived as limited, people focus selectively on the most important aspects of their lives such as goals related to emotional meaning and emotional satisfaction, and less in long-term or health-related goals (Löckenhoff & Carstensen, 2004).

But it is not only the found association between perceptions of aging and lifetime that render the consideration of lifetime in PA research a promising approach. Many studies consider chronological age as proxy for time, which is a well-known predictor of PA (e.g., Bélanger, Townsend, & Foster, 2011; Hallal et al., 2012; Molanorouzi, Khoo, & Morris, 2015). However, socioemotional selectivity theory assumes that in particular proximity to death impacts motivation and goal preference. Recent findings on socioemotional selectivity theory showed that chronological age per se is not an explanatory variable for age-related motivational changes. For example, experimental studies found that many age differences disappear when time perspective is controlled or manipulated (e.g., Fung, Carstensen, & Lutz, 1999; Lang & Carstensen, 2002). This raises the question, whether it is age (as distance from birth) or rather the perceived residual lifetime (as distance to death) better predicts PA, especially among older adults. For example, Bosworth, Warner Schaie, Willis, and Siegler (1999) found for intellectual performance that distance to death explained a significant amount of the variance after controlling for age, socioeconomic variables and survivorship. Moreover, it is not age itself but the perceived residual lifetime that can be targeted by interventions, for example, by providing information for actual life expectancy.

As aging is not only accompanied by the perception of passing time, but also by an increased likelihood of illness and chronic conditions, as outlined in the introduction, there may be further age-specific barriers for PA. Wurm et al. (2010) found an interaction between gain-related SPA and health in predicting PA, which also emphasized the importance of health and illnesses for PA. Based on this finding, illness perceptions as part of the common-sense-model of illness representation (Leventhal, Meyer, & Nerenz, 1980) also affects recovery, coping strategies or health outcomes (for a meta-analytic review see Hagger & Orbell, 2003). Older adults with a specific illness such as a cardiovascular disease or a musculoskeletal disorder may face illness-specific boundaries for engagement in PA. Therefore, Beyer, Wolff, Ulbricht, and Wurm (2018) investigated the interplay of SPA and the perceptions of such illnesses in predicting PA among patients with cardiovascular diseases. 60 older adults aged 60 years and older ($M_{age} = 75.6, SD = 8.41$) with coronary heart disease answered questions regarding their SPA (Lawton, 1975; Liang & Bollen, 1983) and their coronary heart disease (Brief Illness
Perception Questionnaire; Broadbent, Petrie, Main, & Weinman, 2006) and reported the mean duration of their weekly PA. It was found that the illness perception subscale’s understanding and emotional response moderated the positive relationship between SPA and PA. Patients with more positive SPA were more active when they additionally perceived their coronary heart disease as more understandable or less emotionally stressful, respectively. That is, for example, in PA promotion interventions among older adults with coronary heart diseases, besides the promotion of more positive SPA, the causes of the coronary heart disease and strategies for secondary prevention and mentally coping could also be addressed.

Altogether, SPA have emerged as a promising approach in the promotion of PA among older adults. Due to becoming older is often accompanied with passing of time, the consideration of the perceived residual lifetime is also recommended. Results suggests that from a lifespan perspective these factors should also be addressed in interventions to promote PA.

3.4 Strengths, Limitations and Future Directions in Research

The present dissertation has tried to overcome the limitations of recent studies, by extending knowledge regarding domain-specificity, investigating the changeability of SPA, and pointing out approaches that could be integrated into health-promotion interventions for older adults. Several recent studies used a cross-sectional design and remained at the correlates stage. The strengths of this thesis were that large, partial representative population-based samples, longitudinal data, and also an intervention study with an RCT design were used to investigate ongoing issues in SPA research at the individual, but also at the societal level. However, there are also some limitations to the present thesis that need to be acknowledged. How these limitations could be addressed in future research is also discussed.

