

**Fachbereich Erziehungswissenschaft und Psychologie
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A Lifespan Perspective on Health Behaviour Change:
Temporal, Emotional, and Social Aspects in Promoting
Physical Activity in Older Adults

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Abstract

Taking a lifespan view (Baltes & Baltes, 1990; Carstensen, 1995) on the process of health behaviour change by considering psychological concepts that are assumed to gain importance with increasing age, the aim was to examine the interplay of health behaviour change and lifespan theoretical conceptions (outlined by socioemotional selectivity theory; Carstensen, 1995): Close social relationships (*Chapter 2*), a more limited time perspective (*Chapter 3*), and a focus on emotional meaning (*Chapter 4*). Further it was investigated whether these concepts (*Chapter 2-4*) can inform effective health behaviour change interventions (*Chapter 5-6*).

A randomized controlled trial (RCT) with two intervention arms (Standard health care intervention vs. Intervention augmented by lifespan concepts: Strategies of selection, optimization, and compensation: Baltes & Baltes, 1990; and socioemotional selectivity theory: Carstensen, 1995) over a one year period was conducted to answer the research questions.

In line with the hypotheses it could be shown that an intimate partner who also participated in the study (close relationships: *Chapter 2*) had a positive impact on physical activity outcome; That motivational barriers, due to a limited future time perspective can be overcome by self-regulatory planning (*Chapter 3*); And that expectations on emotional outcomes of behaviour are dominant in predicting physical activity (*Chapter 4*). Testing the influence of these concepts in a RCT design, a lifespan intervention condition (focus on social, immediate, and emotional benefits of physical activity and SOC strategy training) was superior in changing physical activity in older adults compared to a standard health care intervention (*Chapter 5*), whereas the putative mediators predicted physical exercise, but did not mediate (*Chapter 6*).

These findings contribute to the development of health behaviour change theories and intervention by adding a lifespan perspective. *Chapter 7* finally gives a general discussion, an outlook on possible future research and provides suggestions for practical implications.

Zusammenfassung

Die allgemeinen Empfehlungen der Weltgesundheitsorganisation (WHO, 2006) zum Ausüben körperlicher Aktivität sind nach Altersgruppen unterteilt, um den Besonderheiten jeder Altersgruppe gerecht zu werden. So unterscheiden sich beispielsweise Art, Intensität und Dauer der empfohlenen Aktivitäten für die jeweiligen Altersgruppen. Die WHO gibt separate Empfehlungen für Menschen von 5 bis 17, 18 bis 64 und 65 und mehr Jahren heraus.

Nimmt man dies als Referenz, ist verwunderlich, dass die Psychologie der Gesundheitsverhaltensänderung der Stratifizierung nach Altersgruppen ihrer Modelle bisher überraschend wenig Aufmerksamkeit geschenkt hat (Penny, Bennett & Herbert, 1994) und es an einer Lebensspannenperspektive auf Gesundheitsverhalten mangelt. Außerdem kann nicht nur das Gesundheitsverhalten selbst, sondern auch das Zusammenspiel von kognitiven, emotionalen und sozialen Antezedenzen von Verhaltensänderung als über die Lebensspanne veränderbar angenommen werden (Carstensen, 1995; Ziegelmann & Lippe, 2007).

Das übergeordnete Anliegen der vorliegenden Dissertation ist es, den Prozess der Gesundheitsverhaltensänderung aus einem Blickwinkel der Lebensspannenpsychologie (Sozioemotionale Selektivitätstheorie: Carstensen, 1995; und Strategien der Selektion, Optimierung und Kompensation: SOK, Baltes & Baltes, 1990) zu betrachten, indem psychologische Konzepte im Zentrum stehen sollen, von denen angenommen wird (Siehe Carstensen, 1995), dass ihre Bedeutsamkeit mit dem Alter zunimmt: Nahe, soziale Beziehungen (*Kapitel 2*), eine begrenzter werdende Zukunftsperspektive (*Kapitel 3*) und ein Fokus auf emotionale Bedeutsamkeit (*Kapitel 4*). Anschließend soll der Frage nachgegangen werden, ob sich diese Konzepte (*Kapitel 2-4*) eignen, effektive Interventionsinhalte zur Änderung von Gesundheitsverhalten (zum Beispiel körperliche Aktivität) abzuleiten (*Kapitel 5-6*).

Die Beantwortung der Fragestellungen dieser Dissertation erfolgte im Rahmen eines längsschnittlich-experimentellen Versuchsaufbaus¹ zur Förderung von Motivations- und Selbstregulationsmechanismen, die der Steigerung der körperlichen Aktivität bei älteren Menschen dienen sollen. Der Fokus lag auf der Integration lebensspannen- und gesundheitspsychologischer Ansätze. An der Fragebogenstudie nahmen 386 Probanden in Alter von 60 bis 95 Jahren über einen Zeitraum von zwölf Monaten und vier Messzeitpunkten (Ausgangsmessung, einen, sechs und zwölf Monate später) teil. Bei den Interventionsmaterialien handelte es sich um aktiv auszufüllende Broschüren. Die Probanden wurden einer von zwei Versuchsbedingungen randomisiert zugewiesen: Einer Gesundheitsförderungsbedingung mit Elementen zur Steigerung der Selbstwirksamkeit und der Handlungsplanung *oder* einer Lebensspannenbedingung, welche zusätzlich zu Selbstwirksamkeit und Handlungsplanung noch lebensspannenpsychologische Komponenten erhielt. Diese waren aus psychologischen Lebensspannentheorien – der sozioemotionalen Selektivitätstheorie (Carstensen, 1995: soziale, gegenwartsbezogene und emotionale Aspekte körperlicher Aktivität) und der Theorie der Selektion, Optimierung und Kompensation (SOK-Strategietraining, Freund & Baltes, 2007) – abgeleitet.

Die empirischen *Kapitel 2-6* können wie folgt zusammengefasst werden:

Kapitel 2 unterscheidet im Zusammenhang einer Intervention zur Förderung körperlicher Aktivität im Alter drei Partnerstatusgruppen, welche als Indikatoren für die soziale Integration dienen sollen. Es wurde angenommen, dass Personen, deren Partner ebenfalls an der Intervention teilnahmen – verglichen mit Personen, deren Partner nicht an der Intervention teilnahmen und Personen, die keinen Partner hatten (zum Beispiel ledige oder

¹ Diese Dissertation wurde im Rahmen des Projektes „FLARE-BSA: Fostering Lifelong Autonomy and Resources in Europe: Behaviour and Successful Aging (Förderung lebenslanger Autonomie und Ressourcen in Europa: Verhalten und erfolgreiches Altern“ (Project ID 01ET0801), welches vom Bundesministerium für Bildung und Forschung gefördert wurde, gefertigt. Paul Gellert wurde von der Robert Bosch-Stiftung und ihrem Graduiertenkolleg „Multimorbidität im Alter“ gefördert.

verwitwete Personen) – stärker von der Aktivitätsförderungsintervention profitieren würden. In einem nächsten Schritt wurde die Vorhersage des Ausmaßes an körperlicher Aktivität durch die erhaltene aktivitätsbezogene, soziale Unterstützung, separat für die drei Partnerstatusgruppen, untersucht. Es konnte gezeigt werden, dass diejenigen Personen mit einem ebenfalls teilnehmenden Partner, verglichen mit den anderen beiden Partnerstatusgruppen, am stärksten von der Intervention hinsichtlich ihrer körperlichen Aktivität profitierten. Außerdem war die erhaltene körperliche, aktivitätsbezogene Unterstützung bei Paaren, die gemeinsam an der Intervention teilnahmen, positiv mit der körperlichen Aktivität assoziiert, während dieser Zusammenhang negativ für Personen ausfiel, deren Partner nicht teilnahmen oder die keinen Partner hatten. Der positive Zusammenhang von sozialer Unterstützung und körperlicher Aktivität bei Paaren, die gemeinsam teilnahmen, könnte durch gemeinsame Aktivitäten oder Zusatzeffekte durch wechselseitige Unterstützung erklärt werden. Der negative Zusammenhang von Unterstützung und Aktivität bei Personen, deren Partner nicht teilnahmen, und bei Personen, die alleinstehend waren, könnte mit ungebeter Unterstützung erklärt werden. Diese kann bei Personen Reaktanz erzeugen und als soziale Kontrolle aufgefasst werden.

Das Anliegen in *Kapitel 3* war es zu untersuchen, inwiefern die Intentions-Planungs-Verhaltenskette (Mediation) durch die Zukunftsperspektive moderiert wird. Die eigene Zukunft als begrenzt wahrzunehmen, könnte eine motivationale Barriere darstellen und Intentionen könnten schwerer in Gesundheitsverhalten umgesetzt werden. Selbstregulatives Handlungsplanen könnte in diesem Kontext als kompensatorische Strategie für Personen mit begrenzter Zukunftsperspektive verstanden werden. Es konnte gezeigt werden, dass Planung den Intentions-Verhaltens-Zusammenhang mediiert. Die Zukunftsperspektive fungierte als Moderator in der Hinsicht, dass für Personen mit einer begrenzten Zukunftsperspektive jede Zunahme im Ausmaß an Planung mit einem stärkeren Zuwachs im Ausmaß körperlicher Aktivität einherging, als dies bei Personen mit offener Zukunftsperspektive der Fall war.

Diese Befunde untermauernd, konnte dasselbe Muster auch für Obst- und Gemüsekonsum repliziert werden. Diese Ergebnisse könnten so interpretiert werden, dass gerade bei Personen mit motivationalen Defiziten durch eine begrenzte Zukunftsperspektive selbstregulative Handlungsplanung diesen Defiziten kompensatorisch entgegenwirkt und die Wahrscheinlichkeit der Handlungsausführung steigt.

In *Kapitel 4* wurde die angenommene relative Bedeutsamkeit von emotionalen (z. B. Freude an körperlicher Aktivität) versus gesundheitsbezogenen (zum Beispiel gesünder durch körperliche Aktivität) Handlungsergebniserwartungen im Alter in der Vorhersage der Intention und der körperlichen Aktivität (direkte und indirekte Pfade über die Intention auf körperliche Aktivität) untersucht. Im Rahmen von Banduras Sozial-Kognitiver Theorie (Bandura, 1997) ergaben sich direkte Effekte von den emotionalen, nicht jedoch von gesundheitsbezogenen Handlungsergebniserwartungen auf Intention und Verhalten. Außerdem war der indirekte Effekt von Selbstwirksamkeit über die emotionalen Ergebniserwartungen auf die körperliche Aktivität signifikant, während es keine signifikante Mediation über die gesundheitsbezogenen Ergebniserwartungen gab. Diese Ergebnisse unterstreichen die relative Bedeutsamkeit von Erwartungen emotionaler Gewinne durch Aktivität im Alter und machen deutlich, dass eine Unterteilung nach Facetten von Handlungsergebniserwartungen sinnvoll sein kann.

Kapitel 5 und *6* prüfen in einem längsschnittlich-experimentellen Design, inwiefern eine Lebensspannen-Interventionsbedingung (Planungs- und Selbstwirksamkeitskomponenten ergänzt um soziale, temporale und emotionale Ergebniserwartungskomponenten, siehe *Kapitel 2-4*) einer herkömmlichen Gesundheitsförderungsbedingung (nur Planungs- und Selbstwirksamkeitskomponenten) überlegen ist.

Der Fokus von *Kapitel 5* liegt auf den Veränderungen der körperlichen Aktivität über die Zeit in den beiden Interventionsbedingungen. Für die körperliche Aktivität von sechs auf

zwölf Monate nach der Ausgangsmessung, wiesen Personen in der Lebensspannenbedingung signifikant bessere Veränderungswerte auf, verglichen mit Personen in der Standardbedingung. Für die Veränderung von der Ausgangsmessung auf sechs Monate später konnte dieser Effekt nicht gezeigt werden. Darüber hinaus ergab sich eine Interaktion aus Ausgangswert und Interventionsbedingung: Höhere Ausgangswerte bei der körperlichen Aktivität waren mit geringerer Steigerung der körperlichen Aktivität durch die Intervention verbunden. Dieser ungünstige Effekt war jedoch in der Lebensspannen-Interventionsbedingung schwächer ausgeprägt. Personen in dieser Bedingung konnten auch mit höheren Ausgangswerten eher von der Intervention profitieren. Die zusätzliche Wirksamkeit der Lebensspannenintervention gibt erste Hinweise darauf, dass es sinnvoll scheint, auch lebensspannenpsychologische Konzepte zur Interventionskonzipierung heranzuziehen, gerade bei der Entwicklung von Intervention für ältere Menschen.

In *Kapitel 6*, dem letzten empirischen Kapitel, geht es darum, den gezeigten Interventionseffekt durch die Interventionsbedingungszugehörigkeit über die angenommenen Wirkmechanismen (Mediatoren) auf die körperliche Aktivität zu erklären. Die Strategien der Selektion, Optimierung und Kompensation (SOC: Freund & Baltes, 2007) und die Zukunftsperspektive aus der Sozioemotionalen Selektivitätstheorie (Carstensen, 1995), welche als potentielle Mediatoren fungierten, konnten das Ausmaß an körperlicher Aktivität zwölf Monate nach der Ausgangsmessung signifikant vorhersagen, nicht jedoch den Effekt der Interventionsbedingung auf die körperliche Aktivität mediiieren. Da die Wirksamkeit der Intervention gezeigt werden konnte, die mutmaßlichen Mediatoren aber nicht ansprachen, bleibt die Passung von Lebensspannentheorie und abgeleiteten Interventionsinhalten ein offenes Forschungsthema.

Ziel dieser Dissertation war es, einen Beitrag zum Verständnis von Prozessen, die zur Gesundheitsverhaltensänderung führen, zu leisten, indem diese um eine

Lebensspannenperspektive ergänzt wurden. Besonders in der Forschung unterrepräsentierte Aspekte der Verhaltensänderung, welche von Lebensspannentheorien abgedeckt werden, sollten dabei mehr Aufmerksamkeit erfahren. Dies konnte für interpersonale, zeitlich-unmittelbare und emotionale Aspekte gezeigt werden, die nach der sozioemotionalen Selektivitätstheorie (Carstensen, 1995) im Alter an Bedeutung gewinnen.

Zukünftige Forschung sollte sich diesen Aspekten separat und in Kombination widmen und speziell der Frage nachgehen, wie diese für die Entwicklung von effektiven Interventionen genutzt werden könnten. Darüber hinaus sollten die angenommenen Veränderungen über die Lebensspanne, die in der vorliegenden Dissertation den Ausschnitt der Gruppe älterer Menschen umfasste, auf andere Altersgruppen ausgeweitet werden oder sogar die intraindividuelle Veränderung über Lebensphasen hinweg abbilden.

Um in der Praxis die Passung von Intervention und Personen zu verbessern, bietet sich die Stratifizierung der Intervention nach Altersklassen oder den damit assoziierten psychischen Veränderungen in der Ziel- und Wertestruktur über die Lebensspanne an. Dadurch können sowohl Adhärenz als auch Effektivität von Interventionen verbessert werden, was individuellem Wohlbefinden, aber auch gesellschaftlichen Bedürfnissen entspricht.

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Chapter 1

Introduction

A Lifespan Perspective on Health Behaviour Change: Temporal, Emotional, and Social Aspects in Promoting Physical Activity in Older Adults

Chapter 1 – Introduction

The "Global Recommendations on Physical Activity for Health" by the World Health Organisation (WHO, 2006) differentiate between the age groups 5–17 years old, 18–64 years old, and 65 years old and above. Given this important recommendation to make a distinction between age groups, surprisingly little attention within the psychology of health behaviour change was given by stratifying behaviour change models over age groups (Penny, Bennett & Herbert, 1994) and thereby adding a lifespan perspective. And not only the behaviour itself, but also the interplay of cognitive, emotional, and social antecedents of behavioural change can vary over age groups as well (Carstensen, 1995; Ziegelmann & Lippke, 2007). The overall aim of this dissertation was to take a lifespan view on the process of health behaviour change by considering psychological concepts that are assumed to gain importance with increasing age: A more limited time perspective, a focus on emotional meaning, and close social relationships.

In this introductory *chapter 1*, the theoretical superstructure of this dissertation is outlined to set the rationale for the research questions investigated in the following empirical *chapters 2 to 6*.

Health Behaviour Change: Current Status

Tracking the development of theories of health behaviour change, a progress from models that focus on health beliefs only to models including self-regulatory strategies (Norman, Abraham & Conner, 2000) can be seen.

Social cognitive models of health behaviour change postulate patterns of psychological factors (e.g. intentions, self-efficacy beliefs, outcome expectancies) that may improve motivation and, thus, eventually lead to sustained behaviour change (Schwarzer & Luszczynska, 2008). The most prominent approaches of this kind are the theory of planned behaviour, social cognitive theory, and protection motivation theory (for an overview, see Armitage & Conner, 2000). Within these models, intention, namely choosing or accepting a goal or standard, is central determinant of behaviour change. In more recent investigations, beyond setting a goal (intention formation) self-regulatory strategies are supposed to facilitate goal attainment, in particular when goal striving is confronted with implemental problems (e.g., temptations, and competing goals, Gollwitzer, 1999; Gollwitzer & Oettingen, 2011; Sniehotta, Scholz & Schwarzer, 2005). Such self-regulatory strategies can take the form of making plans (Gollwitzer, 1999), volitional shielding of intentions (Göhner, Seelig & Fuchs, 2009), or self-monitoring (Sniehotta, Nagy, Scholz & Schwarzer, 2006) and can help transforming intentions into behaviour. Prominent health behaviour change models that include self-regulation are transtheoretical model (Prochaska et al., 2009), health action process approach (Schwarzer & Luszczynska, 2008), and self-regulation theory (Carver, Scheier, Boekaerts, Pintrich & Zeidner, 2000).

Findings from 83 experimental studies ($N = 6,773$) on different behavioural domains showed a medium-to-large effect size $d = 0.65$ of self-regulatory planning (Gollwitzer & Sheeran, 2006) and of planning within the health behaviour domain $d = 0.59$. In a meta-

regression of physical activity and healthy eating intervention studies (122 evaluations, $N = 44,747$) Michie, Abraham, Whittington, McAteer, and Gupta (2009) have shown that self-monitoring as a self-regulatory strategy explained the greatest amount of among-study heterogeneity (13%). Interventions that combined self-monitoring with at least one other technique derived from control theory were significantly more effective than the other interventions ($d = 0.42$ vs. 0.26).