At first, SPA were investigated from a domain-specific approach, allowing a more differentiated investigation of the construct, improvements of SPA, and relationships with outcomes. However, these studies are limited by the examination of only two exemplary domains, the gain-related domain that aging is accompanied with ongoing learning and development, and the loss-related domain that aging is accompanied with physical losses and declines. These two domains showed their different predictive relevance for health-related outcomes but are only a selection of relevant life domains for aging. Other instruments contain further domains such as social relationships, work, and leisure activities or financial situation (e.g., ARRC; Diehl & Wahl, 2010). For a more detailed investigation and to consider the
heterogeneity of aging and older people as well, such domains should also be examined in future studies, depending on the interested outcome. For example, research on dementia and cognitive declines should concentrate on SPA in cognitive domains, whereas research on loneliness should focus on SPA in social or leisure activity domains. Furthermore, domain-specific SPA and their relationships with outcomes may depend on life-stages as well as life circumstances. For future research among middle-aged adults, investigating SPA in the work or family domain may be more relevant for predicting outcomes than the physical domain.

Second, this is the first time that a gain- and a loss-related SPA domain could be improved. However, limitations were that the change in the gain-related domain was more successful than in the loss-related domain, at the societal as well as on the individual level. Furthermore, the intervention effect decreased after the program period. Therefore, future research is needed regarding effective interventions for the improvement and maintenance of long-term effects in various SPA domains. The present dissertations’s findings point to several issues that should be investigated in future research. For example, results of the intervention lead to the assumption that the process of changing SPA in interventions consisted of two phases: at first the sensitization to too negative SPA, and then modifying them of too negative SPA into more positive ones, achieved by different strategies. The first part of the SPA intervention may have led to a greater sensitization of participants to their SPA in the first step, using a quiz on aging, providing information about SPA, and homework to detect negative SPA in everyday life. The improvement of SPA may then be accomplished in the second part of the intervention by changing negative automatic thoughts about aging and strengthening positive aspects of aging. Future research should try to capture this proposed process of change during the intervention period and should also consider domain-specificity. For example, the technique used to change negative automatic thoughts about aging may draw participants’ attention to more opportunities and gains associated with aging, which may explain the greater success in improving the gain-related domain and less of physical aspects. SPA physical losses are more related to health and functioning, which could be addressed, for example, by giving more health-related information in the sensitization phase and focusing more on health-related aspects while using the technique to change negative automatic thoughts.

Third, the present thesis also focused on a lifespan perspective in the promotion of PA. Models of health behavior change mention social cognitive variables such as self-efficacy, intention formation, and self-regulatory processes (e.g., goal setting) as key factors of health behaviors and their promotion. The present dissertation is limited by the lack of such variables
but took a step back: instead of investigating a broad framework, this work focused on domain-specific relationships and moderators in this relationship. Future research should combine known social cognitive variables for PA and investigated lifespan perspective. For example, Klusmann, Sproesser, Wolff, and Renner (2017) showed for healthy eating as health behavior that self-efficacy and the intention to eat healthily serially mediated the relationship between positive SPA and more healthy eating over time. Findings of a partial mediation suggests that there are further important variables in this relationship which could also be considered in a lifespan perspective way, such as risk perception or outcome expectancies.

And fourth, the dissertation focused on older adults. This age group was selected as target group due to their growing experience with aging and the increasing importance of SPA for their health. Additionally, especially older adults hold more negative SPA. But this age group also showed the most notable positive change over time (study 1). This revealed that older adults are a promising target group for investigating SPA and their outcomes as well as interventions to improve SPA. However, research showed that views on aging are relevant to individuals across all ages over the whole lifespan (e.g., Westerhof et al., 2014; Westerhof & Wurm, 2018; Wurm et al., 2017). Therefore, it is important not to limit the issues of the present thesis to the older age group. For interventions, addressing young and middle-aged individuals is important in order to sensitize younger age groups for age and aging— for their own aging but also for a better social interaction with older people or less discriminating behavior. Additionally, results are limited to community-dwelling individuals. The generalization of the findings to older adults, for example, living in institutions or very elderly adults should be treated with caution, due to their on average less healthy state and their different living situations. Therefore, future research should address such target groups. For example, functionally impaired old-old adults represents an at-risk-group, which should receive attention for interventions to hamper the increasing risks for more negative and loss-related SPA as well as illnesses, disability, and dependency. Furthermore, the engagement of more moderate kinds of PA are recommended for this age group (World Health Organization (WHO), 2010). For example, findings of the thesis suggested improving in particular gain-related SPA to increase walking among these individuals.

In sum, the studies in the present thesis answered open research questions in SPA research regarding domain-specificity, interventions to improve SPA, and a lifespan approach for the promotion of PA. The shortcomings and limitations have indicated interesting starting
points for future research. A further aim of this thesis is to derive new approaches for developing health-promotion interventions for older adults.