The theoretical progress by adding self-regulatory mechanisms to the health behaviour change process is undisputed. Nevertheless, and also given the principle of parsimony (Rhodes, Plotnikoff & Spence, 2004), many issues remain understudied or out of focus on current health behaviour change research. So there is still a need for alternative models that better represent our observed world (Rhodes et al., 2004).

Unconsidered Aspects

The predominant focus of belief-based social-cognitive models complemented by self-regulation can inform interventions and lead to partially impressive effects (e.g., Armitage & Conner, 2001; Gollwitzer & Sheeran, 2006; Michie et al., 2009). Nevertheless, there is room for improvement and many facets that influence human behaviour are not appropriately considered. In most social-cognitive models there is little explicit consideration of emotional factors and emotion-regulation (Aspinwall, 1998; Diamond & Aspinwall, 2003), environmental (Dawson, Hillsdon, Boiler & Foster, 2007) and interindividual influences (Knoll, Burkert & Schwarzer, 2006), or temporal factors (Kahana, Kahana & Zhang, 2005). Finally, most social-cognitive theories lack in terms of an appropriate representation of life course dynamics (Carstensen, 1995; Lang & Carstensen, 2002). As they are generic in terms of age or age group, the predictors or prediction pattern assumed in theoretical models were not assumed to change over life time, or to put it another way, there is no lifespan perspective included. Although factors such as emotions, social influences, or contexts are mentioned in

behaviour change techniques schemes (Michie & Prestwich, 2010), they are rarely embedded explicitly in the models of health behaviour change.

Overcoming the Unconsidered Aspects: Introduction of a Lifespan Perspective

As most theories of health behaviour change are lacking not only a lifespan perspective, but also a number of potentially important other facets that lead human behaviour and goal striving, adding these lifespan theoretical concepts could give valuable insights in the process of behaviour change. Socioemotional selectivity theory (Carstensen, 1995) not only has an explicit assumption on changes of goals and resources throughout the life course, it also has a focus of concepts of social network preferences, time orientation, and emotion-regulation that could inform both, development of health behaviour change theories and effective interventions.

Goal priority as a function of time perspective: Socioemotional selectivity.

The selection of goals is a motivational antecedent of behaviour change. Socioemotional selectivity theory (Carstensen, 1995) assumes that future time perspective, as the representation of perceived extension of the personal future and goal-directed possibilities in this future, is an essential motivational factor influencing goal selection and subsequently behaviour itself. According to socioemotional selectivity theory (Carstensen, 1995; Carstensen et al., 2010), individuals are guided by the same essential set of goals throughout life, such as seeking novelty, feeling needed, and expanding one's horizons. However, *the relative priority of these different sets of goals changes as a function of perceived time left in life* (see Figure 1, Löckenhoff & Carstensen, 2004) and leads to the (re)organization of goal hierarchies and goal setting and striving.

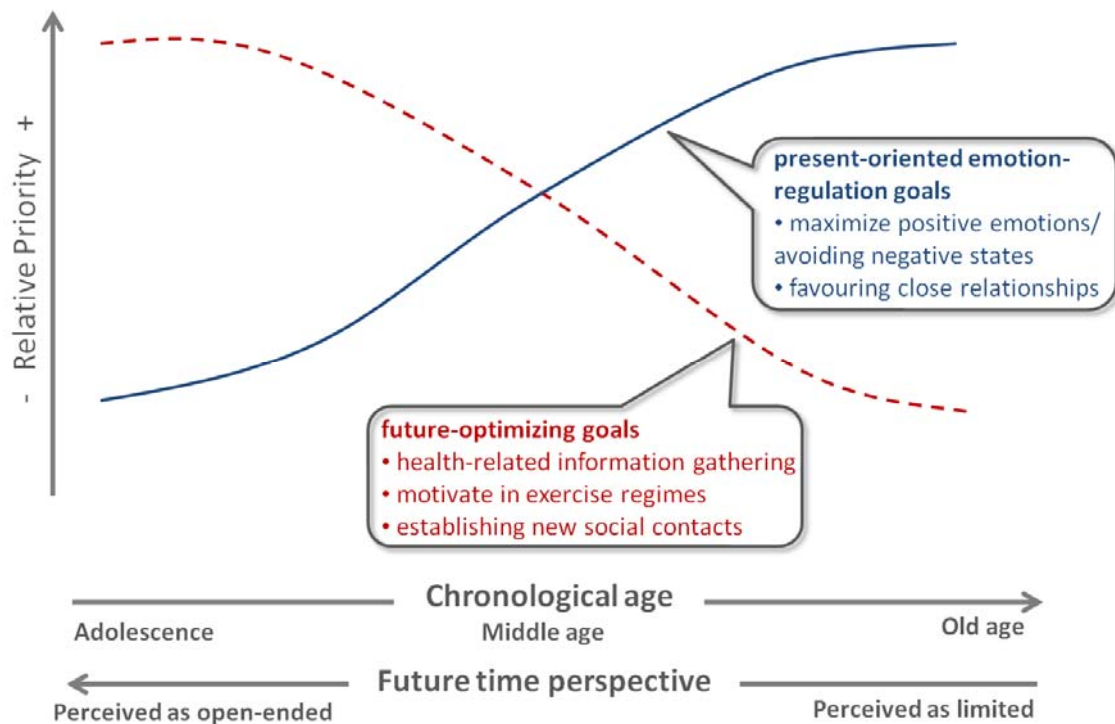


Figure 1. Two sets of goals and their relative priority within the life course assumed by socioemotional selectivity theory (Carstensen, 1995).

Following the assumptions of socioemotional selectivity theory (Löckenhoff & Carstensen, 2004), with increasing age, perceived limitations on time (*future time perspective*) lead to changes in goal hierarchies such that goals related to deriving *emotional meaning* from life are prioritized over goals that maximize long-term payoffs in the far future (see Table 1). These qualitative changes in emotional experience in the face of endings and limitations in time perspective also result in increasingly selective social partner choices and engagement in smaller, but more *emotionally meaningful close relationships* and social networks (Carstensen, Isaacowitz & Charles, 1999). It should be stressed that future time perspective, not chronological age, drives these changes in adulthood (Löckenhoff & Carstensen, 2004).

Table 1

Three main topics within socioemotional selectivity theory that are salient for older adults

- Limited future time perspective
- High priority of emotionally meaningful goals and emotion regulation
- Emotionally meaningful and close social relationships

The focus on emotionally meaningful gratification in those individuals with a more limited future time perspective can bias attention and memory in favour of stimuli that optimize emotion-regulation which is called the *positivity effect* (Carstensen & Mikels, 2005). This shift of goal focus influences health-related information seeking, decision making (Löckenhoff & Carstensen, 2008; Mikels et al., 2010), and health behaviour, such as physical activity (Ziegelmann, Lippke & Schwarzer, 2006b). The positivity effect explains why older adults are likely to focus more on intervention material that is emotionally meaningful (i.e., dealing with positive emotions of physical exercise) rather than on standard health behaviour change messages (i.e., optimizing long term health outcomes), which in turn might lead to desired motivational shifts in terms of health behaviour under study (Löckenhoff & Carstensen, 2007). Older adults prefer a representation of goals in terms of the means (e.g., enjoying exercise: process focus) rather than on the associated outcomes (e.g., weight control: outcome focus) shown by Freund, Hennecke, and Riediger (2010). Using intervention material that is framed in terms of emotional gains or that highlights emotional short-term advantages of exercise could be used as promising ingredients of the intervention.

Rising to the challenges of ageing: Selection, optimization, and compensation.

The lifespan psychological *model of selection, optimization, and compensation* conceptualized as a meta-model of general developmental processes (SOC: Baltes & Baltes,

1990). The action-theoretical conceptualization of the SOC model (Freund, 2008; Freund & Baltes, 2007) spells out the following four self-management strategies for pursuing and maintaining personally relevant goals (e.g., the goal to adopt and maintain a physically active lifestyle): (1) elective selection (i.e., developing and committing to a hierarchy of personal goals); (2) optimization (i.e., engaging in goal-directed actions and means); (3) loss-based selection (i.e., changes in the goal or the goal system in response to loss); (4) compensation (i.e., acquisition and use of means in response to loss). SOC theory has a high potential to contribute to the design of health promotion interventions as shown in a study by Ziegelmann and Lippke (2007). The SOC theory can be used to design prompts for goal formation and selection processes (elective selection); or to support the reconstruction of the goal hierarchy in a behaviour-directed manner (elective selection). In addition, SOC theory spells out strategies that help to invest more effort in the selected health behavioural goals (optimization). In the case of blocked goals, the SOC theory spells out various instances for the strategies of compensation (e.g., modeling others who compensate) and loss-based selection (e.g., reconstruction of the goal hierarchy), which can be trained in interventions.

Towards Lifespan Health Behaviour Change

The interaction of health, behaviour, and ageing (Figure 2) can be seen as the intersection of lifespan psychology and health psychology (Siegler, 1990).

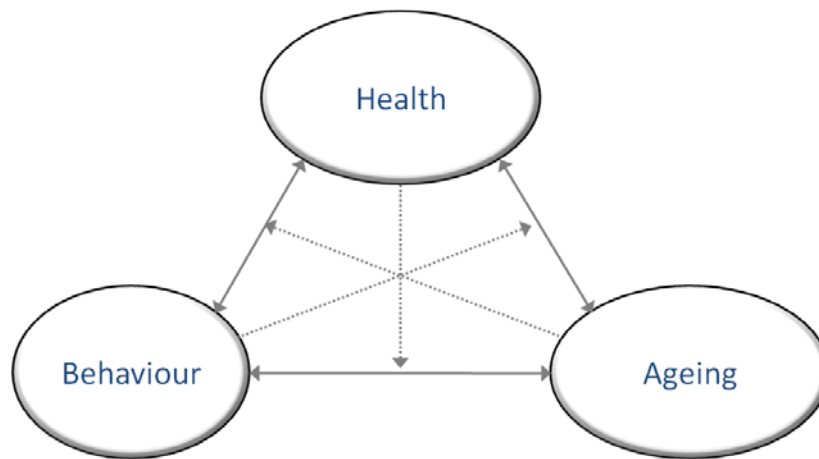


Figure 2. The theoretical relations of health, behaviour, and ageing (source: own diagram).

Although reciprocal influences between lifespan and health psychology seem to be obvious, as for example health and illness are directly linked to ageing, in the past there has, however, been little detection within the field of health psychology of potential contribution of lifespan developmental theories to inform our understanding of issues of health behaviour change (Penny et al., 1994). The other way round, health behaviour change theories are frequently applied to the field of ageing or to older populations (van Stralen, De Vries, Mudde, Bolman & Lechner, 2009), but often the contents are unspecific to the older sample and the theoretical superstructure is not adapted from a general theory to an age-tailored approach. When designing health behaviour change interventions for older age groups it has been shown to be useful to broaden the theoretical focus: An intervention employing a lifespan sample of individuals undergoing orthopedic rehabilitation (Ziegelmann, Lippke & Schwarzer, 2006a) has shown that exercise planning can be embedded in the SOC framework (Ziegelmann, Lippke, & Schwarzer, 2006a). Action theoretical approaches that describe the behavioural processes in terms of motivation (goal setting) and self-regulation (goal striving) are relevant when dealing with health behaviour change across the lifespan (Leventhal, 2002).

Theories of this kind are the theory of selection, optimization and compensation (SOC: Baltes & Baltes, 1990) and socioemotional selectivity theory (Carstensen, 1995).

Physical activity and health in old age.

Health benefits of physical activity for older adults are well documented in terms of reduced mortality (Chakravarty, Hubert, Lingala & Fries, 2008), better functional, physical, and psychosocial health (Hughes et al., 2004; Taylor et al., 2004), more positive affect (Netz, Tenenbaum & Eklund, 2007), reduced risk of falling (Carter, Kannus & Khan, 2001), better health-related quality of life (Motl & McAuley, 2009; Rejeski & Mihalko, 2001), and less cognitive decline (Klusmann et al., 2010). However, despite this evidence, many older adults are not sufficiently active to enjoy these health benefits (Newsom, Kaplan, Huguet & McFarland, 2004). Only 31.5 percent of American adults aged 65 to 74 reported regular leisure-time activity (30 min of light to moderate activity on 5 or more days per week or 20 min of vigorous activity on 3 or more days). Of those aged 75 and older, only 17.6 percent participated in regular physical activity (USDHHS, 2010). A European survey showed that two thirds of the adult population did not reach the recommended physical activity level, which was defined as at least 1 h of moderate intensity on 5 days a week in that study (Cavill, Kahlmeier & Racioppi, 2006). Thus, there is a need for effective interventions to change activity levels.

Interventions to foster physical activity in older adults.

In a meta-analysis including 99,011 participants from 358 studies, Conn, Hafdahl and Mehr (2011) found a moderate mean effect size for comparisons of treatment groups versus control groups of $d = 0.19$ across diverse studies designed to increase physical activity among healthy adults. This effect size is consistent with a mean difference of 496 ambulatory steps per day between treatment and control participants. The effect size from these studies of healthy adults is smaller than the one reported in a study (Conn, Hafdahl, Brown & Brown,

2008) for chronically ill adults ($d = 0.45$). And in a meta-analysis on older adults, Conn, Valentine & Cooper (2002) found an effect size of $d = 0.26$ (43 studies and 33,090 participants), in which interventions targeting disease-specific populations elicited larger activity changes than did interventions not targeting such groups. As interventions designed to increase physical activity found to be modestly effective its components remain largely age-unspecific.

Interventions tailored to age.

Health behaviour change interventions are frequently applied to the field of ageing or to older populations (van Stralen et al., 2009), but often the contents are unspecific to the older sample. One way to deal with age-specific demands across the lifespan was presented by Baltes and Baltes (1990) with their strategies of selection, optimization, and compensation. Using these strategies of successful ageing has been shown to be positively associated with physical activity in a sample of young and middle aged workers (Reuter et al., 2010) and in a sample of young, middle-aged and older adults undergoing orthopedic rehabilitation (Ziegelmann & Lippke, 2007). Another key lifespan assumption arises that with increasing age, goals that foster present-orientated and emotionally gratifying experiences in the here and now win relative priority over sets of long-term goals outlined by socioemotional selectivity theory (positivity effect, Carstensen, 1995; Carstensen & Mikels, 2005). Components framed in terms of emotional gains or highlighting emotional short-term advantages of exercise, could be used as promising ingredients of the intervention. However, interventions that change emotional/ affective beliefs are scarce despite their potential for changing physical activity (Conner, Rhodes, Morris, McEachan & Lawton, 2011).

The derivation of hypotheses and intervention contents from a combination of theories of lifespan psychology and health behaviour change theories and constitutes not only a theoretical advance, but may also have personal and societal implications (Kuhlmey &

Schaeffer, 2009), as the socio-demographic change in an ageing society (Tesch-Römer & Wurm, 2009) has posed challenges for individual well-being as well as for social protection systems, that could be answered best – not by lifespan nor by health psychology – but by lifespan health psychology.

Thus, the present thesis aimed at analysing the interplay of processes of health behaviour change and those concepts, assumed to gain importance over life course (a more limited time perspective, a focus on emotional meaning, and close social relationships) and testing their influences in a randomized controlled trial.

Study and sample for this thesis.

The empirical chapters of this dissertation (i.e., *Chapters 2 to 6*) are based on a comprehensive one year longitudinal study including a randomized intervention¹. This randomized controlled trial aimed at fostering self-regulation and physical activity in the final sample² of $N = 386$ older adults (age range 60-95 years; mean age = 66.6) including two intervention arms (the standard health promotion condition *or* the lifespan condition; see below) and four measurement points in time, at baseline, one month, six months, and twelve months later (see Figure 3). Inclusion criteria were being older than 60 years and not having a medical contraindication to perform physical activity. Participants were recruited via German newspaper announcements, and data collection via mail started in June 2009. Ethical guidelines were followed, and clearance from the ethics committee of the German Psychological Society (DGPs) was obtained.

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² The sample size differs between the chapters according to the time points used for analyses and the analysis procedure (e.g., selection of variables used in analyses, treatment of outliers, inclusion of pilot study data). For more details see the sample description within each of the chapters.

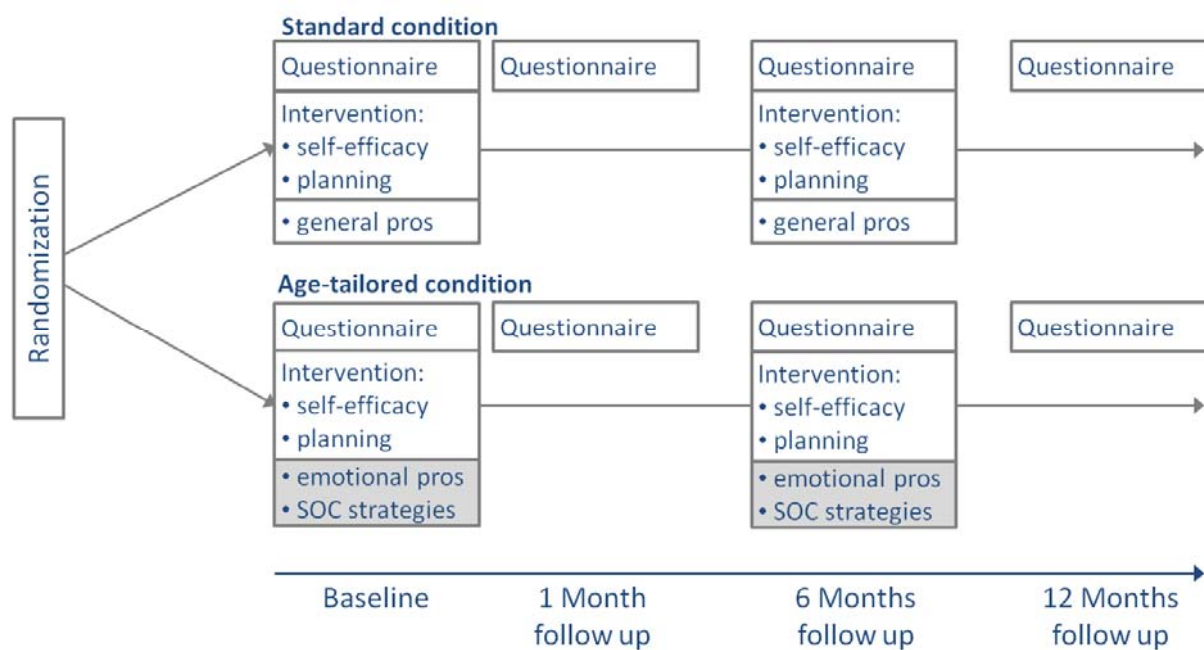


Figure 3. Intervention procedure.

Intervention conditions.

Directly after completing the baseline questionnaire the participants received the intervention material via mail (see Figure 3). At the 6-months follow up booster, intervention material was sent containing similar material as at baseline. Measurement point, twelve months after baseline was the final follow up assessment without intervention material. At baseline and 6 months, participants in both conditions were sent the standard intervention material consisting of *planning* and *self-efficacy* prompting components. Additionally, participants in the age-tailored condition received 1) an age-specific strategy training based on selection, optimization, and compensation theory that paid attention to age-specific demands and barriers to attain and maintain one's activity goals, and they 2) received components that highlight present-orientated, emotion-focused, and social benefits of physical activity, that were assumed to be salient to older adults outlined by socioemotional selectivity theory.

Aim of the Dissertation and Outline of the Chapters

The overall aim of this dissertation is to contribute to the development of health behaviour change theories by adding a lifespan perspective. Especially understudied aspects of the health behaviour change process that can be informed by lifespan theories are in the scope of this dissertation. The first main research question concerns the interplay of behaviour change and concepts that are assumed to gain importance with increasing age (Carstensen, 1995): close social relationships (*Chapter 2*), a more limited time perspective (*Chapter 3*), and a focus on emotional meaning (*Chapter 4*). The second main research question addresses whether these concepts (*Chapter 2-4*) can inform intervention to promote health behaviour (i.e. physical activity) and have additional effects on health behaviour change (*Chapter 5-6*).

The overall structure of the five empirical chapters of this dissertation is as follows: In *Chapter 2* the influence of close relationships on physical activity behaviour is examined by contrasting three social groups according to their partner status and participation status in an intervention. In *Chapter 3* the interplay of future time perspective and self-regulatory planning effort regarding adoption of physical exercise is investigated. *Chapter 4* addresses direct and indirect effects of expectancies towards emotional (or affective) outcomes of physical activity as opposed to cognitive (health-related) ones. Finally *Chapter 5 and 6* are describing the test of the concepts of *Chapter 2* (close relationships), *3* (time perspective) and *4* (expectancies about emotional consequences) in an experimental design, where one intervention condition informed by these concepts is tested against a standard health promotion condition: *Chapter 5* focuses on the longitudinal change in physical activity over time between the two intervention conditions, whereas *Chapter 6* has a look on the mediation mechanisms of that intervention. For an overview of the included measurement points see Table 2.

Table 2

Measurement points and respective chapters.

<i>Chapter</i>	Baseline	1 Month	6 Months	12 Months
2 Close social relationships	x	x		
3 Future time perspective	x	x	x	
4 Expectancies about emotions	x		x	x
5 Intervention effect: Changes	x		x	x
6 Intervention effect: Mediators	x		x	x

Chapter 2 distinguishes three partner status groups, serving as an indicator of social integration in the context of a physical activity intervention. It was hypothesized that individuals whose partner also participated in the intervention, as opposed to individuals whose partners did not participate, or individuals without an intimate partner, would benefit more in terms of their physical activity. In a second step, next to social integration, a differential prediction pattern of exercise-specific received social support on physical activity for each of the three partner status groups was investigated.

The main aim of *Chapter 3* is to examine whether the intention-planning-behaviour chain is moderated by future time perspective: Perceiving one's future time as limited might require high cognitive effort when it comes to translate intentions into behaviours and thereby intensify the mediation of intention via plans into behaviour. Planning may be regarded as a compensatory strategy for those with a limited time perspective.

In *Chapter 4* the aim is to investigate the assumed relative importance of affective versus health-related outcome expectancies in predicting intentions and physical exercise (directly and indirectly via intention) in older adults and highlighting the importance to

separate these facets at a conceptual level to enhance both theory development and health promotion.

Chapter 5 tests in a randomized controlled trial whether an age-tailored intervention was superior in changing physical activity levels in older adults compared to a standard health care intervention. The former included two additional theory-based components, namely age-specific coping strategies and emotion focus that is informed by future time perspective from socioemotional selectivity theory. The focus of *Chapter 5* is on looking at changes in physical activity over time predicted by the intervention condition.

Finally, *Chapter 6* focuses on putative mediators (SOC strategies and future time perspective) translating the RCT intervention into exercise. It was examined whether incorporating lifespan approaches might be useful for health behaviour intervention designs in older adults.

A general discussion of the five empirical chapters is provided in *Chapter 7*, as well as more general conclusions and implications for future research.

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Chapter 2

Physical Activity Intervention in Older Adults: Does a Participating Partner Make a Difference?

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Chapter 3

Future Time Perspective and Health Behaviors: Temporal Framing of Self-Regulatory Processes in Physical Activity and Dietary Behaviors

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Chapter 4

Affective and Health-Related Outcome Expectancies for Physical Activity in Older Adults

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Chapter 5

An Age-Tailored Intervention Sustains Changes in Physical Activity in Older Adults: A Randomized Controlled Trial

Gellert, P., Ziegelmann, J.P., Krupka, S., & Schwarzer, R. (under review). An Age-Tailored Intervention Sustains Changes in Physical Activity in Older Adults: A Randomized Controlled Trial. *Manuscript submitted for publication*

Chapter 6

An Age-Tailored Intervention and its Potential

Mediators:

Time Perspective and Strategies of Selection,

Optimization, and Compensation

Gellert, P., Ziegelmann, J.P., & Schwarzer, R. (under review). An Age-Tailored Intervention and its Potential Mediators: Time Perspective and Strategies of Selection, Optimization, and Compensation. *Manuscript submitted for publication.*

Chapter 7

General Discussion

The overall aim of this dissertation was to contribute to the development of health behaviour change theories and interventions by adding a lifespan perspective (Socioemotional selectivity theory by Carstensen, 1995; and Strategies of selection, optimization, and compensation: SOC by Baltes and Baltes, 1990). Especially understudied aspects of the health behaviour change process (e.g., temporal, social, and emotional aspects) that can be informed by lifespan theories were in the scope of this dissertation. The first main research question concerns the interplay of behaviour change and concepts that are assumed to gain importance with increasing age (see Carstensen, 1995): close social relationships (*Chapter 2*), a more limited time perspective (*Chapter 3*), and a focus on emotional meaning (*Chapter 4*). The second main research question addressed whether these concepts (*Chapter 2-4*) can inform interventions to promote health behaviours (i.e. physical activity) and have additional effects on health behaviour change (*Chapter 5-6*). A summary of dissertation aims, findings, and conclusions can be found in Table 1.

General Discussion

This general discussion integrates the findings of the empirical chapters into a more global lifespan view on health behaviour change, but also further elaborates aspects of the specific discussions of the different chapters. *Chapters 2-4* will be discussed separately, followed by an integrated discussion of these chapters, and after that *Chapters 5-6* which aimed to experimentally test the aspects of *Chapters 2-4* will be discussed. This is followed by a reflection of the strengths and limitations of this study. At the end of the chapter an outlook on possible future research and suggestions for practical implications is provided.

Table 1. *Summary of dissertation aims, findings, and conclusions*

Aims	Findings	Conclusions
<p><i>Chapter 2</i> distinguishes three partner status groups, serving as an indicator of <i>social integration</i> in the context of a physical activity intervention. It was hypothesized that individuals whose partner also participated in the intervention, as opposed to individuals whose partners did not participate, or individuals without an intimate partner, would benefit more in terms of their physical activity. In a second step, next to social integration, a differential prediction pattern of <i>social support</i> on physical activity for each of the three partner status groups was investigated.</p>	<p>In participants whose partners took part in the intervention, physical activity increased substantially more over time, than it did in those individuals whose partners were not involved in the intervention, and in singles. Social support was positively related to physical activity when couples participated together in the intervention, but it was negatively related in singles or when partners did not participate.</p>	<p>Social support appeared to be beneficial for physical activity in older adults when both partners participated in the intervention, which might reflect joint exercise or reciprocal exercise support. Singles or those with non-participating partners were not only less active, they might also have been impeded by misguided support that could be perceived as social control.</p>
<p><i>Chapter 3</i> examine whether the intention-planning-behaviour chain is moderated by future time perspective: Perceiving one's future time as limited might require high cognitive effort when it comes to translate intentions into behaviours and thereby intensify the mediation of intention via plans into behaviour. Planning may be regarded as a compensatory strategy for those with a limited time perspective.</p>	<p>Planning mediated between intentions and physical exercise. Time perspective operated as a moderator, indicating that in individuals with a more limited time perspective a stronger effect of planning on physical exercise emerged. Strengthening the proposition of the findings, the results in exercise behaviour could be replicated in fruit and vegetable intake.</p>	<p>Age-related changes in goal priorities (not age per se) seem to explain age-related changes in health behaviours. Especially in persons with a limited future time perspective, planning as a self-regulatory strategy could compensate for the motivational deficits.</p>
<p><i>Chapter 4</i> the aim is to investigate the assumed relative importance of affective versus health-related outcome expectancies in predicting intentions and physical exercise (directly and indirectly via intention) in older adults and highlighting the importance to separate these facets at a conceptual level to enhance both theory development and health promotion.</p>	<p>Within the framework of Bandura's social cognitive theory, there was a direct effect from affective, but not from health-related outcome expectancy on intentions and behaviour. Also, the indirect effect from self-efficacy on physical exercise via affective outcome expectancy was significant, whereas the mediation via health-related outcome expectancy was not.</p>	<p>These findings emphasize the relative importance of affective versus health-related outcome expectancies in predicting intentions and physical exercise in older adults and highlight the importance to separate these facets at a conceptual level to enhance both theory development and health promotion.</p>
<p><i>Chapter 5</i> tests in a randomized controlled trial whether an age-tailored intervention was superior in changing physical activity levels in older adults compared to a standard health care intervention. The former included two additional theory-based components, namely age-specific coping strategies and emotion focus, that is informed by future time perspective from socioemotional selectivity theory. The focus of Chapter 5 is on looking to changes in physical activity over time predicted by the intervention condition.</p>	<p>Intervention condition predicted latent physical activity change from six-months to twelve-month follow up, but not from baseline to six-month follow up, controlling for gender, age, and physical and mental health. Furthermore, a baseline by treatment interaction emerged: Higher baseline values in physical activity were associated with less positive change in activity from baseline to six months later, whereas participation in the age-tailored condition could buffer this adverse effect.</p>	<p>The results imply that there is a need for effective interventions to change physical activity especially in old age, interventions should be also designed in an age-sensitive manner for this target population. To optimize the fit between intentions and participants, tailored interventions according to age-associated changes in goal structure of the participants could lead to better adherence, and stronger intervention effects, also in the long run.</p>
<p><i>Chapter 6</i> focuses on putative mediators (SOC strategies and future time perspective) translating the RCT intervention into exercise. It was examined whether incorporating life span approaches might be useful for health behaviour intervention designs in older adults.</p>	<p>At twelve-month follow up, the age-tailored (SOC strategies and future time perspective) intervention led to higher exercise levels compared to a standard condition. SOC strategies and future time perspective predicted physical exercise at twelve-month follow up, but did not mediate.</p>	<p>Incorporating life span approaches might be useful for health behaviour intervention designs in older adults. Further endeavour should be made to identify the most active lifespan psychological ingredients via mediation analyses.</p>

Socioemotional Selectivity Theory in Health Behaviour Change (*Chapter 2-4*)

According to the major assumption of socioemotional selectivity theory (Carstensen, 1995; Löckenhoff & Carstensen, 2004), with increasing age, *future time perspective becomes limited*, thereby *close social relationships* and focus on *emotionally benefits and meaning* gains relative importance over goals to optimize the long-term future. *Chapters 2-4* address the issues mentioned in socioemotional selectivity theory within the context of health behaviour change. First the empirical *Chapters 2-4* of this dissertation (close social relationships: *Chapter 2*, a more limited time perspective: *Chapter 3*, and a focus on emotional meaning: *Chapter 4*) will be discussed separately, followed by integrated discussion.

Chapter 2: Preference of close social relationships.

Chapter 2 distinguishes three partner status groups, serving as an indicator of social integration in the context of a physical activity intervention. It was hypothesized that individuals whose partner also participated in the intervention, as opposed to individuals whose partners did not participate, or individuals without an intimate partner, would benefit more in terms of their physical activity. In a second step, next to social integration, a differential prediction pattern of exercise-specific received social support on physical activity for each of the three partner status groups was investigated. Two main findings emerged: a differential mean level change in physical activity and an interactive prediction pattern. It turned out that individuals whose partner also participated in the intervention attained higher levels of physical activity after the intervention, as compared to singles and individuals whose partners did not participate. The second main finding was the prediction of physical activity levels within each group through levels of social support. As hypothesized, higher social support was associated with more physical activity in the subsample of respondents whose

partners also participated. This effect might be due to reciprocal social support for being physically active or social modeling mechanisms assumed in the social cognitive theory (Bandura, 1997). However, it was surprising that in the other two groups (i.e., singles and those whose partners did not participate) a negative association between social support and physical activity emerged. The more participants reported to receive exercise support, the less they were physically active in those two groups. This might be interpreted as misguided or mismatched support, as these participants might have felt controlled, pressured or overprotected instead of encouraged by their social network (van Dam et al., 2005). This is in line with research on unrequested help undermining self-esteem (Warner, Schüz, Wurm, Ziegelmann & Tesch-Römer, 2010) and posing threats to autonomy (Warner et al., 2011; Williams et al., 2006), which is a topic of particular relevance in older adults (M. M. Baltes, Neumann & Zank, 1994).

Chapter 3: Limited future time perspective.

The aim of *Chapter 3* is to examine whether the intention-planning-behaviour chain is moderated by future time perspective: Perceiving one's future time as limited might require high cognitive effort when it comes to translate intentions into behaviours and thereby intensify the mediation of intention via plans into behaviour. Planning may be regarded as a compensatory strategy for those with a limited time perspective. In line with our hypotheses the interaction between future time perspective and planning on subsequent behaviour occurred in the expected direction. Planning appears to be an especially important mediator of the intention-behaviour relation for people with limited future time perspective. The more people perceive their future as being constrained, the stronger becomes the relationship between planning and behavior. Planning seems to operate as a compensatory strategy: It has been shown in previous studies that formation of plans can be a useful strategy to adopt and maintain a behaviour, especially when deficits occur, such as in executive functioning,

attention, or cognitive self-control (see Webb & Sheeran, 2010). In the context of physical exercise, Ziegelmann, Lippke, and Schwarzer (2006) demonstrated the compensatory role of planning.

Chapter 4: Preference for emotional meaning and emotional benefits.

In *Chapter 4* the aim is to investigate the assumed relative importance of affective versus health-related outcome expectancies in predicting intentions and physical exercise in older adults. The preference for expected emotional benefits of physical exercise (affective outcome expectancy, e.g. enjoying exercise itself) was investigated. It showed to be a stronger predictor of physical exercise six months later (direct and indirect via intentions), compared to health-related outcome expectancy (e.g. health benefits as an expected result of regular physical activity). These results emphasize the relative importance of affective versus health-related outcome expectancies in predicting intentions and physical exercise in older adults, which is in line with a number of studies (e.g., Conner et al., 2011; Kraft, Rise, Sutton, & Røsbjerg, 2005; Lawton et al., 2009). Kraft et al. (2005) found in a study on physical exercise that affective outcome expectancy played a more important role in the intention formation process than did health-related outcome expectancy next to other control beliefs. Lawton et al. (2009) found that there was no direct effect of affective outcome expectancy on physical exercise when intention was included into the model, which was unexpected, as an effect of affective outcome expectancy was hypothesized by the authors and was found for other behaviours in that study. In contrast to Lawton et al. (2009), our results showed a direct effect (not via intention) of affective outcome expectancy as it is also assumed in the social cognitive model. Affective outcome expectancy was the strongest direct predictor of physical exercise, and intention was a significant direct predictor, too. Conner et al. (2011) showed in an experimental design that affective framed messages consistently produced greater

increases in physical exercise than the health-related and the control conditions, which underscores the fact that exercise is driven by affective expectations or at least by affective cues.

Integrated discussion of Chapter 2-4: Social, temporal, and emotional priorities in old age.

Chapters 2-4 have shown that major concepts of socioemotional selectivity theory (assumptions about social, temporal, and emotional priorities in old age) can modulate the way that cognitive antecedents of behaviour (e.g. intention or planning processes) are related to the subsequent health behaviour. A participating intimate partner (Chapter 2) and a focus on expected emotional outcomes of physical activity (Chapter 4) seem to be important vehicles in turning interventions into behaviour change outcomes, especially in the age group of older adults. Charles and Carstensen (2010) argue that both, social *and* emotional life, does change as the consequence of a limited time perspective in old age: Social networks narrow, experienced emotions are more predictable and less labile, while negative emotions become more infrequent, social roles change quantitatively and qualitatively, and finally, investments in meaningful relationships increase (Charles & Carstensen, 2010). But the pathways to possible health-protective effects of living in close relationships might also go via transmission of negative emotions (e.g. depressive symptoms, Knoll, Schwarzer, Pfüller & Kienle, 2009) or affects and well-being (Knoll, Kienle, Bauer, Pfüller & Luszczynska, 2007).

The results of this dissertation support the assumption of socioemotional selectivity theory (Carstensen, 1995; Löckenhoff & Carstensen, 2007) within the context of behaviour change that three concepts gain importance with increasing age: Importance of close relationships (*Chapter 2*), a limited time perspective (*Chapter 3*), and emotional meaning (*Chapter 4*). The results of *Chapter 3* also favour the explanation that future time perspective, not chronological age, drives the motivational changes in adulthood: The effect of age on

health behaviour was mediated by time perspective. The findings of Fung and Carstensen (2004) also suggest that perceived endings and perceived constraints on future-oriented goals (two facets of the future time perspective) both increase preferences for emotionally close social partners, thus signifying an emphasis on emotionally meaningful goals. These findings support theories premised on evidence that age-related losses lead to goal changes across the life course (e.g., P. B. Baltes & Baltes, 1990; Brandtstädter & Rothermund, 1994), as well as socioemotional selectivity theory.

The discussed findings support assumptions from socioemotional selectivity theory in the context of health behaviour change process (Shamaskin, Mikels & Reed, 2010), that close social relationships (*Chapter 2*), a more limited time perspective (*Chapter 3*), and a focus on emotional meaning (*Chapter 4*) are important motivational antecedents of health behaviour change. As *Chapter 2-4* gave support on a correlational level of analysis, *Chapter 5-6* goes one step further by using experimental design.

Testing the Components Informed by Socioemotional Selectivity Theory within an Experimental Design (*Chapter 5-6*)

A step further, *Chapter 5-6* addressed the research question whether these concepts (*Chapter 2-4*: Social, temporal, and emotional priorities in old age) can inform intervention to promote health behaviour (i.e. physical activity) and have additional intervention effects on health behaviour change.

In *Chapter 5* in terms of the intervention effect of an lifespan intervention informed by lifespan approaches (socioemotional selectivity theory and SOC theory: Carstensen, 1995;

Freund & Baltes, 2007) versus a standard health promotion intervention there was no difference between the conditions from baseline to 6 months later. But from 6 months to 12 months after baseline there was an effect of the intervention condition on the physical activity change, indicating that individuals in the lifespan condition (tailored to the age group) were superior in changing their activity, as compared to the controls (standard condition). The standard intervention material consisting of *planning* and *self-efficacy* prompting components in a leaflet sent via mail directly after baseline and after 6 months questionnaire. Additionally, participants in the lifespan condition received an age-specific strategy training based on selection, optimization and compensation theory, and received material with present-orientation and emotional focus. Additionally the lifespan intervention condition included 1) a strategy training that paid attention to age-specific demands and barriers to attain and maintain one's activity goals and 2) components that highlight present-orientated and emotion-focused benefits of physical activity, that were salient to older adults. This also implies that the lifespan components have an additional effect over the combined planning and self-efficacy components. Conn, Hafdahl, and Mehr (2011) found in a meta-analysis of 358 studies an effect size for comparisons of treatment groups versus control groups of $d = 0.19$ across diverse studies designed to increase physical activity among healthy adults, and an effect size of $d = 0.26$ among older adults (43 studies, Conn, Valentine & Cooper, 2002). These effect sizes are not directly comparable with the effect sizes found in the present study, as we had no control group, but tested the lifespan intervention condition against an active comparison condition, focused on self-efficacy and planning, that also has proven effective.

In *Chapter 6* it was assumed that this intervention effect could be explained by stronger increases in the potential mediator variables, namely SOC strategies and future time perspective, in the lifespan condition as compared to the standard condition. For mediation hypothesis, the expected multiple mediations took not place as the intervention condition

could not predict differences in SOC strategies and future time perspective. But the expected prediction pattern of the two concepts, SOC strategies and time perspective on physical exercise occurred. SOC strategies and future time perspective were significant predictors, both pointing in the hypothesized direction. Higher values in SOC strategies and time perspective are associated with higher levels of physical exercise.

An intervention that provides SOC strategies in an older population was expected to have additional effects over mere self-efficacy and planning components, and this was confirmed. For example, dealing with chronic illnesses or physical, mental or social losses and to cope with changes in resource allocation can be targeted with the compensation-based or the loss-based selection component from SOC theory (Brandtstädter & Rothermund, 2003; Freund, 2006). In the context of exercise it has been shown that SOC strategies are a useful concept distinct from self-efficacy, planning, or intention (Reuter et al., 2010; Ziegelmann & Lippke, 2007).

Increasing the awareness of emotional and short-term benefits was the future time perspective intervention component of the present study. The shift to emotion-regulation goals in older adults (Carstensen et al., 2010) seems to hold true also in the context of exercising (Ziegelmann et al., 2006). For goal selection, Freund, Hennecke, and Riediger (2010) found age-related differences in exercise-related goal focus. Older adults prefer a process-oriented focus such as enjoying exercise rather than outcomes (e.g., weight control or attraction).

It has been shown that lifespan theories (such as socioemotional selectivity theory, Carstensen, 1995) were able to inform interventions to promote health behaviour (i.e. physical activity) and have additional effects on health behaviour change. After providing strengths

and limitations of the present dissertation the next paragraphs will give an outlook on possible future research and will render suggestions for practical implications.

Strengths and Limitations

Looking at the *sample* covering an age range from 60 to 95 it was well balanced in terms of gender proportions, as well as a reasonable retention rate of 81 percent over a one year period of time. But it can be argued that the generalizability might be questionable due to recruitment via internet and newspaper announcements. Within the population of older adults the sample was relatively young and healthy. Therefore, it remains unclear whether such effects can replicate within other populations. Future research should be extended to inactive high-risk population or frail people but also to sample containing the full lifespan range to compare cohorts of people or even to display change within individuals over time.

In the *design* of the present study both concepts – SOC strategies and future time perspective – were tested simultaneously in one RCT. Future research might test each component separately or apply a full factorial design, as we examined only combinations of different sets of intervention components (planning and self-efficacy versus planning, self-efficacy, focus on immediate social and affective benefits of behaviour, and selection, optimization, and compensation strategies). Also the test against a passive control condition could yield further insights about the effectiveness of the intervention components as we had only an active self-efficacy and planning control condition. But as the present research question mainly focuses on the *additional intervention effect* of lifespan approaches on physical activity outcome, the baseline against the intervention effect hypothesis was tested consisted of standard procedures in health behaviour change intervention (such as self-efficacy and planning) to control for overlap of the components (Willis, 2001). The advantage

of testing a standard intervention versus a standard intervention plus add-on to portrait additional effects is not only appealing in terms of theory and intervention development. It also has ethical advantages as opposed to the use of a passive control condition as participants of both intervention condition got intervention material to be shown as effective.

The *measures* based on self-reports and even though self-report measures of health behaviours are common in health behaviour research, adding objective measures (as well as additional self-report variables to validate the self-report measures of behaviour) in future studies would be appropriate (Prince et al., 2008). Also, the chosen measure of future time perspective as one major construct of this dissertation (Carstensen, Isaacowitz & Charles, 1999; Carstensen & Lang, 1996), although being common in lifespan research, is less frequently used in the context of health behaviour change (e.g., Löckenhoff & Carstensen, 2004; Löckenhoff & Carstensen, 2007). However, more common time perspective measures in the field of health psychology (Strathman, Gleicher, Boninger & Edwards, 1994; Zimbardo & Boyd, 1999) portrait different concepts as "time" in socioemotional selectivity theory spans the life course (Carstensen et al., 1999) and therefore might have other motivational implications on the behaviour change process. For example the present orientation activated by awareness of mortality (future time perspective concept of socioemotional selectivity theory) leads to mixed emotional reactions, such as poignancy, as opposed to hedonism.

Regarding the *intervention effect* only for the second study period (6 to 12 months) a difference between the intervention conditions was found. One explanation might be that the second phase (6 to 12 months) was from winter to summer, whereas the first phase (baseline to 6 months) was from summer to winter and therefore different challenges, physical activities, or barriers to be physically active might be relevant (Bélanger, Gray-Donald, O'Loughlin, Paradis & Hanley, 2009; Rowlands, Pilgrim & Eston, 2009; Shephard & Aoyagi, 2009). Another explanation concerns the frequency the intervention material was given. It

was given after baseline and after 6 months measurement point in time, consequently for the first time period (from baseline to 6 months) the participants received the material for the first time, whereas in the second period (from 6 to 12 months) it was the second time that they received the intervention material. This might lead to continuous skill improvement and learning effects because of intervention familiarization or repetition and thus stronger intervention effects (Wu, Sanderson & Bittner, 2003).

As the hypothesized mediation (intervention condition is assumed to have an indirect effect on physical exercise outcome via the putative mediators SOC strategies and time perspective) did not occur despite an overall intervention effect on 12-month follow up, the endeavour of future studies should be to link the theoretical mediators and theoretically derived intervention contents to a stronger degree. Measurements more proximal to the intervention content could be one strategy. One example could be the assessment of exercise-related emotional states as putative mediator variables rather than only assessing generic time perspective. Another strategy could be to find intervention contents that are closer to the theoretical mediators.

General Implications for Future Research

In this dissertation both concepts – SOC strategies and future time perspective – were tested simultaneously in one RCT. Future research might test each component separately or apply a full factorial design described in the general limitations section. Furthermore, there is also a need to identify the most active ingredients via mediation analyses. Measurements more proximal to the intervention content could help to gain further insight.

Moreover, future research should give emphasis to disentangle the relation between short-term and emotional concepts as these are often, but not per se, overlapped to a strong degree, as the most emotional states occur shortly before or after behaviour.

As this dissertation only focused on expectations about emotions to intervene in the process of behaviour change, it might also be interesting to have a look on emotions and emotion-regulation, that is exploring the possibilities how intervention could help people to learn effective strategies to regulate aversive emotional states that are potential barriers or foster positive emotions in adoption and maintenance of health behaviours. Also the intersection between self-regulatory strategies like coping planning and emotion-regulation might give fruitful insights for that topic and might be a step in the direction to overcome a solely cognitive view on behaviour change.

General Implications for Practice

Intervention programs on physical activity for older adults should try to involve the partners as well, what may lead to better intervention outcomes as the results of this dissertation (*Chapter 2*) have shown that individuals whose partner also participated in the intervention attained higher levels of physical activity after the intervention, as compared to singles and individuals whose partners did not participate. In settings that do not allow the inclusion of partners, or if they are not eligible for participation, partners should at least be informed about their significant role in providing exercise support, which is perceived as support rather than control by the recipient.

The present results have shown time perspective operating as a moderator, indicating that in individuals with a more limited time perspective a stronger effect of planning on health

behaviours emerged (*Chapter 3*). Especially in persons with a limited future time perspective, for example, older adults with physical impairments, planning could compensate for the motivational deficits that come with such conditions. This could be used to inform interventions to improve health behaviour change including self-regulatory components (e.g. planning or SOC strategies) to overcome motivational deficits, due to a lack of future orientation.

It has been shown in this dissertation (*Chapter 4*) that the relative importance of expectations about emotion-related outcomes of exercise (e.g. enjoying exercise) versus health-related ones (e.g. health as a result of exercise) predicting intentions and physical exercise. For practical implications, these results suggest that interventions should focus on emotionally positive information, especially in older adults or in those with a more limited future time perspective (Mikels et al., 2010; Ziegelmann et al., 2006), rather than only on long-term benefits of exercise and health-related information.

The aim of this dissertation was to contribute to the development of health behaviour change theories by adding a lifespan perspective. This constitutes not only a theoretical advance, but may also have personal and societal implications (Kuhlmey & Schaeffer, 2009), as the socio-demographic change in an ageing society (Tesch-Römer & Wurm, 2009) has posed challenges for individual well-being as well as for social protection systems, that could be answered best – not by lifespan nor by health psychology – but by lifespan health psychology. *Chapter 5 and 6* have shown that a lifespan intervention was superior in changing physical activity levels in older adults compared to a standard health psychological intervention. The former included two additional theory-based components, namely 1) focus on emotional, social and immediate benefits of exercising, that is informed by future time perspective from socioemotional selectivity theory and 2) SOC strategies. This was tested

within a randomized controlled trial over one year. The practical implication of this finding might be to optimize the fit between intentions and participants: Tailoring of interventions according to the age or to the age-associated changes in goal structure of the participants could lead to better adherence and stronger intervention effects, even in the long run. As there are specific social, emotional and temporal demands in old age, there is a need for specific intervention, as well.

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Curriculum Vitae

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2011: Research Exchange to University of Newcastle, Faculty of Health and Society

2008: Diploma in Psychology, Freie Universität Berlin

2007: Diploma thesis in Health Psychology: ‘*Future Time Perspective in Health Behaviour Change*’ (Advisor: Ralf Schwarzer, PhD)

2006 to 2007: Student research assistant (Department of Health Psychology, Freie Universität Berlin)

2006: Internship in a Project to develop and evaluate a Metabolic Syndrom prevention program (Cooperation of Deutsche Bahn AG [German Railway Company] and Freie Universität Berlin) for the company's employees

2005 to 2006: Internship at the psychiatric day-unit and the drug addiction clinic of the 'Vivantes Hospital Berlin Spandau'.

Teaching

2011 until now: Lecturing on "Health Psychology" for psychology students (bachelors) at Freie Universität Berlin

2009 to 2010: Lecturing on "Medical Psychology" for medical students (1st year) at Charité – Universitätsmedizin Berlin

Supervision

Co-supervision of Master's projects in Developmental Health Psychology

Peer Review

Applied Psychology: Health and Well-Being (2010)

Gerontology (2011)

Professional Affiliations

European Health Psychology Society (EHPS: since 2009)

CREATE (Collaborative REsearch And Training in the EHPS)

List of Publications

Journal articles

Manuscript submitted for publication

- Gellert, P., Ziegelmann, J.P., Krupka, S., & Schwarzer, R. (Manuscript submitted for publication). An age-tailored intervention sustains changes in physical activity in older adults: A randomized controlled trial.
- Gellert, P., Ziegelmann, J.P., & Schwarzer, R. (Manuscript submitted for publication). An age-tailored intervention and its potential mediators: Time perspective and strategies of selection, optimization, and compensation.

In press

- Gellert, P., Ziegelmann, J.P., & Schwarzer, R. (in press). Affective and health-related outcome expectancies for physical activity in older adults. *Psychology & Health*.

2011

- Gellert, P., Ziegelmann, J.P., Lippke, S., & Schwarzer, R. (2011). Future time perspective and health behaviors: Temporal framing of self-regulatory processes in physical activity and dietary behaviors. *Annals of Behavioral Medicine*. doi: 10.1007/s12160-011-9312-y
- Kreausukon, P., Gellert, P., Lippke, S., & Schwarzer, R. (2011). Planning and self-efficacy can increase fruit and vegetable consumption: A randomized controlled trial. *Journal of Behavioral Medicine*. doi: 10.1007/s10865-011-9373-1

- Gellert, P., Ziegelmann, J.P., Warner, L.M., & Schwarzer, R. (2011). Physical activity intervention in older adults: Does a participating partner make a difference? *8*(3). *European Journal of Ageing*. 211-219. doi: 10.1007/s10433-011-0193-5

Book chapters

In press

- Gellert, P. & Herrmann, W. (in press). Prävention körperlicher Krankheiten. In: *Angewandte Gerontologie – Interventionen für ein gutes Altern in 100 Schlüsselbegriffen*. [Prevention of physical diseases] Wahl, H.-W., Tesch-Römer, C. & Ziegelmann, J.P. (Hrsg.). Kohlhammer, Stuttgart.

Conference presentations

2011

- Gellert, P. (2011). Längsschnittliche Effekte einer lebensspannenpsychologischen Intervention zur Förderung der körperlichen Aktivität im Alter. Paper presented at Methodenkolloquium des Rehabilitationswissenschaftlichen Verbundes BBS – Methoden der Rehabilitationsforschung mit Schwerpunkt der Lebensspannanalyse. Alice Salomon Hochschule Berlin, 30th September 2011.
- Gellert, P., Ziegelmann, J.P., Schwarzer, R. (2011). Effects of a strategy use and time perspective intervention to promote physical activity in older adults. Paper presented at the 25th European Health Psychology Conference, Hersonissos, Crete, Greece, 23rd September 2011.

- Gellert, P., Ziegelmann, J.P., Schwarzer, R. (2011). Strategienutzung und Zukunftsperspektive: Effekte einer Intervention zur Förderung körperlicher Aktivität im Alter. Paper presented at the 10. Kongress für Gesundheitspsychologie, Berlin, Germany, 2nd September 2011.

2010

- Gellert, P., Ziegelmann, J.P. (2010). Intervention zur Steigerung der körperlichen Aktivität im Alter: Effekte Sozialer Integration und Sozialer Unterstützung. Paper presented at the 10. Kongress der Deutsche Gesellschaft für Gerontologie und Geriatrie, Berlin, Germany, 17th September 2010.
- Gellert, P., Ziegelmann, J.P. (2010). Does a Partner Make a Difference?: Effects of Social Integration and Spousal Support on Physical Activity in Older Adults. Paper presented at the 24th European Health Psychology Conference, Cluj-Napoca, Romania, 3rd September 2010.
- Gellert, P. (2010). Life Style Changes in Older Adults: Lifespan and Health-Related Resources to Adopt and Maintain Physical Activity. Presented at Tagung „Multimorbidity in Old Age – Challenge for Interdisciplinarity“, Berlin, Germany, Wissenschaftszentrum Berlin, 26th Februar 2010.
- Gellert, P., Ziegelmann, J.P., Reuter, T. Wiedemann, A.U., & Schüz, B. (2009). Gesundheitsverhalten und Kognitionen der Lebensspanne: Moderierende und mediierende Effekte von Zukunftsperspektive und Selektion, Optimierung und Kompensation. Paper presented at the 9. Kongress für Gesundheitspsychologie, Zürich, Swizerland, 27th August 2009.

2009

- Warner, L.M. & Gellert, P. (2009). Erfolgreiches Altern und Gesundheit: Sozial-kognitive und behaviorale Aspekte. Beiträge von Schmitt, M., Kliegel, M., Warner, L.M. & Gellert, P., Diskutant Tesch-Römer, C. Symposium presented at the 9. Kongress für Gesundheitspsychologie, Zürich, Switzerland, 27th August 2009.
- Gellert, P., Ziegelmann, J.P., Reuter, T. Wiedemann, A.U., & Schüz, B. (2009). Health Behaviour and Life-Span Cognitions: Moderating and Mediating Effects of Future Time Perspective and Strategies of Selection, Optimization and Compensation. Poster session presented at the 23rd conference of the European Health Psychology Society, Pisa, Italy, 24th September 2009.

2008

- Gellert, P., Ziegelmann, J.P., Reuter, T. Wiedemann, A.U., & Lippke, S. (2008). Future time perspective in health behavior change: Moderation of the intention-behavior relation. Poster presented at the XXIX. International Congress of Psychology, Berlin, Germany, 22th July 2008.

Erklärung

Hiermit versichere ich, dass ich die vorgelegte Arbeit selbstständig verfasst habe. Andere als die angegebenen Hilfsmittel habe ich nicht verwendet. Die Arbeit ist in keinem früheren Promotionsverfahren angenommen oder abgelehnt worden.

Paul Gellert

Berlin, Oktober 2011