3.5 Practical Implications for Health Promotion Interventions for Older Adults

More positive SPA, that is more gain- and less loss-related SPA, are beneficial for health and longevity. In particular, in an aging society, it is important for an individual to hold a more positive view regarding their own age and aging for their own health, but also for society to reduce ageism or discriminating behaviors. This dissertation has suggested a range of practical implications for including SPA in health-promotion interventions and programs for older adult as described in the following.

The combination of an SPA intervention with an exercise course or other PA programs over weeks is a promising approach. An advantage of this combination is that participants can profit from the health benefits of the exercises or other performed PA. Additionally, previous studies concluded that a short component regarding age and aging may not be able to change SPA in interventions, but that longer intervention periods beyond one day could be more effective in changing SPA (e.g., Wolff et al., 2014). Therefore, an intervention over a number of weeks may ensure more intensive preoccupation with intervention content and one’ own SPA over time. Furthermore, exercise courses are mostly organized at group level. Groups allow an exchange, for example, of experiences with aging, something which was often practiced in study 2. However, some participants may not become involved in group discussion or may not want some aspects to be discussed in groups. Therefore, a combination of group- and individual, face-to-face-settings may be advisable. The individual face-to-face setting allows the discussion of more personal SPA or fears.

The SPA intervention content should be made personal with individual examples and with a focus on the participants’ living situation (for example, by discussing their positive and negative SPA in everyday situations) to address participants’ age-related gains- as well as losses. Further findings of this thesis suggested that besides SPA topics in relation to perceived lifetime should also be addressed. For example, providing information about life expectancy and strategies to enhance one’s own life expectancy, such as engagement in health behaviors, could be added to such an intervention. An interesting additional finding from study 2 was the following: Participants could continue the exercise program after the study period. In the intervention group, almost half of the participants were interested in continuing the exercise program, whereas in the control group only every fifth person. Hence, health-promotion
interventions which address topics regarding age and aging in a group setting made up of participants with a similar health situation may be more attractive in older age than pure exercise programs.

As an example, for the recommended practical implications for health promoting interventions, the present SPA intervention was adapted for older adults with cardiovascular diseases in a following study (Beyer, Ulbricht, Voigt, & Wurm, 2017). This study integrates an SPA intervention into a lifestyle intervention to promote more PA for older adults with coronary heart disease. The lifestyle intervention over 3 months comprised an exercise program with the focus on interval training (a series of low- and high-intensity trainings) to improve cardiovascular fitness as well as the promotion of a more Mediterranean diet, which is also recommended among patients with cardiovascular diseases (e.g., Chiva-Blanch et al., 2016; Guasch-Ferré et al., 2014). The SPA intervention, which was conducted in a group setting, consisted of providing information and the technique to change negative automatic thoughts about aging, but also the discussion of personal fears and doubts regarding aging as well as regarding the cardiovascular disease (e.g., cardiophobia; Zvolensky, Feldner, Eifert, Vujanovic, & Solomon, 2008) in an individualized, face-to-face setting. In particular, the SPA intervention focused on the detection of individual age- or illness-related barriers for engagement in PA, scrutinizing them critically and, if applicable, reducing them. To date, evaluation is ongoing.

However, an important question arose regarding the improvement of SPA in general (Kotter-Grühn, 2015): Are more positive SPA beneficial in every case or are there beneficial effects of a more negative view, too? The present thesis emphasizes the beneficial health effects of more positive SPA, but there are also a few findings regarding opposite effects. For example, Wolff, Schüz, Ziegelmann, Warner, and Wurm (2015) found that in the short run, after a serious health event, older adults with more negative SPA reported less negative affect than individuals with less negative SPA. Authors concluded that more loss-related SPA may mentally and behaviorally prepare older adults for health events or declines. Therefore, they may be less affected or surprised when they occur and be better able to cope with adverse events. However, in the long run individuals with more negative SPA reported more functional limitations. The purpose of interventions aiming at improving SPA should be to establish realistic and constructive SPA. The aim is not to make individuals believe that aging is not associated with declines or losses or that negative SPA are only replaced by positive and partly unrealistic SPA, thus negating any age-related losses and declines. Furthermore, older adults could interpret age-related declines and losses as their own unsuccessful aging. Therefore, the goal is to promote
realistic SPA, which would motivate older adults to participate and engage in activities and prepare them to cope with the detrimental sides of aging. This would enable older adults to prepare for and handle age-related losses.

As an outlook, findings of the thesis showed that SPA interventions’ benefits may not be limited to health-promotion interventions. Participating in an SPA intervention seems, in particular, to improve mental health among older adults. Parts of the conducted SPA intervention rested on therapeutic principles. For example, the technique to change negative automatic thoughts about aging were derived from cognitive behavioral therapy. In addition, the SPA intervention content comprised also strengthening self-confidence and developing strategies to cope with the daily challenges faced due to one’s own aging, which might also have the effect of reducing depressive symptoms. Therefore, the implementation of such SPA interventions (or at least the discussion of a patient’s SPA) may also be a promising approach in psychotherapy or counseling for older adults.

3.6 Conclusion

More positive SPA are a resource for health in older age. The present dissertation contributed to ongoing SPA research by more closely investigating the relationship between SPA and health and in particular their domain-specificity, their changeability, as well as taking into account a lifespan perspective in the promotion of PA among older adults to gain new approaches for health-promotion interventions for older adults.

Findings of the present thesis mentioned the consideration of age-related gains as well as losses, which allows a more differentiated investigation of the construct and prediction of outcomes. The investigation of age-related gains and losses is needed to capture the heterogeneity of aging. For interventions, it is important to point out age-related gains, but also—in a realistic way—accompanied age-related losses. Future physical activity and health-promotion interventions for older adults should take into account a lifespan perspective, for example, by considering participants’ SPA, as well as their perceived residual lifetime for disease prevention and maintenance of health, in light of demographic changes and increased vulnerability to a large range of adverse outcomes.
References


Levy, B. R., Pilver, C., Chung, P. H., & Slade, M. D. (2014). Subliminal strengthening: Improving older individuals' physical function over time with an implicit-age-


List of Figures

Figure 1 Percentage of individuals with SPA physical losses and SPA ongoing development, for a) age groups and b) level of education. SPA = self-perceptions of aging. Adapted from Altern im Wandel. Zwei Jahrzehnte Deutscher Alterssurvey, p. 351.

Figure 2 Percentage of individuals with a) SPA ongoing development and b) SPA physical losses, for age groups, in 1996, 2002, 2008, and 2014. SPA = self-perceptions of aging. Adapted from Altern im Wandel. Zwei Jahrzehnte Deutscher Alterssurvey, pp. 352-353.


Figure 4 Manifest means of SPA ongoing development, for group and measurement occasion. SPA = self-perceptions of aging.

Figure 5 Manifest means of SPA physical losses, for group and measurement occasion. SPA = self-perceptions of aging.

Figure 6 Interaction between SPA ongoing development at T1 and walking at T2, moderated by perceived residual lifetime. SPA = self-perceptions of aging. Adapted from Beyer, Wiest, & Wurm (2019), p. 811.

Figure 7 Interaction between SPA physical losses at T1 and doing sports at T2, moderated by perceived residual lifetime. SPA = self-perceptions of aging. Adapted from Beyer, Wiest, & Wurm (2019), p. 811.
List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AARC</td>
<td>Awareness of Age-Related Change</td>
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<tr>
<td>AgeCog</td>
<td>Aging-related Cognitions</td>
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<td>ATOA</td>
<td>Attitudes Toward Own Aging</td>
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<td>CES-D</td>
<td>Center for Epidemiological Studies Depression Scale</td>
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<td>DEAS</td>
<td>German Ageing Survey</td>
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<td>FTP</td>
<td>Future time perspective</td>
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<td>PGCMS</td>
<td>Philadelphia Geriatric Center Morale Scale</td>
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<tr>
<td>RCT</td>
<td>Randomized controlled trial</td>
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<td>SPA</td>
<td>Self-perceptions of aging</td>
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<td>SPPB</td>
<td>Short Physical Performance Battery</td>
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<td>PA</td>
<td>Physical activity</td>
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<td>WHO</td>
<td>World Health Organisation</td>
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Appendix: Publications
Study 1  Älter werden – Gewinn oder Verlust?
Individuelle Altersbilder und Altersdiskriminierung

The article was published as:

Study 2 Are self-perceptions of ageing modifiable?

Examination of an exercise programme with vs.
without a self-perceptions of ageing-intervention for older adults

The article was published as:

Study 3  There is still time to be active.

Self-perceptions of aging, physical activity, and the role of perceived residual lifetime among older adults

The article was published as: