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How Does the Experience of Loneliness Change Across the Adult Life Span?

An Examination of Age-Related Changes in the Level, Antecedents and
Consequences of Loneliness

Dissertation

zur Erlangung des akademischen Grades einer
Doktorin der Philosophie (Dr. phil.)

vorgelegt von M.Sc. Anne Böger

Berlin, Juli 2018

Datum der Disputation: 06.12.2018

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Danksagung

Einen großen Dank an Dr. Oliver Huxhold für die engagierte Betreuung dieser Doktorarbeit. Ebenso bedanke ich mich herzlich bei allen (weiteren) Kolleginnen und Kollegen, Freundinnen und Freunden sowie Verwandten, die mir bei dieser Arbeit auf die ein oder andere Art zur Seite gestanden haben, sei es durch Begutachtung, Rückmeldung oder Ratschläge, durch emotionale Unterstützung oder auch einfach durch die nötige Ablenkung von der Arbeit.

Zuletzt möchte ich mich ganz besonders bei Felix bedanken. Vor allem deinetwegen habe ich mich in den letzten vier Jahren immer unterstützt und nur selten einsam gefühlt habe. Dafür bin ich dir zutiefst dankbar.

Abstract

Loneliness has been defined as the feeling that one's social relationships are deficient in some important way, either quantitatively or qualitatively (Perlman & Peplau, 1981). Results from previous research suggest that loneliness is both a consequence and an antecedent of social relationships and relationship goals. It is still an open question, however, to what extent the experience of loneliness remains stable as people grow older. The aim of the present dissertation is to combine previous research on loneliness and adult development by examining how the average level, social antecedents and social consequences of loneliness change with increasing age.

Results from previous studies suggest that quantitative aspects of social relationships, such as social network size and the frequency of social activities, deteriorate with advancing age (Huxhold, Fiori, & Windsor, 2013; Wrzus, Hanel, Wagner, & Neyer, 2013). Based on this observation, many people assume that loneliness is more prevalent or intense among older adults than among younger ones (Tornstam, 2007). However, previous cross-sectional studies provided little evidence that older people are lonelier than middle-aged and younger adults (e.g. Dykstra, 2009). In fact, the level of loneliness depends not only on the quantity but also on the quality of social relationships (Fiori & Consedine, 2013; Pinquart & Sörensen, 2001b), and, unlike quantitative characteristics, qualitative characteristics of social relationships may improve with age (Luong, Charles, & Fingerman, 2010). Moreover, there may be age-related shifts in people's relationship goals and how they evaluate different aspects of their social relationships. Hence, the interrelations between loneliness and different social relationship characteristics are not necessarily stable but may change with age. In the present dissertation, I take a closer look at the developmental dynamics of loneliness across adulthood. Specifically, I address three major research questions:

RQ 1: Does the average level of loneliness change between midlife and old age?

(Chapters 2 & 3)

RQ 2: Do the social antecedents of loneliness change with age?

(Chapters 3 & 4)

RQ 3: Do the socio-motivational consequences of loneliness change with age?

(Chapter 5)

In Chapter 1, I first describe previous research on loneliness and adult development in order to derive the three research questions of this dissertation. In Chapters 2 through 5, I then detail a number of empirical studies designed to examine these research questions. Specifically, Chapter 2 provides a general overview of current loneliness rates among German adults in the second half of life and examines how the prevalence of loneliness differs between historical cohorts of older adults (RQ1). Chapter 3 investigates how the average level of loneliness changes between midlife

and old age (RQ1). Furthermore, Chapter 3 examines whether emotional qualities of social relationships improve and become more relevant for predicting loneliness as people grow older (RQ2). Chapter 4 investigates whether the absence of a romantic partner becomes less straining and less predictive of loneliness with increasing age (RQ2). Finally, Chapter 5 shifts the focus from the antecedents to the consequences of loneliness and explores how socio-motivational reactions to loneliness vary with age (RQ3). In Chapter 6, I integrate the results from all of the empirical chapters and discuss their implications for both research and practice.

The analyses presented in Chapters 2 through 4 were based on data from the German Ageing Survey (DEAS), a cohort-sequential and nationally representative study of community-dwelling adults in the second half of life (40 years and older) living in Germany (Klaus et al., 2017). The analyses reported in Chapter 5 used data from a diary study and two experimental studies with young, middle-aged and older adults in Germany.

In line with the findings of previous cross-sectional studies, the results of this dissertation show that the average level of loneliness remains relatively stable between midlife and old age. Age-related changes in emotional qualities of the social network, however, were found to include both gains (e.g. a reduced number of distressing relationships) and losses (e.g. a reduced satisfaction with friendships). While poor emotional quality of social relationships was equally predictive of loneliness between midlife and old age, the absence of a romantic partner appeared to be less straining and less relevant as an antecedent of loneliness as people grew older. The results regarding the socio-motivational consequences of loneliness indicate that a temporarily heightened level of loneliness may amplify people's motivation to avoid negative social experiences. There was no indication that the immediate socio-motivational consequences of loneliness differ between young, middle-aged and older adults.

Taken together, the findings of this dissertation suggest that the age-related stability in loneliness from midlife into old age observed in previous studies may reflect changed relationship goals rather than improved relationship quality. Moreover, the results provide first evidence suggesting that the immediate socio-motivational consequences of loneliness may be relatively stable across the adult life span. Further studies are needed to find out whether the same motivational effect of loneliness leads to different changes in social relationship across adulthood. Additionally, it appears crucial to understand how both stable inter-individual differences and intra-individual changes in a person's relationship goals contribute to the development of loneliness. Specifically, it remains an open question to what extent the flexible adaption of relationship goals may be beneficial or damaging to a person's social well-being. All in all, both researchers and practitioners dealing with loneliness should pay greater attention to the fact that factors in the emergence and maintenance of loneliness may vary over persons and time.

Zusammenfassung

Einsamkeit beschreibt das Gefühl, dass den eigenen sozialen Beziehungen etwas Wichtiges fehlt, entweder in Hinblick auf ihre Qualität oder in Hinblick auf ihre Quantität (Perlman & Peplau, 1981). Ergebnisse bisheriger Forschung weisen darauf hin, dass Einsamkeit sowohl eine Konsequenz als auch ein Antezedens von Beziehungsmerkmalen und Beziehungszielen ist. Eine offene Frage ist bislang, in welchem Ausmaß das Erleben von Einsamkeit im Verlaufe des Erwachsenenalters stabil bleibt. Ziel der vorliegenden Dissertation ist es, bisherige Forschungsansätze zu Einsamkeit und zur Entwicklungspsychologie des Erwachsenenalters zu kombinieren, indem untersucht wird, wie sich das mittlere Niveau sowie die sozialen Antezedenzen und Konsequenzen von Einsamkeit mit zunehmendem Alter verändern.

Die Ergebnisse früherer Forschung weisen darauf hin, dass sich quantitative Aspekte sozialer Beziehungen, wie zum Beispiel die Größe sozialer Netzwerke oder die Häufigkeit sozialer Aktivitäten, mit zunehmenden Alter verschlechtern (Huxhold, Fiori, & Windsor, 2013; Wrzus, Hanel, Wagner, & Neyer, 2013). In Anbetracht dieser Befunde gehen viele Menschen davon aus, dass Einsamkeit von alten Menschen sehr viel häufiger oder intensiver erlebt wird als von jungen Menschen (Tornstam, 2007). Allerdings erbrachten bisherigere Querschnittsstudien kaum Hinweise darauf, dass ältere Erwachsene tatsächlich einsamer sind als Erwachsene im mittleren und jungen Erwachsenenalter (e.g. Dykstra, 2009; Luhmann & Hawkley, 2016). Tatsächlich hängt Einsamkeit nicht nur von der Quantität, sondern auch von der Qualität sozialer Begegnungen ab (Fiori & Consedine, 2013; Pinqart & Sörensen, 2001b), und anders als die Quantität, könnte sich die Qualität sozialer Beziehungen mit zunehmendem Alter verbessern (Luong, Charles, & Fingerman, 2010). Des Weiteren ist es möglich, dass sich persönliche Beziehungsziele, und somit die Art und Weise wie verschiedene Beziehungscharakteristika bewertet werden, mit dem Alter verändern. Folglich sind die Zusammenhänge von Einsamkeit und verschiedenen Merkmalen sozialer Beziehungen nicht zwangsweise stabil, sondern weisen im Verlaufe des Erwachsenenalters möglicherweise Veränderungen auf. In der vorliegenden Dissertation möchte ich die entwicklungsbezogenen Dynamiken von Einsamkeit näher betrachten. Speziell untersuche ich die folgenden drei Forschungsfragen:

- F1: Verändert sich das mittlere Niveau von Einsamkeit vom mittleren bis in das hohe Erwachsenenalter? (Kapitel 2 & 3)
- F2: Verändern sich soziale Antezedenzen von Einsamkeit mit dem Alter? (Kapitel 3 & 4)
- F3: Verändern sich sozio-motivationale Konsequenzen von Einsamkeit mit dem Alter? (Kapitel 5)

In Kapitel 1 werde ich zunächst Ansätze und Befunde aus der bisherigen Forschung zu Einsamkeit und zur Entwicklungspsychologie des Erwachsenenalters beschreiben, um schließlich die drei Forschungsfragen dieser Dissertation abzuleiten. In Kapitel 2 bis 5 werde ich dann eine Reihe von empirischen Studien vorstellen, die die verschiedenen Forschungsfragen untersuchen. Kapitel 2 gibt einen Überblick über die Verbreitung von Einsamkeit bei deutschen Erwachsenen in der zweiten Lebenshälfte. Darüber hinaus wird in Kapitel 2 untersucht, wie sich die durchschnittliche Häufigkeit von Einsamkeit zwischen historischen Kohorten von älteren Erwachsenen unterscheidet (F1). Kapitel 3 beschäftigt sich mit der Frage, wie sich das mittlere Niveau von Einsamkeit vom mittleren bis in das hohe Erwachsenenalter verändert (F1). Des Weiteren wird in Kapitel 3 untersucht, ob sich verschiedene Aspekte emotionaler Beziehungsqualität mit zunehmenden Alter verbessern und ob auch Aspekte emotionaler Beziehungsqualität mit zunehmendem Alter an Relevanz für die Vorhersage von Einsamkeit gewinnen (F2). Kapitel 4 geht der Frage nach, ob das Fehlen einer romantischen Beziehung mit zunehmenden Alter als weniger belastend erlebt wird und ob es für die Vorhersage von Einsamkeit an Relevanz verliert (F2). Kapitel 5 wendet sich schließlich den Konsequenzen von Einsamkeit zu und untersucht, wie sich sozio-motivationale Reaktionen auf Einsamkeit bei Erwachsenen verschiedenen Alters unterscheiden. In Kapitel 6 werden die Ergebnisse aller empirischen Kapitel integriert. Des Weiteren werden die Implikationen der Befunde für Forschung und Praxis diskutiert.

Für die Analysen in Kapitel 2, 3 und 4 werden Daten des Deutschen Alterssurveys (DEAS), einer repräsentativen Quer- und Längsschnittbefragung von deutschen Erwachsenen in der zweiten Lebenshälfte (40 Jahre und älter), verwendet (Klaus et al., 2017). Für die Analysen in Kapitel 5 werden Daten von einer Tagebuchstudie und von zwei experimentellen Studien mit jungen, mittelalten und alten Erwachsenen herangezogen.

Im Einklang mit Befunden früherer Querschnittsstudien weisen die Ergebnisse dieser Dissertation darauf hin, dass das mittlere Einsamkeitsniveau vom mittleren bis in das hohe Erwachsenenalter relativ stabil ist. Allerdings zeigen die Analysen auch, dass altersbezogene Veränderungen in der emotionalen Qualität des sozialen Netzwerks nicht nur Gewinne (z.B. weniger belastende Beziehungen), sondern auch Verluste (z.B. eine geringere Zufriedenheit mit Freundschaftsbeziehungen) umfassen. Während eine geringe emotionale Qualität sozialer Beziehungen vom mittleren bis in das hohe Erwachsenenalter im ähnlichen Maße mit höherer Einsamkeit einhergeht, scheint das Fehlen einer romantischen Beziehung mit zunehmendem Alter für die Vorhersage von Einsamkeit an Bedeutung zu verlieren. Die Analysen zu den sozio-motivationalen Konsequenzen von Einsamkeit weisen darauf hin, dass ein erhöhtes Einsamkeitsniveau die Motivation verstärkt, negative Beziehungserfahrungen zu vermeiden. Es fanden sich keine Hinweise darauf, dass sich die unmittelbaren sozio-motivationalen

Konsequenzen von Einsamkeit zwischen jungen, mittelalten und alten Erwachsenen unterscheiden.

Insgesamt weisen die Ergebnisse dieser Dissertation darauf hin, dass die in verschiedenen Studien beobachtete Stabilität des Einsamkeitsniveaus vom mittleren bis in das hohe Erwachsenenalter eher auf veränderte Beziehungsziele als auf eine verbesserte Beziehungsqualität zurückführbar sein könnte. Des Weiteren gaben die Befunde erste Hinweise darauf hin, dass die direkten sozio-motivationalen Konsequenzen von Einsamkeit vom jungen bis in das hohe Erwachsenenalter relativ stabil sind. Weitere Studien sind nötig, um zu untersuchen, ob dieselben motivationalen Effekte von Einsamkeit bei Personen verschiedenen Alters mit unterschiedlichen Veränderungen in der Quantität und Qualität sozialer Beziehungen einhergehen. Des Weiteren ist es eine wichtige Aufgabe zukünftiger Forschung, besser zu verstehen, wie sowohl stabile inter-individuelle Unterschiede als auch intra-individuelle Veränderungen in persönlichen Beziehungszielen zur Entwicklung von Einsamkeit beitragen. So ist bislang kaum erforscht, inwiefern die flexible Anpassung persönlicher Beziehungsziele das soziale Wohlbefinden einer Person verbessert oder beeinträchtigt. Insgesamt sollte sowohl in der Einsamkeitsforschung als auch bei der Gestaltung von Einsamkeitsinterventionen stärker berücksichtigt werden, dass Faktoren, die zur Entstehung und Aufrechterhaltung von Einsamkeit beitragen, nicht nur von Person zu Person, sondern auch über die Zeit variieren können.

Chapter 1

Loneliness and Adult Development: Previous Research and Open Questions

1.1 Introduction

Studies suggest that satisfying relationships with other people are crucial for leading a happy, healthy and meaningful life (Baumeister & Leary, 1995; Berkman, Glass, Brissette, & Seeman, 2000; Thoits, 2011). Reliable social ties provide us with the support and help that we need to feel secure and to confront the various challenges in our lives. In addition, interactions with different people foster learning and personal growth by providing novel, stimulating information and experiences. Moreover, and maybe most importantly, close social partners help us to establish a feeling of self-esteem and meaning in life by acknowledging our achievements and by showing us their love and affection.

Social relationships, however, are not always positive and satisfying. Some social ties bring along as many conflicts and as much distress as they provide joy and pleasant experiences. In addition, contextual and individual barriers to social engagement, such as a lack of free time or health-related impairments, may prevent people from being involved in social activities to the degree that they would desire. Whenever people feel that their social relationships are deficient in some important way, they are at risk of feeling lonely (Perlman & Peplau, 1981). Results from previous research suggest that loneliness is the result of a cognitive process during which a person evaluates his or her social relationships in light of his or her relationship goals (Peplau & Perlman, 1982). In this sense, loneliness signals a mismatch between the social relationships that a person has and the social relationships that he or she would like to have. Loneliness can motivate people to take steps to actively improve and expand their social relationships but can also motivate people to downgrade their relationship goals and to withdraw from social relationships.

All in all, results from previous research on loneliness suggest that feeling lonely may not only be an outcome but also a trigger of changes in a person's social relationships and relationship goals. How the social antecedents and consequences of loneliness change and/or remain stable as people grow older, however, is less well understood at this point. The clear majority of previous studies focused on how loneliness is predicted by deficiencies in social relationships (e.g. a low number of supportive ties) and applied both cross-sectional designs and age-homogenous samples. In addition, many studies have focused exclusively on older adults, assuming that loneliness is more or less a problem of old age (Törnstaam, 2007). The assumption that loneliness is more characteristic of old age is grounded in the observation that both the size of people's social networks and the number of their social activities tend to shrink with age, while barriers to social engagement tend to increase (Bukov, Maas, & Lampert, 2002; Huxhold et al., 2013; Wrzus et al., 2013). Loneliness, however, depends not only on structural aspects of social relationships but also on relationships quality and relationship goals (Dykstra & Fokkema, 2007; Fiori & Consedine, 2013; Pinquart & Sörensen, 2001b; Zhang, Yeung, Fung, & Lang, 2011), and, as with the structural

Chapter 1: Loneliness and Adult Development: Previous Research and Open Questions

aspects of social relationships, relationship quality and relationship goals may change across the adult life span (Carstensen, Isaacowitz, & Charles, 1999; Luong et al., 2010).

In the present dissertation I aim to more closely examine how the experience of loneliness changes across the adult life span. Specifically, I address three overarching research questions that are summarized in Figure 1-1. The research questions are examined in different empirical studies that are presented in Chapter 2 through 5.

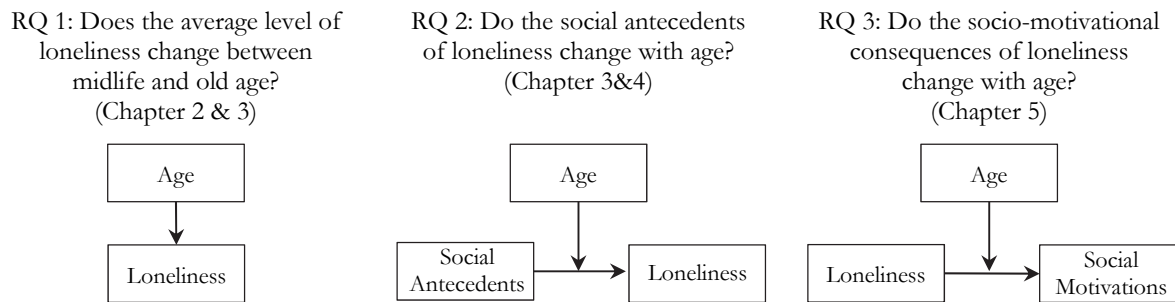


Figure 1-1. Illustration of the major research questions of this dissertation.

In the remaining sections of this chapter, I discuss previous findings regarding the antecedents and consequences of loneliness (Section 1.2) as well as age-related changes in social relationships and relationship goals across the adult life span (Section 1.3). Based on an integration of the literatures concerning loneliness and adult development, I then derive the research questions and hypotheses of this dissertation (Section 1.4). The chapter is closed with a brief introduction of the data sources used for the empirical investigations (Section 1.5) as well as a summary of the goals and structure of this dissertation (Section 1.6).

1.2 Previous Research on Loneliness

1.2.1 Definition and measurement of loneliness

Social scientists from diverse disciplines have intensively studied the phenomenon of loneliness since the 1950s. Accordingly, there have been many different definitions and conceptualizations of the psychological phenomenon of loneliness (for an overview of early definitions and theoretical approaches see, Peplau & Perlman, 1982). Perlman and Peplau (1981, p. 31) introduced a definition frequently used in contemporary research. Namely, they defined loneliness as “[...] the unpleasant experience that occurs when a person’s network of social relations is deficient in some important way, either quantitatively or qualitatively” (p. 31). De Jong Gierveld (1987) further specified this definition, stating that loneliness may arise in situations “[...] in which the number of existing relationships is smaller than is considered desirable or admissible, as well as situations where the intimacy one wishes for has not been realized” (p. 120). Most definitions and theories agree that loneliness has three core features, as postulated by Peplau & Perlman (1982, p. 3):

1. Loneliness results from deficiencies in a person's social relationships
2. Loneliness is a subjective experience that is different from objective social isolation, and
3. Loneliness is an unpleasant and distressing experience.

The understanding of loneliness in Psychology as described above may differ from how people use the word “loneliness” in everyday life. In particular, the concept of loneliness as understood by Psychologists specifies that individuals find loneliness always unpleasant and distressing. Moreover, loneliness is clearly differentiated from social isolation and the state of being alone. Specifically, Perlman and Peplau (1982) conceptualize loneliness as the result of a cognitive process whereby people evaluate their social relationships in light of their relationship goals. According to this so-called *cognitive discrepancy approach* (Peplau & Perlman, 1982), loneliness arises whenever people perceive a mismatch between their existing social relationships on the one hand and the relationships that they would like to have on the other hand. A lack of social contact is thus neither a necessary nor a sufficient condition for feeling lonely. People may feel perfectly integrated while being on their own. At the same time, people can be involved in many social activities but may nonetheless feel lonely because their social interactions do not fulfill their relationship goals.

Because loneliness is based on a perceived mismatch between a person’s social reality and his or her subjective social ideals, loneliness can only be assessed by self-report. Objective measures, such as observations of social network structure or interactional quality, may be useful for identifying people at risk of being lonely but cannot be used to infer the actual feeling of loneliness. Both direct and indirect self-report measures of loneliness have been used in psychological research. Direct measures ask about the frequency or intensity of loneliness during a given time frame (e.g.

at the moment, during the past week), whereas indirect questionnaires purposefully avoid reference to the term “loneliness.” Instead, indirect measures ask people to indicate their agreement with paraphrasing expressions (e.g. “I feel left out”) or ask people to evaluate different characteristics of their social relationships, such as the potential for support (e.g. “There are plenty of people I can lean on when I have problems”), the experience of emotional closeness (e.g. “There are enough people I feel close to”) or the size and composition of their social network (e.g. “I find my circle of friends and acquaintances too limited”) (example items from De Jong-Gierveld & Kamphuls, 1985). Based on the answers, a continuous loneliness score can then be calculated (e.g. based on a sum or average) which may be best understood as the person’s overall feeling of loneliness/connectedness rooted in the global evaluation of the quantity and quality of his or her social relationships.

Compared to indirect assessments, direct assessments of loneliness may be more compelling with regard to their content validity. Direct measures are also particularly useful for assessing short-term fluctuations in loneliness on a day-to-day or on a moment-to-moment basis. At the same time, however, loneliness may be experienced as painful and embarrassing, and some people might be reluctant to admit that they feel lonely. Hence, direct measures may underestimate loneliness and this bias may be differently pronounced in different populations (De Jong Gierveld, Van Tilburg, & Dykstra, 2006). Studies suggest, for instance, that direct measures of loneliness may underestimate feelings of loneliness among men who could be more reluctant than women to admit that they feel lonely (Pinquart & Sörensen, 2001a). Due to the problems associated with direct measures, many researchers have preferred indirect measures of loneliness, such as the De Jong Gierveld loneliness scale (De Jong-Gierveld & Kamphuls, 1985) and the UCLA loneliness scale (Russel, Peplau, & Cutrona, 1980). Indirect measures may be less suited to capture short-term fluctuations in loneliness. They are essential, however, for detecting more profound and long-lasting changes in a person’s social relationships.

1.2.2 Social antecedents of loneliness

Previous research has distinguished between distal and proximal antecedents of loneliness. *Distal antecedents* encompass personal dispositions (e.g. personality traits) and characteristics of the social context (e.g. societal norms) that affect a person’s social relationships and relationship goals. Hence, distal antecedents influence a person’s level of loneliness indirectly by shaping opportunities and barriers for social behavior as well as the social expectations and standards that a person holds. In this dissertation I focus on *proximal antecedents* of loneliness that encompass characteristics of a person’s *social relationships* on the one hand and a person’s *relationship goals* on the other hand. *Social relationships* are characterized by “[...] repeated interactions between the dyad members and a

mental representation of the relationship as such” (Wrzus et al., 2013, page 53). Due to their mental representation, social relationships may influence a person’s psychological experiences well-beyond the direct social contact they involve, for instance, by influencing perceptions of available social support. The term *social network* is used in the following to describe the entirety of a person’s social relationships.

Based on the assumption that loneliness arises from deficiencies in a person’s social relationships (Perlman & Peplau, 1981), a great number of earlier studies tried to identify social network characteristics that increase the risk of loneliness. The results of this research suggest that, on average, loneliness is more pronounced for people with smaller social networks or less frequent participation in social activities (Böger & Huxhold, 2017; Drennan et al., 2008; Hawkley et al., 2008). The mechanisms by which large social networks help to reduce feelings of loneliness are not yet comprehensively understood. There is reason to assume, however, that people with more frequent social contact and a higher number of social relationships have a higher diversity of social experiences, and hence feel less lonely. Adults with larger social networks, for instance, may be more likely than people with smaller social networks to have a wide range of different social relationships, such as different familial ties and friends as well as both emotionally close and peripheral ties. Social network diversity may help to elevate feelings of social connectedness as different relationship types go along with different characteristics (Neyer, Wrzus, Wagner, & Lang, 2011) which can make particular relationships more or less functional for fulfilling different social needs (Huxhold, Miche, & Schuz, 2014). Emotionally close relations with a romantic partner or long-term friend, for instance, may be most relevant for fulfilling a person’s need for support and affection (Ikkink & van Tilburg, 1998). Less close ties with acquaintances, however, may also contribute to a person’s well-being (Gillian & Elizabeth, 2014) by providing stimulating experiences, for instance, or new information (Fingerman, 2009; Granovetter, 1973).

All in all, research suggests that people who are well integrated and socially active are less likely to feel lonely. Nevertheless, not all social interactions nor every social relationship enhances a person’s overall feeling of social connectedness. For instance, a higher frequency of distressing or straining social exchanges predicts higher levels of loneliness (Chen & Feeley, 2014; Dykstra & Fokkema, 2007; Fiori & Consedine, 2013). Loneliness has also been associated with social relationships marked by a low frequency of positive exchanges (Fiori & Consedine, 2013), a low potential for receiving emotional support (Chen & Feeley, 2014; De Jong Gierveld, van Groenou, Hoogendoorn, & Smit, 2009) as well as low relationship satisfaction (Heylen, 2010). In sum, empirical results indicate that not only a high quantity, but also a high quality of social relationships is relevant for predicting loneliness.

Although a high frequency of distressing social exchanges is a risk factor for loneliness, not every person with straining relationships is also lonely. In fact, as argued in the cognitive discrepancy approach (Peplau & Perlman, 1982), loneliness arises only when characteristics of a person's social interactions clash with his or her *relationship goals*. A high number of conflicts, for instance, may be more or less influential for a person's feeling of loneliness, depending on whether that person has a strong need for harmony or not. The term *relationship goal* is used broadly in this dissertation to describe any mental representation of a desired relationship characteristic. Relationship goals may refer to desired social relationships quantities, such as having a lot of friends, or desired social relationship qualities, such as feeling emotionally close to others.

Theoretical discussions have emphasized the importance of relationship goals as antecedents of loneliness for a long time. To date, however, very few empirical studies have examined the ways in which relationship goals affect the emergence of loneliness. The few existing studies support the notion that goals moderate the relationship between social relationship characteristics and loneliness. It has been found, for instance, that divorced people without a romantic partner report a higher level of loneliness, but only to the extent that they find it important to have a romantic partnership (Dykstra & Fokkema, 2007). In another study, Zhang and colleagues (2011) found that interdependence goals (i.e. the importance of being integrated in social groups) moderate the link between the number of peripheral network members and loneliness. Specifically, a higher number of peripheral social contacts was associated with less loneliness, but only for people with high interdependence goals.

Taken together, results from previous studies suggest that loneliness arises as a result of the interplay between the quantity and quality of a person's social relationships on the one hand, and his or her relationship goals on the other hand (see Figure 1-2).

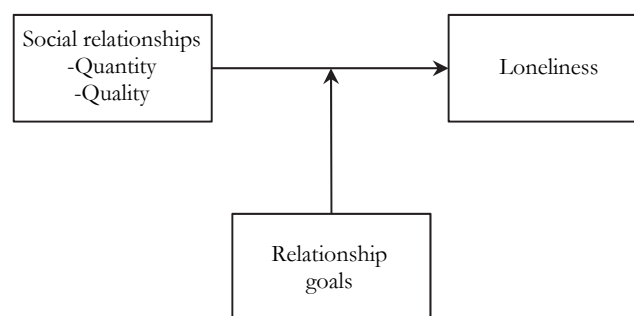


Figure 1-2. Proximal antecedents of loneliness. Changes in a person's level of loneliness can be triggered by changes in the quantity of social relationships, changes in the quality of social relationships or changes in relationship goals.

Changes in a person's social relationships (e.g. the loss of a long-term relationship) that pose a threat to a relevant relationship goal (e.g. the goal to feel emotionally close to others) can trigger increases in loneliness. At the same time, changes in relationship goal (e.g. an intensified wish for harmonic relationships) that affect how a person experiences his or her social relationships (e.g. a high number of conflicts with a relevant social tie) can likewise trigger feelings of loneliness. To resolve feelings of loneliness, people may either adjust the characteristics of their social relationships or adjust their relationship goals. If both strategies fail, loneliness may turn into a long-lasting experience.

1.2.3 Social consequences of loneliness

Studies suggest that the experience of loneliness affects a person's psychological and emotional experiences in profound ways. Grounded in the assumption that the maintenance of reliable social partners was of utmost importance for the survival and reproductive fitness of our ancestors, Weiss (1973) and Cacioppo (2006) proposed that loneliness has evolved as important signal for life-threatening deficits in a person's protective social relationships. From this point of view, it seems likely that feelings of loneliness are tightly linked to a basic sense of threat and anxiety. Empirical studies support the notion that the experience of social exclusion or rejection lowers a person's sense of control and his or her self-esteem (see, Gerber & Wheeler, 2009). Moreover, people with a higher level of loneliness have been found to report heightened emotional distress and intensified negative affect (Böger & Huxhold, 2017; Cacioppo et al., 2000; Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006; Steptoe, Leigh, & Kumari, 2011). The emotional and psychological experiences associated to loneliness may stimulate ambivalent social motivations (Cacioppo, Hawkley, et al., 2006; Goossens, 2018). On the one hand, people feelings lonely may be more motivated to *approach* positive social outcomes (e.g. emotional closeness, acceptance) in order to compensate for the experienced relationship deficit. On the other hand, lonely people also feel vulnerable which may increase their motivation to *avoid* further negative social experiences (e.g. being rejected). Both approach and avoidance reactions to loneliness may lead to an adaption of social relationships and/or relationship goals (see Figure 1-3).

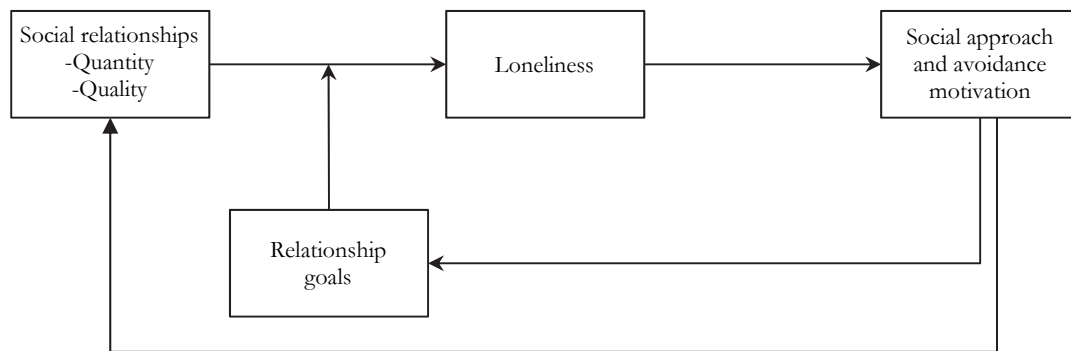


Figure 1-3. Proximal consequences of loneliness. Changes in loneliness can affect people's motivation to avoid negative and to approach positive social outcomes. Immediate socio-motivational changes in response to loneliness can be followed by an adaption of relationship goals and/or an adaption of social relationship characteristics.

Empirical studies support the notion that loneliness induces both approach- and avoidance-related socio-motivational reactions. In general, compared to people with low levels of loneliness, people with high levels of loneliness have been shown to be more vigilant toward the social signals surrounding them (Gardner, Pickett, Jefferis, & Knowles, 2005). The heightened vigilance appears to be directed at both positive and negative social cues. Studies have shown, for instance, that socially excluded people pay more attention to smiling faces (DeWall, Maner, & Rouby, 2009) as well as indicate more interest in making new friends (Maner, DeWall, Baumeister, & Schaller, 2007). At the same time, social exclusion has also been associated with a heightened motivation to prevent negative events in life (Park & Baumeister, 2015) as well as a higher sensitivity towards potential sources of aggression (DeWall, Twenge, Gitter, & Baumeister, 2009). In a similar vein, studies found social exclusion to lead to both increased and decreased affiliative behavior (see, DeWall & Richman, 2011; Gerber & Wheeler, 2009).

Both increased approach and increased avoidance behavior in response to loneliness may have benefits and costs. Approach behavior facilitates the attainment of positive social outcomes but can also lead to negative social experiences. To seek out contact with a novel social partner, for instance, may improve chances of establishing a new friendship but does also pose the risk of being rejected. Avoidant behaviors, in contrast, may reduce the risk to have negative social experiences but makes it also difficult to actively improve one's social situation. To avoid the discussion of an issue of dispute, for instance, may help to circumvent a fight but may also prevent the effective solution of a relationship problem.

Whether people prefer either approach- or avoidance-focused reactions to loneliness appears to depend on characteristics of the current social context, such as the available interaction partners (DeWall & Richman, 2011; Gerber & Wheeler, 2009). It has been found, for instance, that rejected people show more prosocial behavior than non-rejected people when interacting with

novel social partners but not when interacting with the perpetrator of the rejection experienced before (Gerber & Wheeler, 2009). In addition to that, social reactions to loneliness appear to depend on personal dispositions, such as a person's fear of negative evaluations (FNE). In a study of Maner and colleagues (2007), for instance, people high in FNE were less likely than people low in FNE to show affiliative behavior after experiencing social exclusion. Differential reactions to heightened loneliness and social exclusion may be one pathway through which social traits contribute to stable differences in social relationships and a person's overall level loneliness.

In sum, previous evidence suggests that loneliness may lead to both an increased motivation to approach positive social outcomes and an increased motivation to avoid negative social outcomes. The relative strength of both motivational reactions may depend on opportunities and constraints of the current social context as well as on personal dispositions. Approach responses to loneliness may help to actively improve one's social relationships and activities, whereas avoidance responses may serve to prevent (further) deteriorations of one's social situation. Both avoidance- and approach-focused motivational reactions to loneliness can be functional for a person's social well-being. If avoidance-focused reactions to loneliness predominate on a regular basis, however, there might be an increased risk for a decrease in the quantity and quality of social relationships as well as for a stabilization of loneliness over time.

1.3 Previous Research on Adult Development: Age-related Changes That May Influence the Experience of Loneliness across the Adult Life Span

In this section I discuss how age-related changes in future time perspective, biological capacities and social context may influence the experience of loneliness. Specifically, I want to show that age-related reductions in the quantity of social relationships most likely occur in parallel with age-related changes in relationship quality and relationship goals. Moreover, there may be age-related changes in the opportunities and constraints for coping with heightened loneliness.

1.3.1 Age-related changes in future time perspective

Results from previous research on social aging suggest that a person's future time perspective – that is the subjective nearness to death – influences social motivations in profound ways. The socio-emotional selectivity theory (SST) (see, Carstensen et al., 1999; Lang & Carstensen, 2002) proposes that young adults tend to perceive their remaining lifetime as more or less open-ended. With advancing age, however, people may start to feel that their time is running out. According to SST, this age-related shift in time perspective leads to changes in the prioritization of different relationship goals. Specifically, due to their relatively extended time horizon, younger adults may generally be more motivated than older adults to seek out (social) experiences that stimulate learning and foster their long-term development. Therefore, compared to older adults, younger adults may seek out a higher diversity of social experiences and more contact with novel social partners (Carstensen et al., 1999; Lang & Carstensen, 2002). As people age and their time horizon gets more and more restricted, however, investing in long-term development may become less relevant. Instead, older people may start to prioritize emotionally meaningful experiences in the here and now (Carstensen et al., 1999; Lang & Carstensen, 2002). As a consequence, people may find the emotional qualities of social relationships, such as feeling close to others or having a high number of pleasant exchanges, more important as they grow older (Carstensen et al., 1999; Fung, Carstensen, & Lutz, 1999; Lang & Carstensen, 2002). A high quantity and diversity of social contact, in contrast, may lose importance with increasing age. Due to this goal shift, older people may adapt their social behavior (e.g. regarding the selection of social ties or the handling of interpersonal conflicts) to increase the emotional quality of social relationships (Luong et al., 2010). Hence, other than social relationship quantity, relationship quality may actually improve as people grow older.

1.3.2 Age-related changes in biological capacities and health

Age-related deteriorations of biological capacities and physical health are likely to accentuate the feeling that one's time is running out (Kooij & Van De Voorde, 2011). Biological changes, however,

may also have more direct effects on social behavior and relationship goals. Age-related changes in fertility, for instance, affect both the salience and relevance of goals related to mating and parenthood (Heckhausen, Wrosch, & Fleeson, 2001). Moreover, age-related changes in health and a person's physiological resilience to stress may influence the importance of social support and harmony in social relationships. As proposed in the model of strength and vulnerability integration, age-related physical changes might reduce a person's capacity to cope with the physiological consequences of distressing social exchanges (Charles, 2010). Older people may thus generally try to avoid social strain and establish harmony within their social contact. Moreover, as diseases and functional impairments start to accumulate, people may start prioritizing close and reliable social partners over peripheral and unstable ones.

Apart from influencing relationship goals, physical impairments also affect a person's opportunities for social engagement. As their physical fitness decreases, people may have to disengage from certain social activities leading to decreases in the quantity and diversity of social contact (Bukov et al., 2002; Huxhold et al., 2013; Luhmann & Hawkley, 2016). In a similar vein, physical impairments are likely to limit a person's possibilities for coping with loneliness. People with restricted mobility, for instance, may find it more difficult to actively tackle a feeling of loneliness by engaging in new social activities or establishing new social relationships. Instead, strongly impaired people may have to cope with loneliness by adjusting their relationship goals (see also, Brandtstaedter & Rothermund, 2002). Although downgrading one's relationship goals may effectively reduce loneliness, over the long term it could also contribute to a gradual decrease in the quantity and quality of a person's social relationships.

1.3.3 Age-related changes in social context

Age-related changes in biological capacities and health are not only intertwined with shifting time perspectives but also with changes in a person's social context. As people grow older, there is a substantial increase in the likelihood of experiencing involuntary relationship losses due to illness and deaths among one's social partners. Moreover, from young adulthood to old age, people experience a number of typical social role transitions that may influence both their social relationships and relationship goals. For young and middle-aged adults, the transition to parenthood is a common social role change that poses new opportunities and constraints to social activities. Parenting entails many time-consuming responsibilities that may restrict a person's possibilities for social leisure activities (Bost, Cox, Burchinal, & Payne, 2002; Claxton & Perry - Jenkins, 2008). Parents may, for instance, have to reduce social contact with other family members and friends in order to be able to fulfill their work and family responsibilities. At the same time,

parents may be likely to be engaged in several contexts that require frequent social engagement, such as work and social networks related to their children. Different changes occur during the transition to retirement – a common social role change in old adulthood. Compared to employees, retirees have fewer time constraints and more freedom to arrange social activities (Pinquart & Schindler, 2009; van Solinge, 2012). At the same time, their social involvement may become more dependent on their own initiative and self-regulatory ability (see also, Böger & Huxhold, 2017; Freund, Nikitin, & Ritter, 2009). Therefore, retirement may increase the risk for social isolation and loneliness among people who have difficulty building and/or maintaining social activities and relationships.

Importantly, not only one's own social role transitions, but also the role transitions of others may lead to changes in a person's relationship goals and social behavior across the life span. As the number of married couples within one's peer group increases, for instance, a person's partnership and mating goals may become more salient. As a consequence, singles may start to feel lonelier and increase their effort to find a suitable partner. In general, adults may feel more or less lonely depending on their perception of how normative their own social network is for someone of their age (see, Luhmann & Hawkley, 2016). In young adulthood, for example, it is common to have many non-familiar social ties as one searches for a romantic partner and builds a career. In addition, young adults tend to have good opportunities (e.g. social contact related to work and education) and few barriers (e.g. in term of health-related impairments) to establish and maintain relationships with friends and acquaintances. As people age, however, it becomes ever more likely that death and illness will reduce their network of friends and acquaintances. Hence, older adults may perceive having few non-familiar ties as more typical for people of their age group than younger adults. As a consequence, older adults with fewer friendships and acquaintances may feel less lonely than younger adults with similar social network characteristics.

In sum, not only contextual opportunities and constraints for social engagement, but also contextual relationship norms may change with age which most likely affects how people evaluate different characteristics of their social relationships. To understand how loneliness develops across the adult life span, it is thus necessary to consider age-related shifts in social relationships alongside age-related shifts in relationship goals and norms (see also, Luhmann & Hawkley, 2016).

1.4 Loneliness across the Adult Life Span: Research Questions and Hypotheses of this Dissertation

As discussed in Section 1.3, age-related changes in time perspective, biological capacities and social context are likely to influence a person's social relationships and relationship goals as well as the way in which people react to feelings of loneliness. To date, however, few empirical studies have examined how the experience of loneliness changes with age, and existing studies are characterized by a number of methodological limitations. Most importantly, the majority of studies relied on cross-sectional designs and age-homogenous samples. This dissertation seeks to narrow the existing research gap regarding age-related changes in the experience of loneliness by examining how not only the average level but also the social antecedents and the socio-motivational consequences of loneliness change across the adult life span. Figure 1-4 illustrates the major research questions of the dissertation that I discuss in more detail in the following sections.

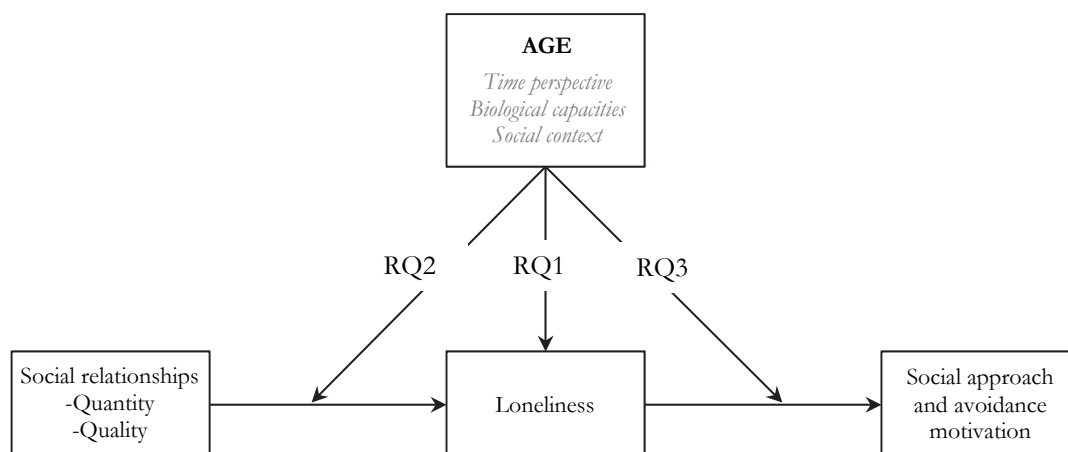


Figure 1-4. Summary of the research questions. The dissertation examines age-related changes in the average level of loneliness (RQ1) as well as in the relationship between social relationship characteristics and loneliness (RQ2) and in the relationship between loneliness and social motivations (RQ3).

1.4.1 Research question 1: How does the average level of loneliness change between midlife and old age?

Age-related decreases in biological capacities and health may force a reduction of social engagement with age. Moreover, illnesses and deaths among one's social partners may lead to involuntary losses of social relationships in old adulthood. Results from previous research support the notion that the number of social relationships and the frequency of social activities decrease as people grow older (Huxhold et al., 2013; Wrzus et al., 2013). Based on this observation, it is

often assumed that loneliness is most prevalent or intense among old adults (Tornstam, 2007). Previous studies based on cross-sectional age-differences in the prevalence or mean level of loneliness have provided little evidence that older people are lonelier than middle-aged and younger adults (Dykstra, 2009; Luhmann & Hawkey, 2016; Pinguart & Sörensen, 2001b; Tesch-Römer, Wiest, Wurm, & Huxhold, 2013). Importantly, however, very few longitudinal studies have examined how loneliness may change with age, as opposed to how loneliness differs between age groups. Cross-sectional studies cannot distinguish between changes in loneliness related to ontogeny and changes in loneliness related to historical developments. It is possible, however, that increases in loneliness across historical time counterbalance age-related increases in loneliness, resulting in the null-relationship between age and loneliness observed in previous cross-sectional studies. So far, empirical studies have not provided evidence that the prevalence of loneliness has increased across historical time (see, Dykstra, 2009). The number of long-term cohort studies, however, is at this point still restricted. Theoretically at least, loneliness might be more prevalent or intense in later born cohorts due to less stable partnerships and lower fertility rates which have resulted in smaller family networks (Eckhard, 2015; Grünheid & Sulak, 2016).

In sum, age-related changes in the average level of loneliness are insufficiently understood at this point. Thus, the first aim of this dissertation was to investigate how the average level of loneliness changes between midlife and old age, independent of potential changes in loneliness across historical time (see Figure 1-5). This research question is addressed in Chapters 2 and 3. Specifically, Chapter 2 details an empirical study investigating how rates of loneliness differ between historical cohorts of older adults, while Chapter 3 details a second empirical study examining how average the level of loneliness changes between midlife and old age using an accelerated longitudinal design.

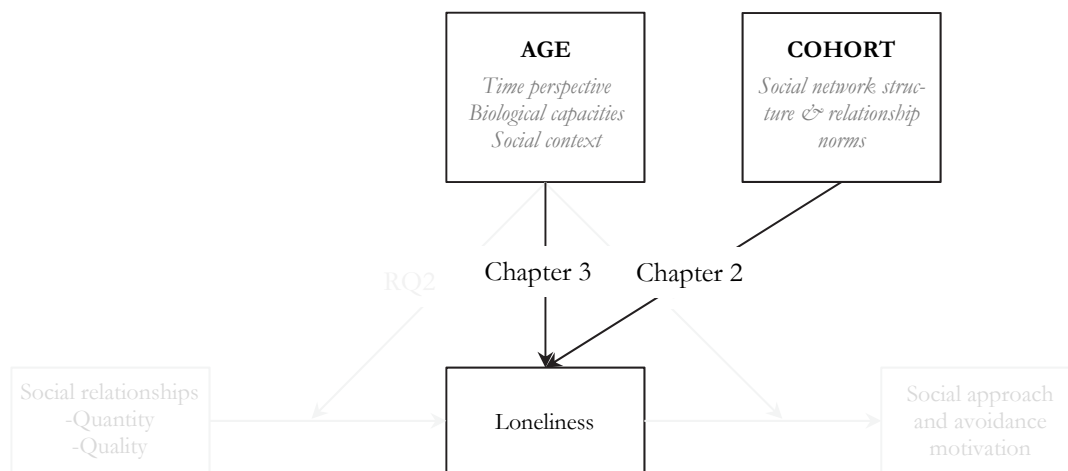


Figure 1-5. Illustration of the empirical analyses to answer research question 1. Aim of the analyses presented in Chapter 2 and 3 is to better differentiate historical changes from age-related changes in the average level of loneliness.

1.4.2 Research question 2: Do the social antecedents of loneliness change with age?

In a previous study, we found that reductions in the number of supportive relationships and in the frequency of social leisure activities gain relevance for predicting a person’s level of loneliness with increasing age (Böger & Huxhold, 2017). Age-related changes in social relationships, however, may involve not only losses but also gains. Empirical findings suggest, for instance, that aspects of relationship quality may improve rather than deteriorate with age (Luong et al., 2010). As discussed in Section 1.3.1, the SST proposes that people start to place a higher importance on emotionally meaningful experiences when approaching the end of their lives (Carstensen et al., 1999). Older people may also have a stronger urge to avoid straining experiences because they have more difficulty regulating physiological components of emotional distress (Charles, 2010). As a consequence of this goal shift, people may adjust their social behavior to actively increase the emotional quality of their social relationships (see, Luong et al., 2010). Previous studies suggest, for instance, that older adults are more likely than younger ones to select emotionally-satisfying social ties (Carstensen et al., 1999; English & Carstensen, 2014; Lang & Carstensen, 1994), to avoid negative social exchanges (Birditt, Fingerman, & Almeida, 2005) and to selectively attend to positive characteristics of their social context (Reed, Chan, & Mikels, 2014). At the same time, a high emotional quality of the social network may also become more relevant for maintaining a feeling of social connectedness with increasing age. Building on this previous research on social development, Chapter 3 examines how different aspects of social relationship quality (number of distressing ties, number of pleasant ties, relationship satisfaction) and their effects on loneliness may change with age (see Figure 1-6).

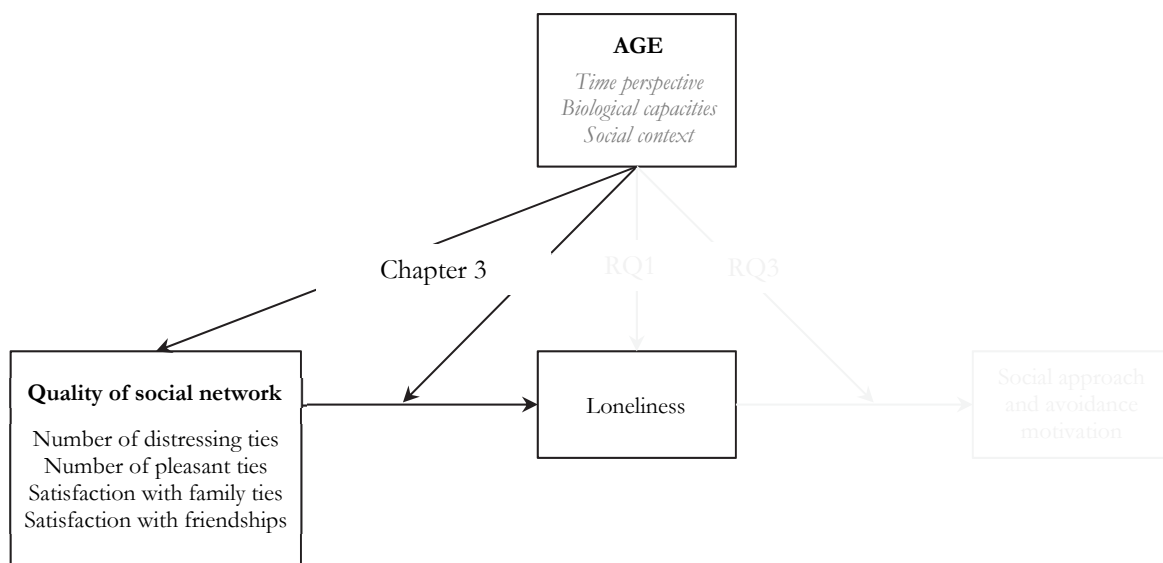


Figure 1-6. Illustration of the first part of the empirical analyses to answer research question 2. The analyses presented in Chapter 3 examine whether different aspects of the quality of the social network gain relevance for predicting loneliness with increasing age. It is also examined whether the quality of the social network improves with age.

It is hypothesized that (1) the qualitative aspects of people's social relationships would improve with age and that (2) qualitative aspects of social relationships would gain relevance for predicting loneliness with increasing age.

As a specific aspect of social relationships, Chapter 4 examines the extent to which the absence of a romantic partnership may become both less straining and less relevant as a predictor of loneliness as people grow older. Social norms about having a romantic partner appear to change across the adult life span (see also, Luhmann & Hawkley, 2016). A central developmental task of young adulthood is to establish a long-term partnership and by middle adulthood, living without a partner is the exception as opposed to the rule (Eckhard, 2015). For middle-aged adults, it may thus be particularly straining and stigmatizing to be a single person (Luhmann & Hawkley, 2016). With increasing age, however, fewer people have a committed partnership due to divorce/separation and widowhood. As a consequence, having a romantic partner may be less of a relationship norm for older than for middle-aged adults. In addition, older people may be less dependent on the presence of a steady partner to feel integrated and supported. Child rearing responsibilities, for instance, tend to decrease as people move from midlife to old age, which may decrease the relevance of having a romantic partner. In addition, older adults may have more high-quality relationships with long-term friends, children and other close family members (Luong et al., 2010) that provide not only support but also a sense of emotional closeness. Considering these changing partnership norms and social resources, it was hypothesized that partnership status would lose relevance for predicting differences in loneliness as people grow older (see Figure 1-7). Another assumption was that being single may be experienced as less straining with increasing age.

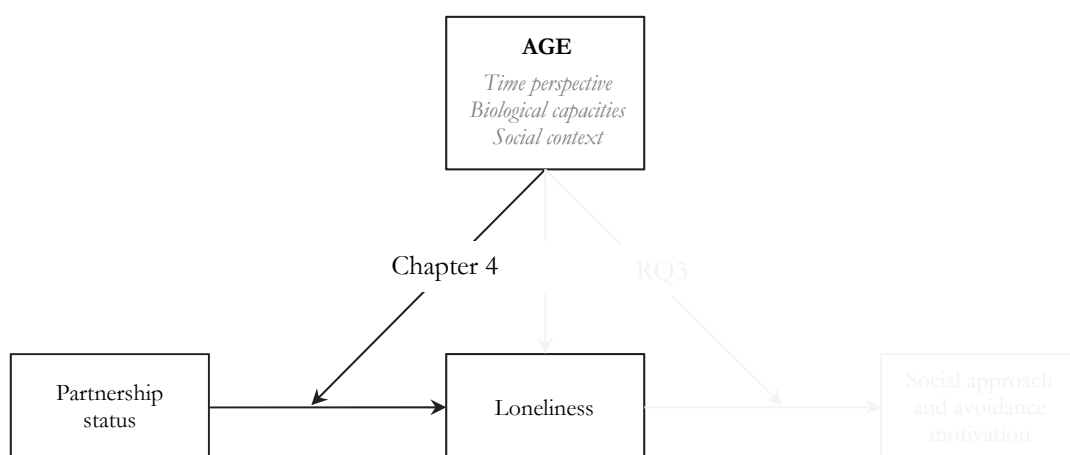


Figure 1-7. Illustration of the second part of the empirical analyses to answer research question 2. The analyses presented in Chapter 4 examine whether partnership status grows less relevant for predicting loneliness with increasing age.

1.4.3 Research question 3: Do the socio-motivational consequences of loneliness change with age?

As discussed in section 1.2.3, previous research suggests that changes in social relationships and relationship goals are not only social antecedents but also social consequences of loneliness (Böger & Huxhold, 2017; Cacioppo, Fowler, & Christakis, 2009; Cacioppo & Hawkey, 2009; Cacioppo, Hawkey, et al., 2006; Qualter et al., 2015). In an earlier study we found evidence suggesting that increases in people’s general level of loneliness predict decreases in both the number of close relationships and the frequency of social activities. Moreover, we found that the adverse effects of heightened loneliness gained strength from midlife to old age. The mechanisms behind this age-effect, however, are still unknown at this point. Chapter 5 seeks to narrow the research gap by examining whether loneliness differentially affects people’s social approach and avoidance motivation across adulthood (see Figure 1-8).

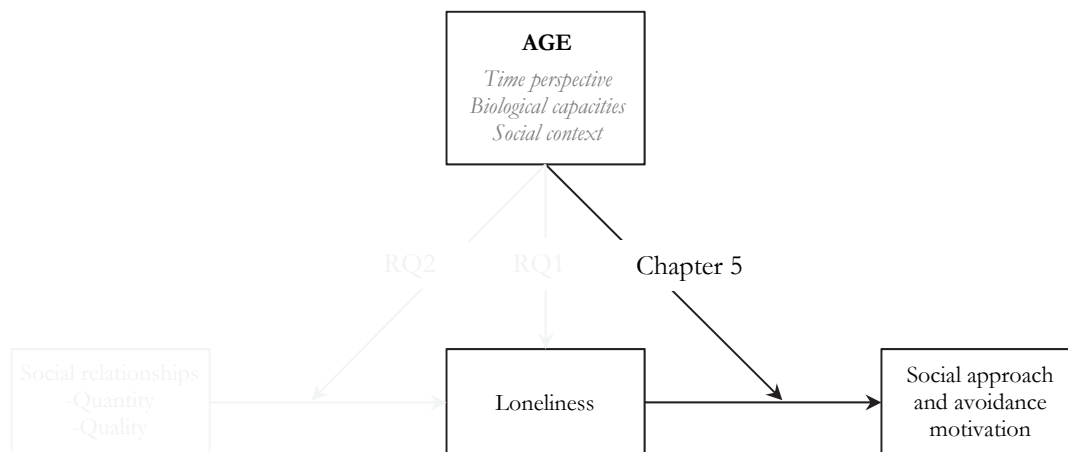


Figure 1-8. Illustration of the empirical analyses to answer research question 3. The analyses presented in Chapter 5 examine how increased loneliness affects social approach and avoidance motivation and how the socio-motivational effects of loneliness vary with age.

As previously discussed, loneliness may increase people’s motivation to approach positive social outcomes and to avoid (further) negative social experiences. To date, little is known about whether these socio-motivational consequences of loneliness change across the adult life span. Considering previous research on age-related changes in personal goals, however, it might be hypothesized that both the avoidance and the approach response to loneliness intensify with increasing age. As discussed in section 1.3.1, the SST proposes that satisfying social relationships and positive emotional states grow more important as people approach the end of their life’s (Carstensen et al., 1999). Therefore, loneliness, that is the emotionally unpleasant experience that one’s social relationships are deficient, may be more threatening to a person’s general well-being with increasing age. As a result, older adults may be more motivated than younger adults to avoid further

deteriorations in their social relationships when feeling lonely. At the same time, older adults may be also more motivated to seek out positive social experiences that could help to fulfil their prioritized goals of positive emotional states and pleasant relationships.

It is also possible, however, that approach responses to loneliness are less pronounced rather than more pronounced as people grow older. As discussed in section 1.3.2, age-related increases in physical impairments may limit the possibilities of older adults for engaging into an active, problem-focused coping with loneliness. People with restricted mobility, for instance, may find it more difficult to actively tackle a feeling of loneliness by engaging in new social activities or establishing new social relationships. Moreover, frequent antecedents of increased loneliness in old age, such as bereavement or health problems, may be rather difficult to influence. Therefore, compared to younger adults, older adults may be more likely to prefer passive, emotion-focused over active, problem-focused coping with loneliness. This means, instead of adapting their social behavior, older adults may rather downgrade their relationship goals or apply strategies of distraction to escape their feelings of loneliness (see also, Brandtstaedter & Rothermund, 2002; Charles, 2010).

Finally, it is also possible that basic socio-motivational effects of loneliness remain relatively stable across ontogeny. As argued by Cacioppo and colleagues (Cacioppo, Hawkley, et al., 2006; Goossens, 2018), immediate approach and avoidance reactions to loneliness may represent an evolutionary ingrained automatism, developed to rapidly protect a person from the negative consequences of social isolation. Inter-individual differences in people's immediate reactions to loneliness may be to a large extent attributable to genetically determined dispositions (Boomsma, Willemsen, Dolan, Hawkley, & Cacioppo, 2005) that remain relatively stable across the life span. As a consequence, the direct socio-motivational effects of loneliness may actually show little change as people grow older.

All in all, different theories and findings on loneliness and aging lead to opposing predictions regarding age-related differences in the socio-motivational effects of loneliness. In absence of pertinent empirical evidence, age-related differences in the relationship between heightened loneliness and the strength of social approach and avoidance motivation are examined exploratively with no clear hypotheses.

1.5 Data Sources for the Empirical Studies

The empirical analyses presented in Chapters 2 through 5 are based on four different datasets. The analyses discussed in Chapters 2 through 4 are based on data from the nationally representative German Ageing Survey (DEAS). DEAS is an ongoing study of adults in the second half of life (40 years and above) living in Germany (for a detailed description of the study and sample see, Klaus et al., 2017). The study is approved and funded by the Federal Ministry for Family Affairs, Senior Citizens, Women and Youth (BMFSFJ). DEAS covers a wide range of topics, including a person's social network structure and quality, a person's social activities and different indicators of psychological and social well-being. Data is collected via in-home interviews and self-administered questionnaires. Representative baseline cohorts of community-dwelling German adults aged 40 to 85 years were recruited in 1996, 2002, 2008 and 2014. All cohorts were selected through national probability sampling and were systematically stratified by gender, place of residence (Eastern vs. Western Germany) and age group (40 to 54 years, 55 to 69 years, 70 to 85 years). Available participants of each baseline cohort were re-interviewed in each subsequent wave of 2002, 2008 and 2014. Two additional assessment waves in 2011 and 2017 were restricted to longitudinal participants. The analyses in this dissertation used data from all DEAS waves except for 2017. Due to the wide age range of participants and the inclusion of different age cohorts, the DEAS is perfectly suited to estimate both historical and age-related changes over extended periods of time.

In the absence of appropriate DEAS data, the analyses of socio-motivational effects of loneliness presented in Chapter 5 are based on three other datasets. The first dataset came from a daily diary study with 744 German young (18-39 years), middle-aged (40-59 years) and older (60+ years) adults. The study was conducted at the University of Zurich as part of a larger project on age-differences in social motivation and assessed people's daily approach and avoidance goals as well as their daily level of loneliness. The second dataset came from an online study with 496 German young (18-39 years), middle-aged (40-59 years) and older (60+ years) adults that was designed to replicate the findings from the diary study with an experimental design. In this study, participants visualized a social situation that involved either a new or a close friend and reported to which extent they would endorse different approach and avoidance goals during this situation. Before doing so, half of the participants was asked to visualize and describe a moment during which they had felt very lonely (loneliness manipulation) while the other participants described the house or flat that they lived in (control manipulation). A third, independent study with 135 German young (18-39 years), middle-aged (40-59 years) and older (60+ years) adults was conducted beforehand to examine whether the loneliness visualization task led to an increase in the momentary level of loneliness and whether the effect was similar for young, middle-aged and older adults.

1.6 Summary: Research Questions and Structure of this Dissertation

Most empirical studies of loneliness have relied on cross-sectional designs and age-homogenous samples. Little is therefore known about how the experience of loneliness may change across the adult life span. Based on an integration of the existing literatures on loneliness and adult development, I identified three open questions and developed assumptions about how the level of loneliness, its social antecedents and social consequences may change across the adult life span. In Chapters 2 through 5 I detail a series of empirical studies that together address the three research questions of this dissertation (see Table 1-1 for summary of the research questions as well as an overview of the empirical analyses in Chapter 2 to 5). In Chapter 6 I summarize the results from all empirical studies and discusses their implications for research and practice.

Table 1-1

Summary of research questions, assumptions and empirical analyses of this dissertation

Assumptions	Empirical Analyses & Data
<i>Research questions 1: Does the average level of loneliness change between midlife and old age? (Chapters 2 & 3)</i>	
<p>The average level of loneliness may not only vary with age but also over historical time. Thus, results from previous cross-sectional studies on age-differences in loneliness may grant limited insight into how the level of loneliness <i>changes</i> from midlife to old age.</p>	<p><i>Chapter 2</i> compares average loneliness rates among independent cohorts of older adults to gain insights into cohort differences in loneliness. The analyses use cross-sectional data from DEAS waves 1996, 2002, 2008 & 2014 (age range of sample: 40-85 years).</p> <p><i>Chapter 3</i> estimates age-related <i>changes</i> in the average level of loneliness from midlife into old age using an accelerated longitudinal design. The analyses use data from DEAS waves 2002, 2008 & 2011 (age range of sample: 40 to 83 years).</p>
<i>Research questions 2: Do the social antecedents of loneliness change with age? (Chapters 3 & 4)</i>	
<p>Other than social network size, the overall quality of a person's social network may improve with age. Due to shifting relationship goals, the strengths of predictive relationships between different aspects of social relationships and loneliness may change with age.</p>	<p><i>Chapter 3</i> analyses:</p> <ol style="list-style-type: none"> (1) Age-related changes in different aspects of social network quality and (2) Age-related changes in the predictive relationships between different aspects of social network quality and loneliness from midlife into old age using an accelerated longitudinal design. <p>The analyses use longitudinal data from DEAS waves 2002, 2008 & 2011 (age range of sample: 40 to 83 years).</p> <p><i>Chapter 4</i> analyses age-related changes in the relationship between partnership status and loneliness from midlife into old age. The analyses use data from DEAS waves 2008 & 2014 (age range of sample: 40 to 83 years).</p>
<i>Research questions 3: Do the socio-motivational consequences of loneliness change with age? (Chapter 5)</i>	
<p>Increased loneliness may affect the strength of people's social approach and social avoidance goals. The socio-motivational effects of loneliness may change with age.</p>	<p><i>Chapter 5</i> analyses age-related differences in the relationship between heightened loneliness and the strength of social approach and avoidance goals in different social situations. The analyses use cross-sectional data from a daily diary study (<i>Study 1</i>, age range of sample: 18 to 83 years) and two experimental studies conducted online (<i>Study 2</i>, age range of sample: 20 to 85 years and <i>Study 3</i>, age range of sample: 18 to 87 years).</p>

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Chapter 2

Allein unter vielen oder zusammen ausgeschlossen: Einsamkeit und wahrgenommene soziale Exklusion in der zweiten Lebenshälfte.

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Böger A., Wetzel M. & Huxhold O. (2017). Allein unter vielen oder zusammen ausgeschlossen: Einsamkeit und wahrgenommene soziale Exklusion in der zweiten Lebenshälfte [Alone in the crowd or collectively excluded: Loneliness and perceived social exclusion in the second half of life]. In: Mahne K., Wolff J., Simonson J., Tesch-Römer C. (eds) *Altern im Wandel [Aging in the course of time]*. Springer VS, Wiesbaden.

This chapter does not exactly replicate the final version of the chapter published in “Altern im Wandel”. Please do not copy or cite without author's permission. The final chapter is available at https://doi.org/10.1007/978-3-658-12502-8_18

Abstract

Only few adults in the second half of life report loneliness or perceived social exclusion in 2014 – adults who are 70 years or older report loneliness less frequently than younger adults:

In 2014, about 1 in 10 adults aged 40 to 69 years reports feelings of loneliness. In contrast to that, only 7.1 percent of the adults aged 70 to 85 years report loneliness in 2014. Perceived social exclusion is reported by 6.4 percent of the adults aged 40 to 85 years in 2014.

Among people aged 71 years or more, the percentage of lonely people decreased between 1996 and 2014: Among people aged 42 to 70 years, the percentage of lonely people remained stable between 1996 and 2014. In contrast to that, the percentage of lonely people decreased by 5 percentage points among people aged 71 to 77 years and by 8 percentage points among people aged 78 to 83 years between 1996 and 2014.

People with a below-average number of relationships able to provide advice or emotional comfort in times of need are more frequently lonely: People with a below-average number of relationships able to provide advice in times of need are more frequently lonely (13.7 percent) than people with an at least average number of potential advisers (7.0 percent). In a similar vein, loneliness is more common among people with a below-average number of people able to provide emotional comfort in times of need (12.6 percent versus 6.5 percent).

People living in poverty or having low education have a much higher risk of feeling excluded from society: Among people living in poverty, the prevalence of perceived social exclusion is about three times higher than among people not living in poverty (17.6 percent versus 4.9 percent). In a similar vein, feelings of social exclusion are much more common among people with low education (16.7 percent) than among people with high education (3.7 percent).

People feeling socially excluded have a much higher risk to feel lonely than people not feeling socially excluded: In 2014, loneliness and perceived social exclusion are often experienced in parallel. Almost half (41.7 percent) of the people feeling socially excluded does also feel lonely. Among people not feeling socially excluded, the percentage of lonely people is not higher than 6.7. percent.

Kernaussagen

Die 40- bis 85-Jährigen fühlen sich im Jahr 2014 selten einsam oder gesellschaftlich ausgeschlossen – Personen über 70 Jahre sind dabei seltener einsam als Jüngere: Etwa jede und jeder zehnte 40-bis 69-Jährige berichtet im Jahr 2014 von Einsamkeit. Bei den 70- bis 85-Jährigen sind es hingegen nur 7,1 Prozent. Im Jahr 2014 fühlen sich zudem 6,4 Prozent der 40- bis 85-Jährigen gesellschaftlich ausgeschlossen.

Bei den über 71-Jährigen ist der Anteil einsamer Personen im Jahr 2014 geringer als im Jahr 1996: Unter den 42- bis 72-Jährigen berichten im Jahr 2014 ähnlich viele Personen von Einsamkeit wie im Jahr 1996. Bei den 72- bis 77-Jährigen ist der Anteil einsamer Personen im Jahr 2014 hingegen um etwa fünf Prozentpunkte und bei den 78- bis 83-Jährigen sogar um etwa acht Prozentpunkte geringer als im Jahr 1996.

Personen mit einer unterdurchschnittlichen Anzahl von Beziehungen, in denen sie Rat oder Trost erhalten können, berichten häufiger von Einsamkeit: Personen mit einer unterdurchschnittlichen Anzahl von Beziehungen, die mit Rat unterstützen können, erleben häufiger Einsamkeit (13,7 Prozent) als Personen mit einer mindestens durchschnittlichen Anzahl von Ratgeberinnen und Ratgebern (7,0 Prozent). Auch bei Personen mit einer unterdurchschnittlichen Anzahl von Personen, die Trost spenden können, ist der Anteil einsamer Personen bedeutsam erhöht (12,6 Prozent versus 6,5 Prozent).

Personen in Armut und Personen mit geringer Bildung haben ein deutlich höheres Risiko, sich aus der Gesellschaft ausgeschlossen zu fühlen: Bei Personen, die in Armut leben ist der Anteil von Personen mit wahrgenommener sozialer Exklusion rund drei Mal höher als bei Personen, die nicht von Armut betroffen sind (17,6 Prozent versus 4,9 Prozent). Ebenso gibt es in der Gruppe der Niedriggebildeten deutlich mehr Personen, die sich gesellschaftlich ausgeschlossen fühlen (16,7 Prozent) als in der Gruppe der Hochgebildeten (3,7 Prozent).

Personen, die sich als sozial exkludiert wahrnehmen, haben ein deutlich höheres Einsamkeitsrisiko als Personen, die sich nicht als sozial exkludiert wahrnehmen: Im Jahr 2014 gehen Einsamkeit und wahrgenommene soziale Exklusion oft Hand in Hand. Fast die Hälfte (41,7 Prozent) der Personen, die sich gesellschaftlich ausgeschlossen fühlen, erlebt auch Einsamkeit. Bei Personen, die sich nicht sozial exkludiert fühlen, beträgt der Anteil einsamer Personen hingegen nur 6,7 Prozent.

2.1 Einleitung

Wenn Menschen sich dauerhaft isoliert oder ausgeschlossen fühlen, kann dies gravierende Konsequenzen in unterschiedlichen Lebensbereichen haben. Anhaltende Gefühle der Isolation können nicht nur mit depressiven Symptomen (Cacioppo, Hughes, Waite, Hawkley, & Thisted 2006b) sondern auch mit gesundheitlichen Beeinträchtigungen und einer erhöhten Mortalität einhergehen (Hawkley, Thisted, Masi, & Cacioppo 2010; Luo, Hawkley, Waite, & Cacioppo 2012). Des Weiteren können Ausgeschlossenheitsgefühle prosoziales Verhalten vermindern (Twenge, Baumeister, DeWall, Ciarocco, & Bartels 2007) und so den sozialen Zusammenhalt gefährden (Castel, Dörre, & Bescherer 2009).

Oft fühlen Menschen sich dann ausgeschlossen oder isoliert, wenn die Menge oder Qualität ihrer persönlichen Beziehungen die eigenen Beziehungsbedürfnisse nicht erfüllt. Diese Erfahrung wird als ‚Einsamkeit‘ bezeichnet und ist ein wichtiger Indikator für die Qualität der persönlichen Integration (De Jong-Gierveld 1987). Darüber hinaus können sich Menschen auch auf der gesellschaftlichen Ebene ausgeschlossen fühlen, eine Erfahrung, die als wahrgenommene soziale Exklusion bezeichnet wird (Bude & Lantermann 2006). Um die Besonderheiten und Zusammenhänge zwischen beiden Ausgeschlossenheitserlebnissen besser zu verstehen, kann eine übergreifende Perspektive hilfreich sein. Nach einer Betrachtung von Einsamkeit im sozialen Wandel, widmet sich dieses Kapitel daher der Untersuchung von Gemeinsamkeiten und Unterschieden in den Risiken und dem Auftreten von Einsamkeit und wahrgenommener sozialer Exklusion.

Seit 1996 haben die persönlichen Beziehungsnetzwerke der 40- bis 85-Jährigen einen umfassenden Wandel erfahren (vgl. Kapitel 12 bis 14 sowie 17). Denkbar ist, dass diese Veränderungen die Häufigkeit des Einsamkeitserlebens beeinflusst haben. Bisherige Befunde des Deutschen Alterssurveys (DEAS) weisen darauf hin, dass sich der Anteil einsamer Personen von 1996 bis 2002 leicht verringert hat und danach stabil geblieben ist (Tesch-Römer, Wiest, Wurm, & Huxhold 2013). Es wird untersucht, wie sich dieser Trend bis zum Jahr 2014 fortgesetzt hat. Eine Möglichkeit ist, dass Veränderungen der familialen Beziehungsstrukturen, zum Beispiel in Form wachsender Wohndistanzen oder rückläufiger Eheschließungen, einen größeren Anteil einsamer Personen bedingen (vgl. Kapitel 13 & 14; vgl. Tesch-Römer et al. 2013). Allerdings muss ein Rückgang traditioneller Beziehungsmodelle nicht zwangsweise eine Verringerung der sozialen Integration nach sich ziehen. Die Aufwertung von Freundschaften (vgl. Kapitel 17) und alternativen Partnerschaftsmodellen (vgl. Kapitel 13) kann nicht nur die Vielfalt persönlicher Beziehungsnetzwerke erhöhen, sondern auch neue Wege für das Sicherstellen sozialer Zugehörigkeit ermöglichen. Es ist somit denkbar, dass die Einsamkeitsquoten auch zwischen 2008 und 2014 eher stabil bleiben. Die Trends im Auftreten von Einsamkeit könnten sich zwischen den Altersgruppen jedoch unterschiedlich entwickelt haben. Von 1996 bis 2008 haben die Einsamkeitsquoten vor allem bei den 70- bis 85-

Jährigen abgenommen, während sie in anderen Altersgruppen weitestgehend stabil geblieben sind (Tesch-Römer et al. 2013). Dies könnte sich darauf zurückführen lassen, dass eine zunehmende Lebenserwartung und eine verbesserte Gesundheit vor allem bei Älteren zu einer Steigerung von sozialen Aktivitäten und einer Verringerung sozialer Verluste führen. So hat sich beispielsweise der Anteil der 70- bis 85-Jährigen, die Verwitwung erfahren haben, in den letzten Jahrzehnten bedeutsam verringert (Engstler & Tesch-Roemer 2010). Zu vermuten ist, dass diese Abnahme beziehungsweise Verzögerung des Partnerverlusts dazu beiträgt, dass sich die Häufigkeit von Einsamkeit gerade bei über 70-Jährigen bedeutsam verringert hat.

Eine geringe Einbindung in enge und unterstützende Beziehungsnetzwerke gilt als bedeutendes Risiko für das Entstehen von Einsamkeit (De Jong Gierveld, van Groenou, Hoogendoorn, & Smit 2009; Hawkey, Hughes, Waite, Masi, Thisted, & Cacioppo 2008). Um sich gesellschaftlich zugehörig zu fühlen, kann diese persönliche Ebene der Integration jedoch von untergeordneter Bedeutung sein. Stattdessen wird davon ausgegangen, dass Personen sich als sozial exkludiert wahrnehmen, wenn sie nicht an den kulturellen Standards teilhaben können (zum Beispiel Konsum) oder ihre politischen Einflusststrukturen marginalisiert werden (zum Beispiel Wahlrecht) (Marlier & Atkinson 2010). Wahrgenommene soziale Exklusion könnte somit stärker durch Merkmale der sozioökonomischen Stellung, wie beispielsweise Armut und Bildung, bestimmt sein (Bude & Lantermann 2006).

Soziale Netzwerke und die sozioökonomische Stellung unterscheiden sich häufig zwischen Altersgruppen sowie zwischen Männern und Frauen. Das Auftreten von Einsamkeit und sozialem Exklusionsempfinden könnte somit mit dem Alter und Geschlecht variieren. Wie in Kapitel 17 dargestellt, nennen Männer häufig eine geringere Anzahl von engen und unterstützenden Beziehungen und weniger Potenzial für soziale Unterstützung (Antonucci & Akiyama 1987; Huxhold, Mahne, & Naumann 2010). Dies lässt vermuten, dass Männer häufiger von Einsamkeit berichten als Frauen. Gleichzeitig könnten Frauen aufgrund ihrer tendenziell schlechteren Einbindung in den Erwerbsmarkt häufiger soziale Exklusion empfinden als Männer (vgl. Kapitel 3). Auch ein höheres Alter kann mit unterschiedlichen Risiken für Einsamkeit und soziale Exklusion einhergehen. So sind ältere Personen trotz eines kleineren sozialen Netzwerkes nicht unbedingt einsamer, was unter anderem mit den qualitativ hochwertigen und engen Beziehungen Älterer begründet werden könnte (Luong, Charles, & Fingerman 2010). Vor allem Personen ab 70 Jahren könnten sich jedoch häufiger exkludiert fühlen als Jüngere, weil sie seltener ehrenamtlich engagiert sind (vgl. Kapitel 5) und weil sie nicht mehr am Erwerbsleben teilhaben. Des Weiteren kommt es beim Übergang in den Ruhestand oft zu einer Verringerung des Einkommens und dadurch zu einer Reduktion von Konsummöglichkeiten (vgl. Kapitel 6).

Trotz des unterschiedlichen Ursprungs von Einsamkeit und Gefühlen der sozialen Exklusion ist ein enger Zusammenhang beider Erfahrungen zu erwarten. Kritische Lebensereignisse, wie beispielsweise der Verlust des Arbeitsplatzes oder der Tod des Ehepartners, können sowohl die sozioökonomische Stellung einer Person als auch ihre persönliche Integration negativ beeinflussen. Es ist somit davon auszugehen, dass es Personen gibt, die gleichzeitig Risiken für Einsamkeit und soziale Exklusion erfahren. Des Weiteren weisen Studien darauf hin, dass das Erleben von Ausgeschlossenheit die Entwicklung negativer Wahrnehmungsmuster (zum Beispiel Misstrauen) und das Auftreten antisozialer Verhaltensweisen (zum Beispiel Aggression oder Rückzug aus Beziehungen) befördert (Cacioppo, Hawkley, Ernst, Burleson, Berntson, Nouriani, & Spiegel 2006a; Twenge et al. 2007). Auf diese Art könnte wahrgenommene soziale Exklusion die Qualität persönlicher Interaktionen negativ beeinflussen und die Entwicklung von Einsamkeit fördern. Ebenso könnte auch Einsamkeit zum Rückzug aus dem gesellschaftlichen Leben beitragen und darüber zu einem Anstieg sozialen Exklusionserlebens führen. Auf lange Sicht beeinträchtigen beide Ausgeschlossenheitsgefühle also nicht nur das persönliche Wohlbefinden, sondern möglicherweise auch die Entwicklung und Aufrechterhaltung von persönlichen Beziehungen und des gesellschaftlichen Engagements. Die Entwicklung negativer Wahrnehmungsmuster kann zudem ein Hindernis für die Inanspruchnahme von privaten und professionellen Unterstützungsangeboten sein, wodurch Gefühle der Ausgeschlossenheit zu einer sich selbst verstärkenden und andauernden Erfahrung werden können.

Angesichts dieser Risiken ist es von hoher Relevanz zu untersuchen, wie häufig und unter welchen Bedingungen die 40- bis 85-Jährigen Gefühle der Einsamkeit und der sozialen Exklusion erleben und wie beide Erfahrungen zusammenhängen. In diesem Kapitel werden hierzu folgende Fragen adressiert:

1. Wie hat sich die Häufigkeit von Einsamkeit gewandelt und unter welchen Bedingungen fühlen sich Personen im Jahr 2014 einsam?
2. Unter welchen Bedingungen nehmen sich Personen im Jahr 2014 als sozial exkludiert wahr?
3. Wie hängen Einsamkeit und wahrgenommene soziale Exklusion zusammen?

2.2 Datengrundlage

Daten. Für die Beantwortung der Fragestellungen werden die Daten der 40- bis 85-Jährigen Teilnehmerinnen und Teilnehmer des DEAS aus den Jahren 1996, 2002, 2008 und 2014 genutzt. Einsamkeit wird seit 1996 im schriftlichen Fragebogen erfasst. Wahrgenommene soziale Exklusion wurde im Jahr 2014 erstmalig im schriftlichen Fragebogen erhoben.

Einsamkeit. Zur Erfassung von Einsamkeit wurde eine kurze Skala verwendet (nach De Jong Gierveld & Van Tilburg 2006, modifiziert). In diesem Instrument werden den Befragten sechs Aussagen zur Einschätzung ihrer persönlichen Zugehörigkeit präsentiert. Zwei dieser Aussagen sind beispielsweise „Ich vermisse Leute, bei denen ich mich wohl fühle“ und „Es gibt genügend Menschen, mit denen ich mich eng verbunden fühle“. Für jede Aussage wird auf einer Skala von eins (trifft genau zu) bis vier (trifft gar nicht zu) eingeschätzt, wie sehr sie die eigene Situation beschreibt. Wenn nötig wurden die Antworten umkodiert, sodass hohe Werte eine hohe Einsamkeit abbilden. Anschließend wurde ein Mittelwert über alle Antworten errechnet. Liegt der Mittelwert bei 2,6 oder höher gelten Personen als ‚einsam‘. Dieser Wert zeigt an, dass Personen die Mehrheit aller Einsamkeit implizierenden Aussagen als eher oder genau zutreffend eingeschätzt haben.

Wahrgenommene soziale Exklusion. Auch die wahrgenommene soziale Exklusion wurde über eine kurze Abfrage mit vier Aussagen zur Einschätzung der gesellschaftlichen Zugehörigkeit erfasst. Zwei dieser Aussagen sind beispielsweise „Ich habe das Gefühl, gar nicht richtig zur Gesellschaft zu gehören“ und „Ich habe das Gefühl, im Grunde gesellschaftlich überflüssig zu sein“. Ebenfalls auf einer Skala von eins (trifft genau zu) bis vier (trifft gar nicht zu) schätzen die Befragten für jede Aussage ein, wie gut sie ihre eigene Situation beschreibt. Alle Antworten wurden umkodiert, sodass hohe Werte eine hohe wahrgenommene soziale Exklusion abbilden. Wie bei Einsamkeit wurden alle Antworten zu einem Mittelwert verrechnet. Als Schwellenwert für das Anzeigen wahrgenommener sozialer Exklusion wurde ebenfalls der Wert 2,6 gewählt, da Personen über diesem Wert die Mehrheit aller Exklusion implizierenden Aussagen als eher oder genau zutreffend bewertet haben.

Armut. Personen mit einem äquivalenzgewichteten Haushaltsnettoeinkommen von monatlich weniger als 880 Euro wurden als einkommensarm klassifiziert (vgl. Kapitel 6). Diese Grenze entspricht 60 Prozent des Medians der äquivalenzgewichteten Haushaltsnettoeinkommensverteilung in der Population und ist ein häufig verwendeter Schwellenwert für die Feststellung relativer Einkommensarmut.

Persönliche Integration. Zur Einschätzung der persönlichen Integration wurden zwei Maße zur sozialen Unterstützung herangezogen (vgl. Kapitel 17). Zum einen wurden die Befragten gebeten bis zu fünf Personen zu nennen, an die sie sich wenden können, um nach Rat zu fragen (Potenzial

für informationelle Unterstützung). Zum anderen nannten die Befragten bis zu fünf Personen, an die sich wenden können um Trost oder Aufmunterung zu erhalten (Potenzial für emotionale Unterstützung). Aus den Angaben wurde die Anzahl der potenziell zur Verfügung stehenden Personen für Rat beziehungsweise für Trost (null bis fünf) ermittelt. Zur besseren Veranschaulichung bedeutsamer Zusammenhänge wurde zudem ein dichotomer Indikator gebildet. Die Kategorisierung basiert auf der mittleren Anzahl der Personen für Rat beziehungsweise Trost im Jahr 2014 (Personen für Rat $M = 2,2$; Personen für Trost $M = 2,0$). Die Anzahl von Personen, die informationelle beziehungsweise emotionale Unterstützung leisten können, wurde in unterdurchschnittlich (weniger als zwei) und mindestens durchschnittlich (zwei und mehr) unterteilt.

Gruppierungsvariablen. Zur Prüfung von Altersunterschieden im Jahr 2014 wurden – analog zur Schichtung der Stichprobe – drei Altersgruppen verwendet: 40- bis 54-Jährige, 55- bis 69-Jährige und 70- bis 85-Jährige. Altersunterschiede im Wandel wurden anhand von Sechs-Jahres-Altersgruppen untersucht, um Überschneidungen zwischen Erhebungszeitpunkten und Altersgruppen zu vermeiden (42- bis 47-Jährige, 48- bis 53-Jährige, 54- bis 59-Jährige, 60- bis 65-Jährige, 66- bis 71-Jährige, 72- bis 77-Jährige, 78- bis 83-Jährige). Neben Altersunterschieden wurden auch Unterschiede nach Geschlecht und Bildungsgruppe betrachtet. Zur Untersuchung von Bildungsunterschieden wurden – basierend auf einer reduzierten ISCED-Klassifizierung – drei Bildungsgruppen unterschieden: niedrige, mittlere und hohe Bildung (vgl. Kapitel 2).

Um Gruppenunterschiede auf ihre statistische Signifikanz zu testen, wurden logistische Regressionsanalysen berechnet, wobei für die Stratifizierungsvariablen Altersgruppe, Geschlecht und Region (Ost-/Westdeutschland) kontrolliert wurde. In den Beschreibungen von Alters-, Geschlechts- und Bildungsunterschieden im Auftreten von Einsamkeit beziehungsweise sozialem Exklusionsempfinden werden die gewichteten Häufigkeiten berichtet. Für die Darstellung der Zusammenhänge von Einsamkeit und Exklusionsempfinden mit dem Armutsstatus und den Indikatoren persönlicher Integration (Personen für Rat beziehungsweise Trost) sind die Anteile hingegen direkt aus am Mikrozensus gewichteten logistischen Regressionen geschätzt worden. Das genaue Vorgehen ist in Kapitel 2 beschrieben.

2.3 Ergebnisse

2.3.1 Einsamkeit

Im Jahr 2014 erlebt etwa jede und jeder zehnte 40- bis 85-Jährige Einsamkeit (8,9 Prozent, Abbildung 2-2). Von 1996 bis 2002 hat sich der Anteil einsamer Personen bedeutsam reduziert und ist danach stabil geblieben (1996: 10,7 Prozent, 2002: 7,7 Prozent; 2008: 8,7 Prozent). Der Vergleich von 2008 und 2014 zeigt, dass sich der Anteil einsamer Personen auch in jüngster Zeit kaum verändert hat (vgl. Tabelle A1 im Anhang A).

Bei den über 71-Jährigen ist der Anteil einsamer Personen im Jahr 2014 geringer als im Jahr 1996.

Das Muster der Veränderungen unterscheidet sich hierbei zwischen den Altersgruppen (Abbildung 2-1). Bei Personen, die 72 Jahre oder älter sind ist der Anteil von Personen, die sich einsam fühlen im Jahr 2014 bedeutsam geringer als im Jahr 1996. Bei den 72- bis 77- Jährigen hat sich diese Verringerung bereits im Jahr 2002 gezeigt, während sie bei den 78- bis 83-Jährigen erst im Jahr 2008 erkennbar war. Im Gegensatz dazu sind bei Personen unter 72 Jahren lediglich temporäre Schwankungen nicht aber systematische Veränderungen im Auftreten von Einsamkeit erkennbar. Bei den 48- bis 53-Jährigen und den 60- bis 65-Jährigen hat sich der Anteil einsamer Personen von 1996 bis 2002 verringert, ist im Jahr 2008 jedoch wieder angestiegen. Im langfristigen Trend ist das Auftreten von Einsamkeit bei den Jüngeren daher weitestgehend stabil: in allen Altersgruppen von 40 bis 71 Jahren unterscheidet sich der Anteil einsamer Personen im Jahr 2014 nicht bedeutsam von dem Anteil im Jahr 1996.

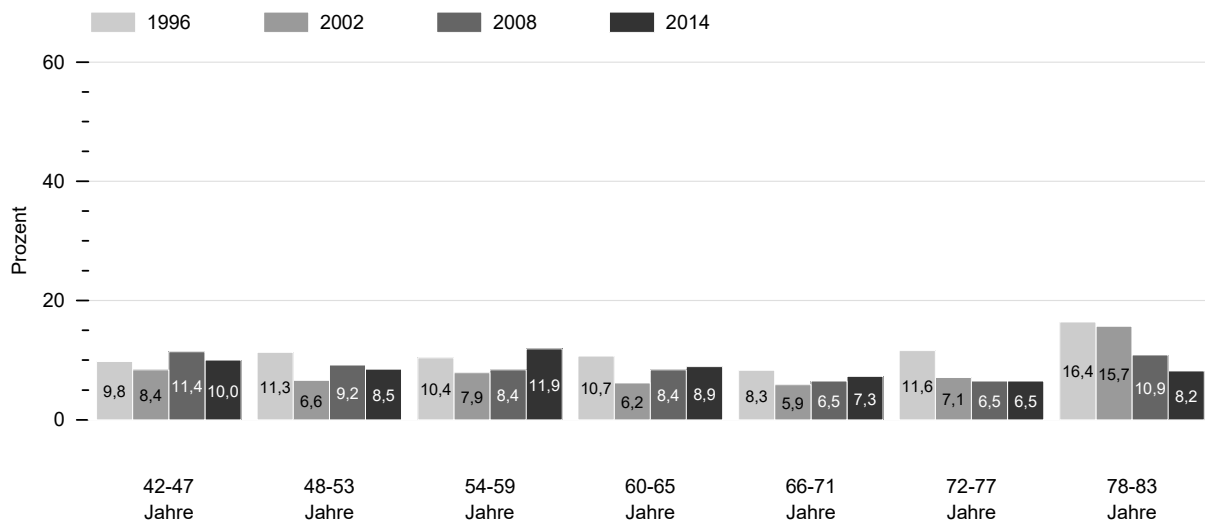


Abbildung 2-1. Anteile von Personen mit Einsamkeit nach Alter. Vergleich von 1996, 2002, 2008 und 2014 (in Prozent). Quelle: DEAS 1996 (n = 3.979), 2002 (n = 2.766), 2008 (n = 4.392), 2014 (n = 4.216) gewichtet, gerundete Angaben; ($p < ,05$). Signifikante Unterschiede zwischen 1996 und 2014 nur bei den 72- bis 77-Jährigen sowie bei den 78- bis 83-Jährigen. Keine signifikanten Unterschiede zwischen 1996 und 2014 bei allen Altersgruppen unter 72 Jahren. Signifikante Abnahme bei den 72- bis 77-Jährigen zwischen 1996 und 2002, danach stabil. Signifikante Abnahme zwischen 2002 und 2008 bei den 78- bis 83-Jährigen, danach stabil. Signifikante Abnahme zwischen 1996 und 2002 bei den 48- und 53-Jährigen und bei den bei 60- bis 65-Jährigen, danach signifikanter Anstieg.

Die 40- bis 85-Jährigen fühlen sich im Jahr 2014 selten einsam oder gesellschaftlich ausgeschlossen – Personen über 70 Jahre sind dabei seltener einsam als Jüngere.

Insgesamt berichten die 40- bis 85-Jährigen im Jahr 2014 also selten von Einsamkeit (8,9 Prozent, Abbildung 2-2) und sie nehmen sich auch selten als gesellschaftlich ausgeschlossen wahr (6,4 Prozent, Abbildung 2-4). Im Einklang mit dem altersdifferenziellen Wandel im Anteil einsamer Personen (Abbildung 2-1) unterscheidet sich das Auftreten von Einsamkeit im Jahr 2014 zwischen den Altersgruppen. So berichten rund sieben Prozent der 70- bis 85-Jährigen, dass sie sich einsam fühlen, während es in den beiden jüngeren Altersgruppen jeweils etwa zehn Prozent sind (Abbildung 2-2). Der Anteil einsamer Personen unterscheidet sich nicht bedeutsam zwischen Männern und Frauen (vgl. Tabelle A1 im Anhang A) jedoch zwischen Personen mit unterschiedlicher sozioökonomischer Stellung. So geben nur 7,3 Prozent der Hochgebildeten an, sich einsam zu fühlen, während es in der Gruppe der Personen mit niedriger Bildung 14,7 Prozent sind (Abbildung 2-2). Noch deutlichere Unterschiede bestehen zwischen Personen mit verschiedenem Armutstatus. Während 7,9 Prozent der Personen, die nicht in Armut leben Einsamkeit berichten, sind es bei den Personen in Armut 19,7 Prozent.

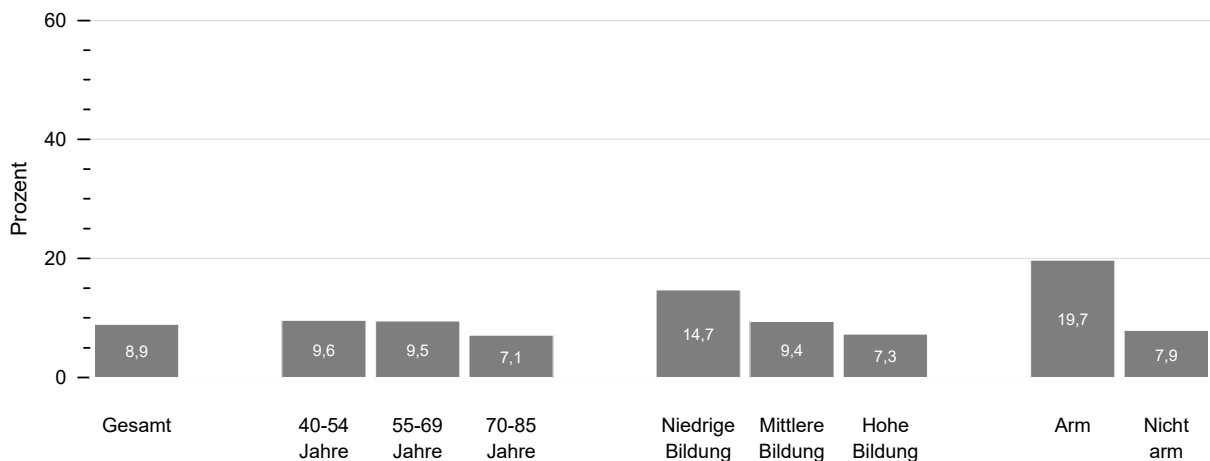


Abbildung 2-2. Anteile von Personen mit Einsamkeitsempfinden nach Alter, Bildung und Armutsstatus (in Prozent) 2014. Quelle: DEAS 2014 (n = 4.216), gewichtet, gerundete Angaben; ($p < ,05$). Signifikante Unterschiede zwischen 70- bis 85-Jährigen und 55- bis 69-Jährigen sowie 40- bis 54-Jährigen. Kein signifikanter Unterschied zwischen 40- bis 54-Jährigen und den 55- bis 69-Jährigen. Alle Bildungsgruppenunterschiede signifikant. Signifikanter Unterschied zwischen den Armutsgruppen.

Personen mit einer unterdurchschnittlichen Anzahl von Beziehungen, in denen sie Rat oder Trost erhalten können, berichten häufiger Einsamkeit.

Wie erwartet, variiert der Anteil einsamer Personen auch bedeutsam mit dem Potenzial für soziale Unterstützung. Eine geringere Anzahl von Personen, die emotionale Unterstützung leisten können steht mit einem erhöhten Auftreten von Einsamkeitsgefühlen in Verbindung. Auch eine geringere Anzahl von verfügbaren Ratgeberinnen und Ratgebern geht mit einer höheren Wahrscheinlichkeit für Einsamkeit einher. Abbildung 2-3 illustriert diese Zusammenhänge anhand des Vergleichs von Personen mit unterdurchschnittlich vielen Beziehungen (weniger als zwei Personen) und mindestens durchschnittlich vielen Beziehungen (zwei oder mehr Personen), die Trost beziehungsweise Rat geben können. Der Anteil einsamer Personen ist in den Gruppen mit unterdurchschnittlichem Unterstützungspotenzial bedeutsam höher (12,6 Prozent beziehungsweise 13,7 Prozent) als bei Personen mit mindestens durchschnittlichem Potenzial für Trost beziehungsweise Rat (6,5 Prozent beziehungsweise 7,0 Prozent).

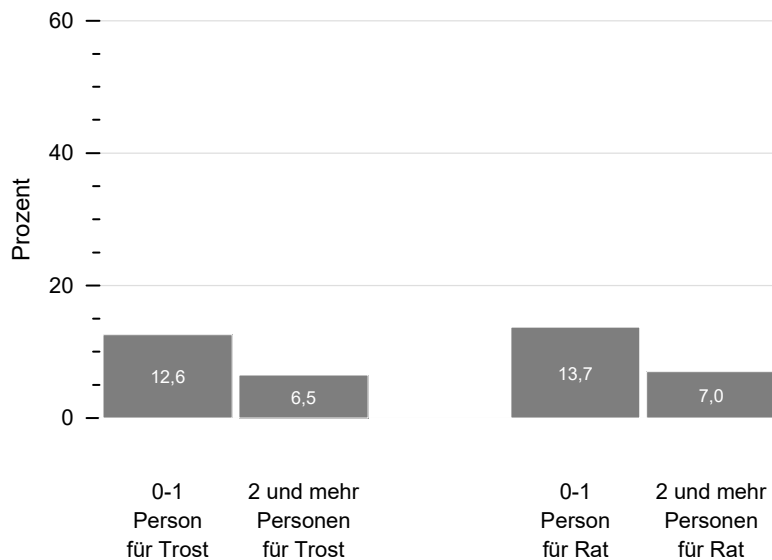


Abbildung 2-3. Anteile von Personen mit Einsamkeitsempfinden. Vergleich von Personen mit unterdurchschnittlichem versus mindestens durchschnittlichem Potenzial für Trost beziehungsweise Rat (in Prozent) 2014. Quelle: DEAS 2014 (n = 4.149 für Trost; n = 4.157 für Rat), gewichtet, gerundete Angaben; ($p < ,05$). Alle Unterschiede signifikant.

2.3.2 Wahrgenommene soziale Exklusion

Wahrgenommene soziale Exklusion wird im Jahr 2014 von 6,4 Prozent der 40- bis 85-Jährigen berichtet. Das Auftreten von Exklusionsempfinden unterscheidet sich nicht bedeutsam zwischen den Altersgruppen (Abbildung 2-4) oder zwischen Männern und Frauen (vgl. Tabelle A2 im Anhang A).

Personen in Armut und Personen mit geringer Bildung haben ein deutlich höheres Risiko, sich aus der Gesellschaft ausgeschlossen zu fühlen.

Wie bei Einsamkeit variiert der Anteil von Personen, die sich als sozial exkludiert wahrnehmen jedoch mit Merkmalen der sozioökonomischen Stellung. Nur 3,7 Prozent der Hochgebildeten berichten ein Empfinden sozialer Exklusion. In der Gruppe der Personen mit niedriger Bildung sind es hingegen 16,7 Prozent (Abbildung 2-4). Ähnlich starke Unterschiede bestehen zwischen Personen mit unterschiedlichem Armutsstatus. Fast ein Fünftel (17,6 Prozent) der von Armut betroffenen Personen gibt an, sich als sozial exkludiert wahrzunehmen. Bei Personen, die nicht in Armut leben, sind es hingegen nur 4,9 Prozent (Abbildung 2-4). Armut und Bildung zeigen somit etwas stärkere Zusammenhänge mit wahrgenommener sozialer Exklusion als mit Einsamkeit.

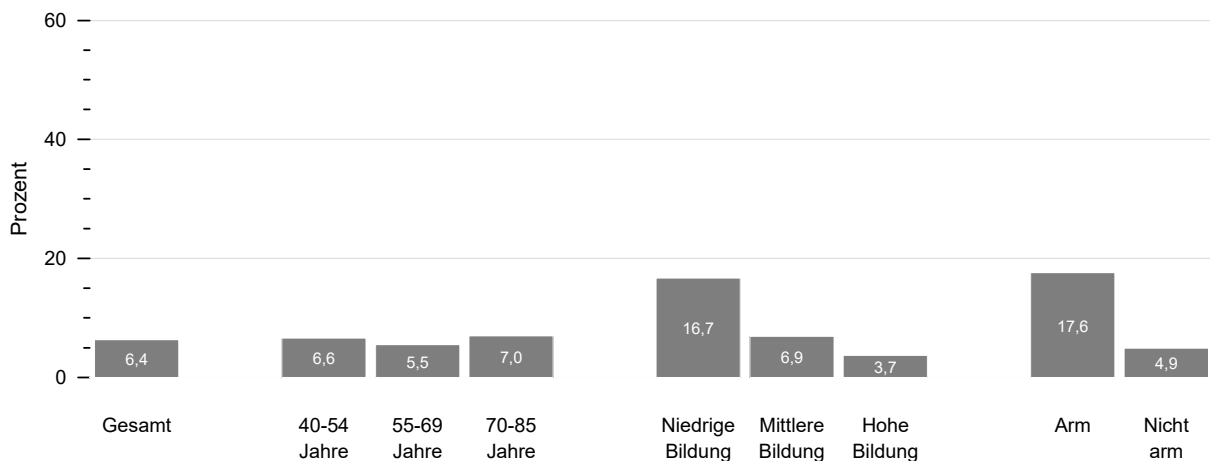


Abbildung 2-4. Anteile von Personen mit wahrgenommener sozialer Exklusion nach Alter, Bildung und Armutsstatus (in Prozent) 2014. Quelle: DEAS 2014 (n = 4.225) gewichtet, gerundete Angaben; ($p < ,05$). Keine signifikanten Unterschiede zwischen den Altersgruppen. Alle Bildungsgruppenunterschiede und Unterschiede zwischen den Armutsgruppen signifikant.

Neben der Beziehung zur sozioökonomischen Stellung zeigt sich auch ein bedeutsamer Zusammenhang zwischen der Wahrscheinlichkeit für Exklusionsempfinden und dem Potenzial für soziale Unterstützung. Abbildung 2-5 zeigt, dass wahrgenommene soziale Exklusion bei Personen mit unterdurchschnittlichem Unterstützungspotenzial etwas häufiger vorkommt (8,0 Prozent beziehungsweise 7,6 Prozent) als bei Personen mit einer mindestens durchschnittlichen Anzahl von Personen, die emotionale beziehungsweise informationelle Unterstützung leisten können (4,9 Prozent beziehungsweise 5,6 Prozent). Die Zusammenhänge sind hierbei aber geringer ausgeprägt als die zwischen den Beziehungen für Rat beziehungsweise Trost und Einsamkeit.

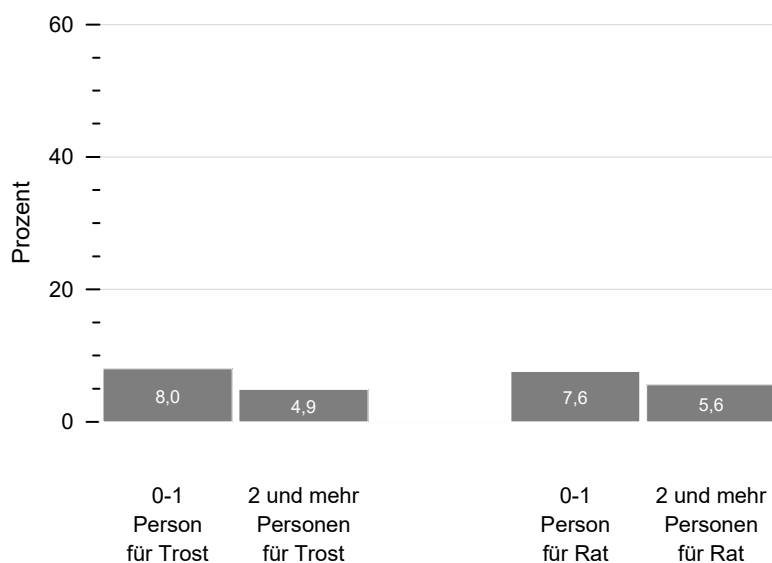


Abbildung 2-5. Anteile von Personen mit wahrgenommener sozialer Exklusion. Vergleich von Personen mit unterdurchschnittlichem versus mindestens durchschnittlichem Potenzial für Trost beziehungsweise Rat (in Prozent) 2014. Quelle: DEAS 2014 (n = 4.157 für Trost; n = 4.165 für Rat), gewichtet, gerundete Angaben; ($p < ,05$). Alle Unterschiede signifikant.

2.3.3 Zusammenhang von Einsamkeit und wahrgenommener sozialer Exklusion

Trotz der theoretisch unterschiedlichen Ursprünge von Einsamkeit und wahrgenommener sozialer Exklusion zeigten die bisherigen Analysen deutliche Überschneidungen in den Risiken für beide Erfahrungen. Ein Grund hierfür könnte sein, dass das Empfinden sozialer Exklusion Risiken für Einsamkeit befördert und auch umgekehrt, Einsamkeit mit Risiken für soziale Exklusion einhergeht. Zudem könnten bestimmte Lebenslagen sowohl die persönliche Integration als auch Aspekte der sozioökonomischen Stellung einer Person negativ beeinflussen. Tatsächlich scheinen soziale Exklusion und Einsamkeit nicht immer unabhängig voneinander empfunden zu werden. Im Jahr 2014 zeigt sich, dass 2,7 Prozent aller 40- bis 85-Jährigen sich sowohl einsam als auch sozial exkludiert fühlen (ohne Abbildung). In Hinblick auf die Gesamtgruppe der Personen im Alter von 40 bis 85 Jahren ist der Anteil von Personen mit gleichzeitigem Empfinden von Einsamkeit und sozialer Exklusion somit eher gering.

Personen, die sich als sozial exkludiert wahrnehmen, haben ein deutlich höheres Einsamkeitsrisiko als Personen, die sich nicht als sozial exkludiert wahrnehmen.

Betrachtet man genauer, wie sich die Gruppen der Personen mit und ohne Einsamkeit beziehungsweise mit und ohne Exklusionsempfinden zusammensetzen, zeigt sich jedoch ein deutlicher Zusammenhang zwischen beiden Ausgeschlossenheitserfahrungen. Bei Personen ohne Exklusionsempfinden liegt der Anteil von Personen mit Einsamkeit bei lediglich 6,7 Prozent. Von den Personen mit Exklusionsempfinden fühlen sich hingegen 41,7 Prozent auch einsam (Abbildung 2-6).

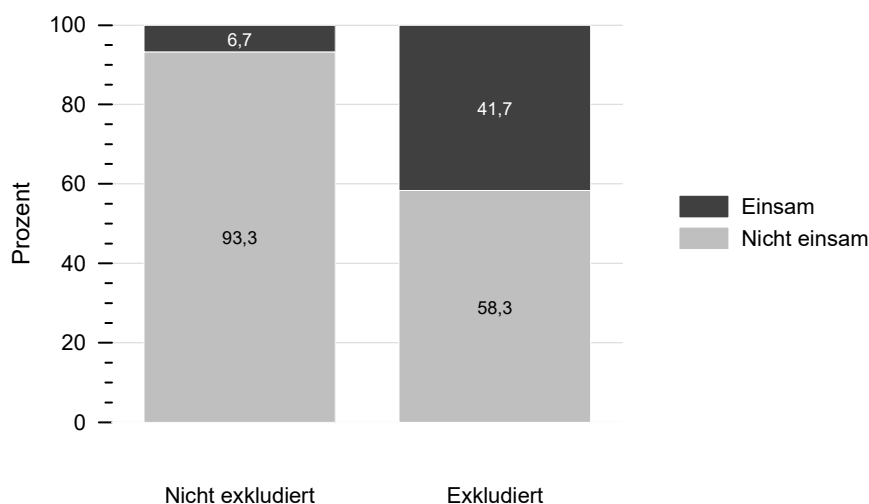


Abbildung 2-6. Anteile von Personen, die sich einsam fühlen. Vergleich zwischen Personen ohne und mit wahrgenommener sozialer Exklusion (in Prozent), 2014. Quelle: DEAS 2014 (n = 4.225), gewichtet, gerundete Angaben; ($p < ,05$). Signifikanter Unterschied zwischen Personen mit und ohne wahrgenommener sozialer Exklusion.

Auch umgekehrt zeigt sich, dass Personen mit Einsamkeit sehr viel häufiger soziale Exklusion empfinden als Personen ohne Einsamkeit (ohne Abbildung). Während der Anteil von Personen mit wahrgenommener sozialer Exklusion bei nicht einsamen Personen nur 4,0 Prozent beträgt, liegt er in der Gruppe der Personen mit Einsamkeit bei 29,1 Prozent.

2.4 Diskussion und Implikationen

Gefühle der Ausgeschlossenheit und Isolation können negative Konsequenzen in unterschiedlichen Lebensbereichen nach sich ziehen. Einsamkeit gilt als bedeutsames Risiko für Wohlbefinden und körperliche Gesundheit (Hawkley & Cacioppo 2010). Wahrgenommene soziale Exklusion kann prosoziales Verhalten vermindern (Twenge et al. 2007) und den sozialen Zusammenhalt gefährden (Castel et al. 2009).

Angesichts dieser gravierenden möglichen Konsequenzen ist es positiv zu sehen, dass sich die Mehrheit von Personen in der zweiten Lebenshälfte weder als einsam noch als sozial exkludiert wahrnimmt. Wie sich die Häufigkeit wahrgenommener sozialer Exklusion bei den 40- bis 85-Jährigen über die Zeit entwickelt, kann erst mit den kommenden DEAS-Befragungen beantwortet werden. Die bisherigen Erhebungen weisen jedoch darauf hin, dass es entgegen häufig geäußelter Befürchtungen, zwischen 1996 und 2014 nicht zu einer Erhöhung des Anteils einsamer Personen gekommen ist. Bei den über 71-Jährigen hat sich die Häufigkeit des Einsamkeitserlebens sogar verringert. Dieser Trend steht im Einklang mit verschiedenen Verbesserungen der sozialen Einbindung, die sich in dieser Altersgruppe zu kumulieren scheinen. Im Vergleich von 1996 bis 2014 leben immer mehr der 70- bis 85-Jährigen in einer Partnerschaft (vgl. Kapitel 13). Und auch der Anteil der Kinderlosen hat sich in dieser Altersgruppe bedeutsam verringert (vgl. Kapitel 14). Zudem können soziale Aktivitäten mit Freundinnen und Freunden gerade bei den Älteren immer besser aufrechterhalten werden (vgl. Kapitel 17). In den jüngeren Altersgruppen hingegen halten sich positive und negative Veränderungen der sozialen Integration seit 1996 stärker die Waage. Im Jahr 2014 ist die Häufigkeit von Partner- und Kinderlosigkeit in den jüngeren Altersgruppen entweder ähnlich hoch oder höher als im Jahr 1996 (vgl. Kapitel 13 und 14). Zudem kommt es insbesondere bei den 42- bis 71-Jährigen zu einem stärkeren Zuwachs der Wohnentfernung zu den eigenen Kindern (vgl. Kapitel 14). Gleichzeitig erleben die jüngeren Altersgruppen eine positivere Entwicklung des Potenzials für soziale Unterstützung als die Älteren (vgl. Kapitel 17).

Im Jahr 2014 ist der Anteil einsamer Personen bei den unter 70-Jährigen sogar etwas höher als bei den 70- bis 85-Jährigen. In Anbetracht der Tatsache, dass ältere Personen zu allen Zeitpunkten weniger Bezugspersonen und soziale Aktivitäten berichten (vgl. Kapitel 17), scheint dieser Befund zunächst paradox. Eine mögliche Erklärung ist, dass sich die Anzahl sozialer Kontakte im

Alter zwar verringert, die Qualität bestehender Beziehungen jedoch eher zunimmt. So wird beispielsweise vermutet, dass Personen im höheren Alter Konflikte eher vermeiden und stärker nach Harmonie streben (Charles 2010; Luong et al. 2010). Im Einklang mit dieser Idee berichteten Personen in höheren Altersgruppen seltener Gefühle von Wut und Ärger gegenüber den eigenen Kindern (vgl. Kapitel 14).

Armut, niedrige Bildung und ein geringes Potenzial für soziale Unterstützung gehen sowohl mit einer erhöhten Wahrscheinlichkeit für Einsamkeit als auch mit einem erhöhten Auftreten von Exklusionsempfinden einher. Wahrgenommene soziale Exklusion steht hierbei stärker mit sozioökonomischen Faktoren, Einsamkeit hingegen stärker mit Merkmalen persönlicher Integration in Verbindung. Um genauere Einblicke in Risikolagen zu gewinnen und differenzierte Handlungsmöglichkeiten abzuleiten, erscheint es somit wichtig, zwischen persönlichen und gesellschaftlichen Ausgrenzungserfahrungen zu unterscheiden. Für die Verhinderung wahrgenommener sozialer Exklusion könnte die Minimierung sozioökonomischer Notlagen ein wichtiger Schlüssel sein. Um einsame Personen zu erreichen, kann es hingegen hilfreich sein, niederschwellige Beratungs- und Hilfsangebote auszubauen, welche nicht nur Möglichkeiten zum sozialen Austausch fördern, sondern auch zur Reflexion sozialer Erwartungen und Verhaltensweisen anregen. Ein andauerndes Erleben von Einsamkeit kann zur Entwicklung negativer Wahrnehmungsmuster, wie Misstrauen, beitragen, welche die Qualität sozialer Interaktionen negativ beeinflussen (Cacioppo et al. 2006a). Nur wenn die betroffenen Personen negative Erwartungshaltungen erkennen und abbauen, werden sie von einem Neuaufbau sozialer Aktivitäten hinreichend profitieren können (Masi, Chen, Hawkey, & Cacioppo 2011).

Ein besonderes Augenmerk sollte den Personen gelten, die sich sowohl einsam als auch sozial exkludiert fühlen. Diese Gruppe leidet nicht nur unter einem geringen Zugang zu sozioökonomischen Ressourcen sondern auch unter einem Mangel an sozialem Unterstützungspotenzial. Es ist positiv zu sehen, dass nur eine sehr kleine Minderheit der 40- bis 85-Jährigen im Jahr 2014 sowohl Einsamkeit als auch wahrgenommene soziale Exklusion berichtet. Allerdings ist ein starker Zusammenhang zwischen beiden Ausgeschlossenheitserfahrungen ersichtlich. Dies könnte darauf hinweisen, dass sich Einsamkeit und wahrgenommene soziale Exklusion gegenseitig befördern. Wenn sich Personen als sozial exkludiert wahrnehmen, könnte dies negative Gefühle und Erwartungen nach sich ziehen, welche die Qualität persönlicher Beziehungen beeinträchtigen. Auch in die andere Wirkrichtung sind Zusammenhänge denkbar. Das Erleben von Einsamkeit könnte langfristig beispielsweise zu einer Reduktion von sozialen Ressourcen führen (Cacioppo, Fowler, & Christakis 2009), welche für eine Teilnahme am öffentlichen Leben relevant sind (Lin 1999). Halten Einsamkeit und Exklusionsempfinden an, kann sich das betroffene Individuum auf Grund der unglücklichen Wechselwirkung zwischen beiden Erfahrungen somit in einer Lage befinden, die aus

eigener Kraft nur schwer bewältigt werden kann. Auch wenn sich die Mehrheit der Personen in der zweiten Lebenshälfte gut integriert fühlt, ist es somit relevant, Einsamkeit und wahrgenommene soziale Exklusion weiter zu erforschen und mit Hilfe effektiver Maßnahmen zu mindern. Vor allem die Wechselwirkung zwischen beiden Erfahrungen sollte mit Hilfe längsschnittlicher Daten genauer untersucht werden. Es erscheint jedoch so, dass sowohl die Verminderung sozio-ökonomischer Ungleichheit als auch der Ausbau leicht erreichbarer Beratungs- und Hilfsangebote dazu beitragen können, Einsamkeit und wahrgenommene soziale Exklusion zu verhindern und weiter zu reduzieren.

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Chapter 3

Age-related changes in emotional qualities of the social network from middle adulthood into old age: How do they relate to the experience of loneliness?

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Böger, A., & Huxhold, O. (2018). Age-related changes in emotional qualities of the social network from middle adulthood into old age: How do they relate to the experience of loneliness? *Psychology and Aging, 33*(3), 482-496. doi: 10.1037/pag0000222

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Abstract

Research shows that people maintain fewer social ties and social activities when they grow older. There appears, however, to be little variation in the average loneliness level from middle adulthood into old age. In this study we investigate to what extent beneficial changes in emotional qualities of the social network (SNW) (number of distressing relationships, number of pleasant relationships, relationship satisfaction) may help to prevent an age-related increase in loneliness. We concentrate in particular on the question as to whether these emotional qualities become more relevant for predicting loneliness when people grow older. Data for this study comes from $N=10,900$ participants of the German Ageing Survey (DEAS) that have been observed over up to 9 years of study. The dynamics of emotional qualities of the SNW and loneliness are examined over a broad age range of 40 to 84 years by using an accelerated longitudinal data design. The results of our analyses suggest that age-related changes in emotional qualities of the SNW are marked by both gains and losses. On the one hand, people report fewer distressing ties and a higher satisfaction with family relations when they grow older. On the other hand, older adults are less satisfied with their friendships and acquaintances. The number of pleasant ties demonstrates little variation with age. All emotional qualities of the SNW considered in this study were found to be relevant for predicting a person's level of loneliness. Other than expected, however, predictive effects were similar over age groups.

3.1 Theoretical Background

Studies suggest that persistent loneliness is a powerful trigger for a variety of disadvantageous changes in health and well-being (for a review see, Hawkey & Cacioppo, 2010). It is a widespread belief that loneliness is most prevalent in old age where social losses and functional health restrictions start to be more prevalent (e.g., Tornstam, 2007). Contradicting this assumption, studies suggest that while both the size of a person's social network (SNW) and the extent of social activities tend to decline in the course of aging (Huxhold, Fiori, & Windsor, 2013; Wrzus, Hanel, Wagner, & Neyer, 2013), loneliness is not more common among older adults than among people in middle adulthood (Dykstra, 2009; Luhmann & Hawkey, 2016; Pinqart & Sörensen, 2001; Tesch-Römer, Wiest, Wurm, & Huxhold, 2013). How are adults in late life able to maintain a feeling of integration while facing a reduction in the number of their social partners? Research on socio-emotional aging suggests that while SNWs tend to be of smaller sizes, the emotional quality of social relations may be enhanced when people are older (Carstensen, Isaacowitz, & Charles, 1999; English & Carstensen, 2014; Luong, Charles, & Fingerman, 2010). Moreover, older adults seem to prioritize a high level of relationship quality in their hierarchy of social goals (Carstensen et al., 1999). Based on these ideas we examine how changes in emotional qualities of a person's SNW relate to feelings of loneliness across the second half of life. We concentrate in particular on the question as to whether emotional qualities of the SNW become more relevant for predicting loneliness when people grow older.

3.1.1 Age-related changes in emotional qualities of the social network

When moving from middle adulthood into old age people experience changes in their opportunities and constraints as regards social behavior and goal setting. The subjective future time horizon of a person becomes more and more restricted (Lang & Carstensen, 2002). Additionally, people face a decrease in their physiological flexibility and in their physical health. The Socioemotional Selectivity Theory (SST) (Carstensen et al., 1999) and the model of Strength and Vulnerability Integration (SAVI) (Charles, 2010) propose that these changes promote a prioritization of positive relationship experiences in the individual's hierarchy of social goals. The feeling that time is limited may enhance the wish to establish a sense of meaning and happiness in everyday life (Carstensen et al., 1999). The experience of positive and satisfying social exchanges may be a powerful mean for attaining this goal (Heintzelman & King, 2014). Furthermore, processes of biological aging may reduce the capacity to cope with physiological components of distressing social exchanges (Charles, 2010). Thus, older adults may experience a strong urge to seek positive and to avoid negative social encounters.

The age-related prioritization of positive relationship experiences has been related to changes in social behavior intended to increase the emotional quality of social interactions. Studies found evidence for age-related changes in both the selection of social partners and strategies for dealing with interpersonal tensions (Luong et al., 2010). According to the SST, older people are more likely to exclude distressing and less meaningful ties from their SNW while maintaining those central to positive experiences and relationship satisfaction (Carstensen et al., 1999; English & Carstensen, 2014; Lang & Carstensen, 1994). Studies also suggest that older people are more likely to avoid negative social exchanges, such as open conflicts and disputes, with their prevailing social ties (Birditt, Fingerman, & Almeida, 2005).

Age-specific changes in a person's social context such as the transition into retirement may help to seek positive and to avoid distressing social exchanges by granting an increased freedom in the arrangement of social activities (Pinquart & Schindler, 2009; van Solinge, 2012). Interaction quality within older people's SNW may also benefit from changes in the behavior of interaction partners. Studies indicate, for instance, that people may be more forgiving when engaging with older relationship partners (Fingerman & Charles, 2010).

Additionally, people may perceive their relationships more positively with increasing age. A number of studies on this issue suggest that older people tend to focus on positive and to avoid negative information in their social context (Reed, Chan, & Mikels, 2014). While studying how couples discuss an issue of conflict, for instance, Story and colleagues (2007) found that older people perceived the behavior of their spouse more positively than objective raters – an effect not observable for younger couples. This so called positivity bias has been explained by age-related changes in the processing of emotional stimuli due to a limited future time perspective (Carstensen & Mikels, 2005).

3.1.2 Age-related changes in the association between emotional qualities of the social network and loneliness

Not surprisingly, studies demonstrated a substantial relation between emotional qualities of the SNW and the experience of loneliness. Loneliness has been found to be higher for people reporting higher relationship strain and less positive social exchanges (Y. Chen & Feeley, 2014; De Jong Gierveld, van Groenou, Hoogendoorn, & Smit, 2009; Dykstra & Fokkema, 2007; Fiori & Consedine, 2013; Stokes, 2016) as well as a lower satisfaction with social ties (Heylen, 2010). Currently, however, there is a lack of studies examining the longitudinal relationship between emotional qualities of the SNW and loneliness across a broader age range. A longitudinal and age-differentiated perspective appears to be crucial in this regard for at least two reasons.

First of all, the association between emotional qualities of the SNW and loneliness is likely to be reciprocal rather than unidirectional. Social relationships with high strain and few pleasant experiences are less likely to fulfill a person's needs for social integration. A low emotional quality of the SNW may thus be predictor of heightened loneliness. If people feel lonely over longer periods of time, however, this may also influence the quality of the social interactions they experience. As proposed by J.T. Cacioppo and colleagues (2006), the perception of being isolated from a protective social group may trigger an evolutionary ingrained mode of defense that is marked by avoidant behavior and a higher sensitivity towards social threat. In support of this assumption, studies showed a feeling of social exclusion to be associated with hostile mindsets (DeWall, Twenge, Gitter, & Baumeister, 2009) and less prosocial behavior (Twenge, Baumeister, DeWall, Ciarocco, & Bartels, 2007). As a result, persistent loneliness may not only be an outcome but also a predictor of low relationship quality. This also means that to investigate how loneliness is predicted by changes in emotional qualities of the SNW it is crucial to control for the reversed effect in a longitudinal design.

A second argument for the utility of a longitudinal and age-differentiated approach is that the relationship between loneliness and emotional qualities of the SNW may change across the adult life span. Loneliness is thought to arise when the network of social relations is unable to fulfill social needs and expectations important to a given individual (Perlman & Peplau, 1981). Considering this conceptualization, it has been assumed that the importance of different predictors for loneliness may vary in accordance with individual social goal setting (Dykstra & Fokkema, 2007; Zhang, Yeung, Fung, & Lang, 2011). When placing higher importance on the level of stimulation and information obtained through social ties, for instance, a great variety of social partners may be more relevant for preventing loneliness. Similarly, when people experience a stronger urge for pleasant relationship experiences, the emotional qualities of the SNW may be a more relevant predictor of loneliness. Assuming that positive social experiences become increasingly important with advancing age (Carstensen et al., 1999; Charles, 2010), it can be hypothesized that the emotionally relevant qualities of the SNW are more strongly related to differences and changes in loneliness with increasing age. Increasing the frequency of positive interactions and reducing the frequency of negative social encounters may be more effective in minimizing loneliness when people grow older. Similarly, losses in positive relationship experiences and increases in relational strain may be particularly harmful for older people's feelings of integration.

3.1.3 The current study

Using longitudinal data of people aged 40 to 84 years, our study examines the interrelated dynamics of loneliness and emotional qualities of the SNW. We hypothesize that both the presence of pleasant and the absence of distressing social exchanges will be relevant to fulfill needs for harmonic and meaningful relationship experiences. Previous studies found both aspects of relationship quality to be independently related to well-being and loneliness (Fiori & Consedine, 2013; Newsom, Rook, Nishishiba, Sorkin, & Mahan, 2005). Moreover, the frequency of positive and negative social exchanges may not always be strongly associated (Okun & Lockwood, 2003). Finally, some relationships, in particular those with close ties, may be characterized by both distressing and positive experiences (Fingerman, Hay, & Birditt, 2004). Therefore, we included independent measures of both relationships experienced as distressing and relationships experienced as pleasant. In addition to that, direct ratings of the overall satisfaction with family and friend relations were used to cover further facets of the emotional quality of a person's SNW (e.g. the level of emotional closeness) as well as interactions of different emotional qualities (e.g. the balance of distressing and positive exchanges). We had a total of five hypotheses (H1-H5) for this study. H1 to H3 formulate expectations about age-related changes in loneliness and emotional qualities of the SNW. As age differences in these variables have been studied before, the examination of H1 to H3 can be understood as replication tests. In contrast, the relationship between emotional qualities of the SNW and loneliness is less well examined thus far. In particular, the extent to which these interrelations are both reciprocal (H4) and differentiated by age (H5) is an open question. In the following, we discuss all hypotheses and their theoretical as well as empirical rational one by one.

H1: The average level of loneliness is stable from middle adulthood to old age.

Based on results of previous studies we expected the average level of loneliness to be stable from middle adulthood into old age (Dykstra, 2009; Pinquart & Sörensen, 2001; Tesch-Römer et al., 2013). This stability is assumed to result from the following interrelated trends. First, in contrast to SNW size, there may be favorable changes in emotional qualities of the SNW across the second half of life (see H2-H4). Secondly, emotional qualities of the SNW may gain relevance for predicting loneliness with increasing age (see H5).

H2: The number of distressing relationships decreases from middle adulthood to old age.

We hypothesized a decrease in the number of relationships experienced as distressing with advancing age. As proposed by the SAVI model (Charles, 2010) and the SST (Carstensen et al., 1999) older people should be more likely to exclude negative relationships from their SNW, in

particular when they are not very meaningful. For older people it may be also easier to avoid interactions with distressing ties that are associated with certain social contexts, such as the workplace. Furthermore, age-related changes in conflict behavior and social perceptions may help to reduce the level of distressing exchanges within certain relationships (Birditt et al., 2005; Reed et al., 2014). To some extent - and more so in very old age - a reduction in the number of distressing ties may also represent the involuntary loss of ambivalent ties (ties that are both important and distressing).

H3: The number of pleasant relationships and the level of relationship satisfaction increase from middle adulthood into the early years of old age. This positive trend will go into reverse as people move from the early to the late years of old age.

To fulfill their increasing needs for positive and meaningful relationship experiences, people should be highly motivated to maintain their engagement with all pleasant and satisfying social partners when growing older. In addition to that, the emotional quality of difficult or straining relationships may improve due to changes in conflict behavior of aging adults and their social partners (Birditt et al., 2005; Fingerman & Charles, 2010) as well as a more selective attention to positive characteristics of a given social tie (Reed et al., 2014). The interplay of the active maintenance of positive social relations and changing experiences within straining or difficult relations should lead to an increase in both the number of pleasant relationships and relationship satisfaction with increasing age. The extent to which people are able to engage with pleasant social ties, however, is also restricted by the influence of age-related constraints, such as health problems and social losses. When moving from the early to the late years of old age, the negative effects of constraints and involuntary losses may start to exceed that of self-regulatory efforts designated at maximizing pleasant relationship experiences. The age-related increase in both the number of pleasant ties and relationship satisfaction may thus go into reverse when people move from the early to the late years of old adulthood.

H4: There is a reciprocal relationship between emotional qualities of the SNW and loneliness.

We assumed all emotional qualities of the SNW assessed in this study to be relevant predictors of loneliness. A higher number of distressing relationships is hypothesized to predict a higher level of loneliness. A higher number of positive relationships and a higher level of relationship satisfaction, in contrast, should be predictive of lower loneliness.

As feelings of social isolation have been found to affect social behaviors and perceptions (J. T. Cacioppo et al., 2006; DeWall et al., 2009; Twenge et al., 2007) we also assumed that loneliness will predict the emotional quality of a person's SNW. A higher level of loneliness is expected to

predict a higher number of distressing relationships, a lower number of pleasant relationships and a lower level of relationship satisfaction.

H5: Emotional qualities of the SNW are more predictive of loneliness when people grow older. This age-related increase is less pronounced for the number of distressing relationships than it is for the number of pleasant relationships and for relationship satisfaction.

Due to the proposed shift in socio-emotional goal priorities with age (Carstensen et al., 1999; Charles, 2010), we expected that emotional qualities of the SNW should be more relevant for older than for younger people's feeling of integration. We hypothesized, however, that this general trend could be less pronounced for the number of distressing relationships than for the number of pleasant relationships and relationship satisfaction. An age-related decrease in the number of distressing relationships can represent adaptive changes in social behaviors and social perceptions. In some cases, however, a reduction may also reflect the involuntary loss of an ambivalent relationship. Such a change is not necessarily beneficial for feelings of integration. Changes in the number of stressful relationships may thus have a more ambiguous meaning than changes in the number of pleasant relationships or changes in relationship satisfaction. Therefore, the age-related adaptation of socio-emotional goal priorities may be less pronounced for this indicator of SNW quality.

3.2 Method

3.2.1 Data

We used data collected during three waves of the nationally representative German Ageing Survey (DEAS). DEAS is an ongoing study of community-dwelling adults in the second half of life (40 years and above) living in Germany (Klaus et al., 2017). An ethical approval is not mandatory for general surveys in Germany. The DEAS is approved and funded by the Federal Ministry for Family Affairs, Senior Citizens, Women and Youth (BMFSFJ). Data is collected through in-home interviews and self-administered questionnaires. Baseline cohorts with an age range from 40 to 85 years were recruited in 1996 (DEAS_96 cohort, $N = 4,838$), 2002 (DEAS_02 cohort, $N = 3,084$), 2008 (DEAS_08 cohort, $N = 6,025$) and 2014 (DEAS_14 cohort, $N = 6,002$). All cohorts were selected through national probability sampling and were systematically stratified by gender, place of residence (Eastern vs. Western Germany) and age group (40 to 54 years, 55 to 69 years, 70 to 85 years). Available participants of each baseline cohort were re-interviewed in each subsequent wave of 2002, 2008 and 2014. An additional assessment wave in 2011 was restricted to longitudinal participants and involved the re-interview of a total of $N = 4,804$ participants from all previous

waves ($N = 1,040$ from DEAS_96, $N = 957$ from DEAS_02, $N = 2,807$ from DEAS_08).

Our analyses were based on all valid observations of participants aged 84 years or less. Observations from 1996 and 2014 were left out because some indicators of emotional qualities of the SNW were not assessed at these times. The final sample encompassed a total of $N = 10,900$ persons (49.1 % female). We applied a short version of the International Standard Classification of Education (ISCED; UNESCO, 2006) to determine the distribution of educational levels in our sample. Three levels of educational attainment were differentiated: 1) low education (ISCED 0-2); 2) medium education (ISCED 3-4); and 3) high education (ISCED 5-6) (see Lejeune, Engstler, & Schmiade, 2014). 11.9 % of our sample reported to have no formal vocational training indicating a low education. 67.3 % of the participants reported to have a medium education in terms of a completed vocational training or higher general school certificate. A high education in terms of a completed professional development training or completed university studies was reported by 20.8 % of the participants.

To examine longitudinal attrition in relation to our measures of interest we analyzed how the mean values of these measures differed between participants of the DEAS_02 cohort who dropped out and those who had at least one follow-up assessment. The statistical significance of mean differences was tested with independent t-tests and Welch tests. Furthermore, we computed Cohen's d as standardized effect size. Participants who dropped out of the study reported a higher level of loneliness, $t(2563.0) = 5.13, p < .001, d = 0.20$, fewer distressing ties, $t(2274.4) = -5.22, p < .001, d = -0.20$, and fewer pleasant ties, $t(2983) = -3.81, p < .001, d = -0.14$, than follow-up participants. Participants who dropped out were also less satisfied with their friendships than participants who remained in the study, $t(2856) = -6.61, p < .001, d = -0.25$.

3.2.2 Measures

Emotional qualities of the social network. The number of *distressing relationships* was assessed using three different questions: 1.) "Are there people who are causing you worry or concern at present?" 2.) "Are there people who get on your nerves at the moment or who you often quarrel with?" and 3.) "Do you feel like there are people who often order you around or encroach on your independence?". Participants could name up to 5 relationships that fulfilled the corresponding criterion. The interviewer recorded specific person codes indicating which social partner (e.g. partner, child A, friend A) fulfilled this criterion. The number of valid codes was summed over all three questions. The person codes could be also used to identify and correct for ties that were named in more than one of the questions. Unfortunately, not all relationship codes employed were person-specific. All nieces or nephews of a participant, for instance, were given the same numeric codes

even when they were different persons. To address this issue, we treated multiple naming of ambiguous relationship codes over the three distress-related questions as if it was multiple naming of the same specific person. Therefore, the total number of distressing relationships may have been underestimated in some cases. However, in all three waves there were only few participants who named ambiguous relationships codes in more than one distress-related question (2002: 1.6% of participants; 2008: 2.0% of participants; 2011: 2.2 % of participants).

To assess the number of *pleasant relationships*, people were asked to name up to 5 ties that currently give them great joy or happiness. As with distressing relationships, the interviewer recorded specific person codes indicating which social partner fulfills this criterion. For the current analyses, we looked at the overall number of all valid codes named by the participants.

To assess *relationship satisfaction*, we used two items of the DEAS interview. The first item asked participants to rate their present relations with friends and acquaintances on a scale from 1 (*very good*) to 5 (*very bad*). The second item assessed an equivalent rating for family relations. We reversed the scores for both items so that higher values indicated a higher relationship satisfaction. Associations between both items were of small sizes at all time points (2002: $r = .25$; 2008: $r = .27$; 2011: $r = .26$). To test for domain-specific effects, change trajectories and interrelations with loneliness were analyzed separately for both items.

Loneliness. Feelings of loneliness were measured with a modified version of the six item De Jong Gierveld loneliness scale (De Jong Gierveld & Van Tilburg, 2006). The scale includes statements about a person's social integration, such as "I miss having a sense of security and warmth" (see Table B1 in Appendix B for the complete item list). Participants reported on a scale from 1 (*strongly agree*) to 4 (*strongly disagree*) how much a statement applied to their social lives. Whenever necessary, agreement scores for single items were recoded so that a higher score indicated a higher level of loneliness. The 6-item scale had a good internal consistency at all time-points (Cronbach's α 2002 = .83; Cronbach's α 2008 = .84; Cronbach's α 2011 = .81). To model loneliness as latent variable we created three parcels with two items each. Items were assigned to parcels in accordance with their loadings to assure the best balance of discriminatory power over parcels (Little, Cunningham, Shahar, & Widaman, 2002).

Covariates. To correct for the systematic stratification of the DEAS baseline samples we included region of residence (Eastern versus Western Germany) as covariate in our model. We also controlled for gender, educational status (measures by the ISCED classification) and DEAS cohort affiliation (DEAS_96, DEAS_02 or DEAS_08) as potential confounds of age-related differences. All characteristics are likely to correlate not only with the social integration but also with the chronological age of a given person.

3.2.3 Analyses

Data preparation. Our hypotheses refer to long-term changes over a range of several decades (from middle adulthood into old age). Longitudinal observations, however, were only available for time periods of up to 9 years in this study. To overcome this restriction, we applied an accelerated longitudinal data design that takes advantage of the large range of age-cohorts within our sample (Duncan, Duncan, & Hops, 1996). This data design combines the short-term longitudinal observations of the different age-cohorts in our sample to model changes and interrelations over the whole age range from 40 to 84 years.

To do so, the data was restructured in a way that individual observations are no longer arranged along the year of observation (2002, 2008, 2011) but along the chronological age at time of observation which ranged from 40 years to 95 years in this study. As the observations for people aged 85 years or more were too sparse to support our statistical models we included only data points from people who were 84 years old or younger. To simplify our analyses we divided the final age scale into 15 groups with a range of 3 years (1st group: 40-42 years, 2nd group: 43-45 years, ..., 15th group: 82-84 years). Since the shortest interval between measurement points equals three years (2008 - 2011), age groups cannot be wider in order to avoid some groups containing multiple longitudinal observations relating to one and the same person. At the same time, 3-year intervals allowed us to model age moderations as linear effects while maintaining a manageable level of model complexity.

We included all longitudinal and cross-sectional data-points from wave 2002, 2008 and 2011, including longitudinal observations of the 1996 baseline cohort. This approach maximizes statistical power and is thought to reduce biases in parameter estimates due to longitudinal attrition. Studies showed that biases are less severe if a statistical model is based on all available observations rather than only on observations of people with complete longitudinal data (Graham, 2009). To handle missing information during parameter estimation the full information maximum likelihood (FIML) was applied. The FIML algorithm has been shown to yield good parameter estimates and standard errors if patterns of missing data are related to variables in the statistical model (Graham, Cumsille, & Shevock, 2013).

In order to compare the strength of regression effects across measures, variables were standardized to a common T-metric ($M=50$, $SD=10$) with the means and standard deviations of the 2002 sample serving as points of reference. The dichotomous indicators for gender and region of residence were centered around their mean values while the indicators for education and DEAS cohort affiliation were centered around their middle categories (education: medium education, DEAS cohort: DEAS_02). All steps of data preparation and descriptive analyses were done with

R Version 3.1.0 (R Development Core Team, 2016). Longitudinal structural equation models were implemented in Mplus Version 7.4 (Muthén & Muthén, 1998-2012)

Modeling of mean-level changes in emotional qualities of the social network and loneliness. We used Dual Change Score Models (DCSMs) to examine mean-level changes in emotional qualities of the SNW and loneliness over age groups (McArdle, 2009; Schöllgen, Huxhold, & Schmiedek, 2012). At the core of this approach is the modeling of latent change scores describing how factor scores of a given variable Y (e.g. number of distressing relationships) differ between two subsequent age groups or time points (see Figure 3-1).

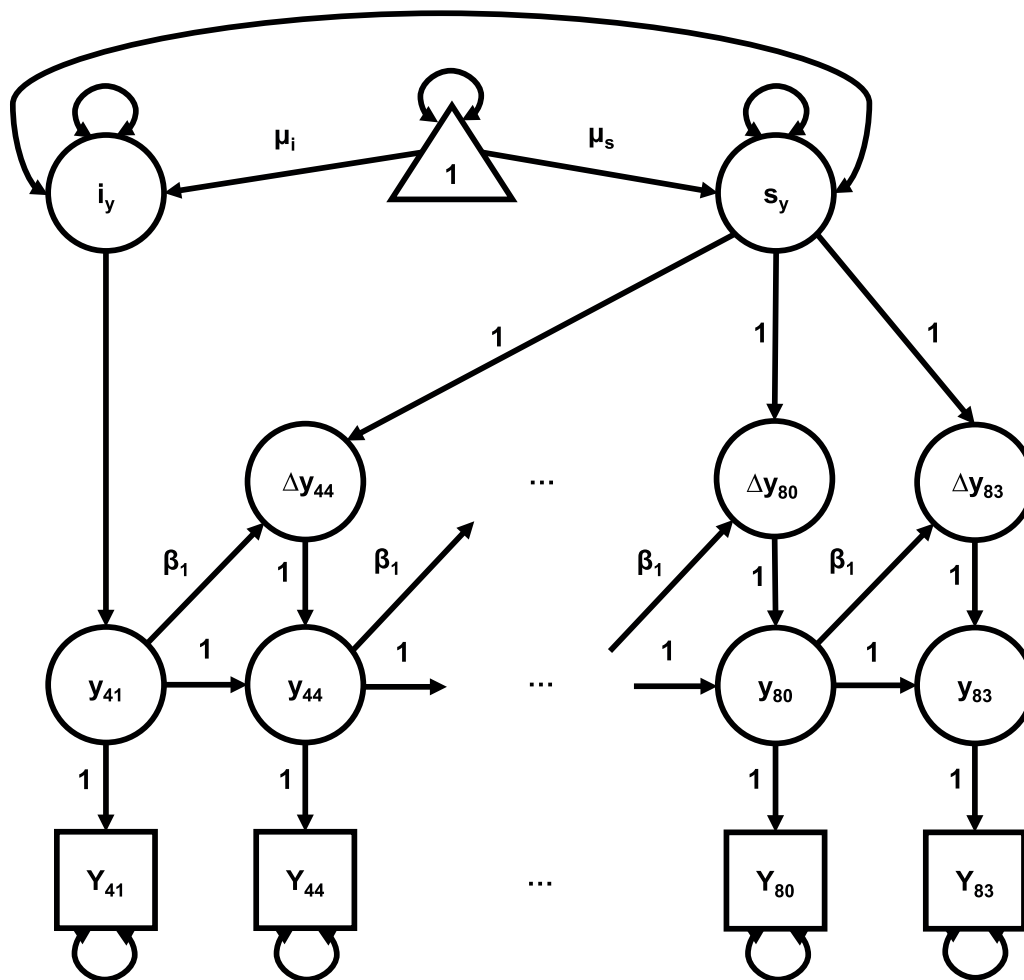


Figure 3-1. A univariate dual change score model to examine age-related changes in a given variable Y (illustration adapted from Schoellgen et al., 2012). Latent change scores (Δy) in a given age group are modeled as linear function of 1) a fixed latent slope s_y weighted by the constant 1 (first change parameter) and 2) the factor score of Y in the preceding age group weighted by regression parameter β_1 (second change parameter). The model includes estimates for the mean intercept (μ_i) and mean slope (μ_s) as well as for individual variation around the mean intercept and mean slope. The individual slope (s_y) and intercept (i_y) are allowed to covary with each other. Effects of covariates (gender, education, region of residence, DEAS cohort) on slope (s_y) and intercept (i_y) have been specified in each model but have been omitted from the illustration.

With more than two age groups, latent change scores can be modeled as linear function of 1) a fixed latent slope s_y (first change parameter) and 2) the factor score of Y in the preceding age group weighted by a regression parameter β_i (second change parameter). The combination of both parameters allows for a flexible modeling of change trajectories with complex, non-linear shapes. DCSMs were estimated separately for all emotional qualities of the SNW and loneliness. All models controlled for influences of gender, place of residence, education and DEAS cohort affiliation. The statistical significance of age-related changes was tested for by comparing a full DCSM (with freely estimated s_y and β_i) to a no-change model (with the average s_y and β_i being fixed to 0). To test the assumption that age-related changes in the number of pleasant ties and relationship satisfaction may go into reverse as people move from the early to the late years of old age, we tested for significant non-linearity in the change trajectories of these variables. To do so, we compared a full DSCM (with freely estimated s_y and β_i) to a linear change only model (with β_i being fixed to 0).

Modeling of the age-differentiated interrelationships between emotional qualities of the social network and loneliness. A multivariate autoregressive model (ARM) was used to estimate the age-differentiated associations between emotional qualities of the SNW and loneliness (see Figure 3-2). In the ARM, changes in a given variable Y are modeled indirectly by controlling for stable differences in Y (autoregressive effect). Cross-lagged regression pathways were specified to model how emotional qualities of the SNW and loneliness predict each other.

All autoregressive effects were constrained to be equal over age groups beginning with age group 2 (43-45-year olds). The same was true for all lagged effects proceeding from loneliness to the different emotional qualities considered. All regression effects proceeding from the first age group (40-42-year olds) were freely estimated, as previous autoregressive effects cannot be controlled for in this age group. To test our assumptions about age-related changes in regression effects (see H5), lagged pathways from emotional qualities of the SNW to loneliness were allowed to show linear variations from age group 2 (43-45-year olds) onwards. To test if the age-moderation is less strong for the effect of distressing relationships than for the effects of other emotional qualities (see H5), all interrelations were estimated in the same model. The different measures of emotional qualities were allowed to covary with each other. The ARM controlled for differences according to gender, education, place of residence and DEAS cohort affiliation.

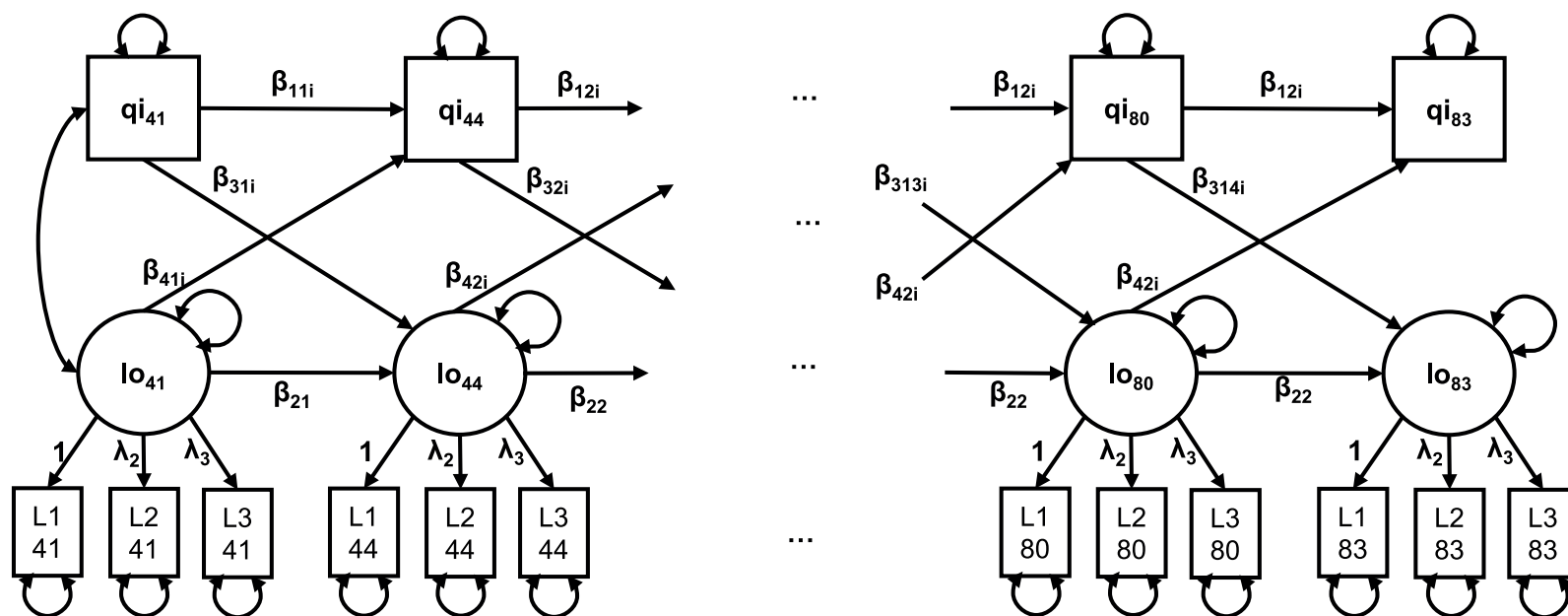


Figure 3-2. An autoregressive structural equation model for estimating the age-differentiated effects of a given emotional quality (q_i , with $i=1,2,3,4$) on loneliness (lo). Loneliness is modeled as latent variable with three indicators (L1, L2, L3). Loading and intercept of the first indicator are set to 1 and 0 respectively. Loadings and intercepts of the other indicators are constrained to be equal over age groups. The model includes autoregressive effects for all emotional qualities of the SNW q_i (effects β_{11i} and β_{12i} with $i=1,2,3,4$), autoregressive effects for loneliness (β_{21} and β_{22}), lagged effects from all emotional qualities q_i to loneliness (effects β_{31i} to β_{314i} with $i=1,2,3,4$) and lagged effects from loneliness to all emotional qualities q_i (effect β_{41i} and β_{42i} , with $i=1,2,3,4$). Autoregressive effects and lagged effects from loneliness to emotional qualities of the SNW are constrained to be equal from age group 44 to age group 83. Lagged effects from all emotional qualities to loneliness are allowed to show linear change from age group 44 to age group 83. All regression coefficients are freely estimated in age group 41 as autoregressive effects cannot be controlled for in this age group. Effects of covariates (gender, education, region of residence, DEAS cohort) have been included in the model but are omitted from the illustration. All indicators for the emotional quality of the SNW are allowed to covary with each other

We used χ^2 -difference tests to examine whether average regression effects and age-moderations were significantly different from zero. In a first step, we tested for the statistical significance of all average regression effects by comparing a model where a particular effect was constrained to zero against a model where the same effect was freely estimated. In a second step, we tested whether lagged effects of emotional qualities of the SNW on loneliness were moderated by age. Here, we specified models where the lagged effects were allowed to show linear changes from age group 2 to age group 15 and compared them against models where the same effects were constraint to be equal over age groups.

3.3 Results

3.3.1 Preliminary analyses and descriptive statistics

Measurement invariance. To test for age-invariance in our measure of loneliness we compared the fit of a liberal autoregressive model with freely estimated factor loadings and intercepts against the fit of a restricted autoregressive model where factor loadings and intercepts were constrained to be equal over age groups. The models were compared by evaluating the degree of change in the comparative fit index (ΔCFI) and in the root mean square approximation error ($\Delta RMSEA$) (F. F. Chen, 2007). According to F.F. Chen (2007) a $\Delta CFI \geq -.005$ combined with a $\Delta RMSEA \leq .010$ indicates invariance in factor loadings and intercepts across all groups. Our loneliness measure fulfilled this criterion with changes in the CFI being $\Delta CFI = -.001$ and changes in the RMSEA being $\Delta RMSEA = -.000$.

Descriptive statistics. The age group specific means and standard deviations of all variables in their raw metrics are given in Appendix B (Table B2). While inspecting the descriptive statistics, it came to attention that mean values of the number of distressing relationships fall below 1 in all age groups. This indicates that a lot of participants named no distressing relationship at all. Additional analyses confirmed that the distribution of this indicator was substantially skewed (average *skewness* = 2.08). Therefore, we used bootstrap confidence intervals as additional test statistic for examining if interrelations between distressing relationships and loneliness differed significantly from zero.

3.3.2 Age-related mean-level changes in loneliness and emotional qualities of the social network

Figure 3-3 displays the mean trajectories for loneliness and all emotional qualities of the SNW as they were estimated by their corresponding DCSMs. All trajectories are adjusted for differences according to gender, education, place of residence and DEAS cohort affiliation.

The exact parameter estimates as well as the indices for model fit and the results of the comparative goodness of fit analysis are provided in Table 3-1. Information on the regression effects of covariates can be found in Appendix B (see Table B3 for the parameter estimates and Figure B1 for a comparison of the adjusted and the unadjusted change trajectory for each variable). Note, that we decided to display all parameter estimates for regression weights with three decimal places, because the shape of mean trajectories may vary noticeably with a varying precision of DSCM parameter estimates. Table 3-1 also provides an approximate Cohen's d effect size for the difference in y between the youngest and the oldest age group in our sample (*aging effect* over 40 years). Values for y are computed from the parameter estimates of the DCSM while standard deviations are set to $SD=10$ in both age groups. Due to the relatively large sample, age-related changes are likely to be labeled as significantly different from zero even when they are very small in size. Considering this, it is useful to have an effect size measure that informs about the practical relevance of age-related changes. In interpreting our effect size measure, we followed the conventional guidelines for Cohen's d (small aging effect: $0.20 \leq \approx d < 0.50$; moderate aging effect: $0.50 \leq \approx d < 0.80$, large aging effect: $\approx d > 0.80$). Note that the two change parameters of the DCSM (μ_s and β_i) do always interact to determine the shape and direction of a given change trajectory and that they are thus difficult to interpret in isolation. Figure 3-3 should be used to readily determine the shape and overall direction of change in a given variable.

Loneliness. The adjusted mean trajectory of loneliness demonstrated a slight increase that was significantly different from zero, $\mu_s = 6.344$, $\beta = -0.124$, $\Delta\chi^2(\Delta df) = 32.70(2)$, $p < .001$. However, the overall aging effect turned out to be of very small size and almost equal to zero, \approx Cohen's $d = 0.01$.

Distressing relationships. As expected, the adjusted mean trajectory for the number of distressing relationships demonstrated a decrease from middle adulthood into old age, $\mu_s = 3.762$, $\beta = -0.080$, $\Delta\chi^2(\Delta df) = 96.96(2)$, $p < .001$. The overall aging effect is small in size, \approx Cohen's $d = -0.39$.

Pleasant relationships. The adjusted mean trajectory of the number of pleasant relationships showed a slight decrease that was significantly different from zero, $\mu_s = 20.310$, $\beta = -0.402$, $\Delta\chi^2(\Delta df) = 14.98(2)$, $p = .001$, but corresponds to a very small aging effect almost equal to 0, \approx Cohen's $d = -0.00$. The change trajectory was of non-linear shape, $\Delta\chi^2(\Delta df) = 14.96(1)$, $p < .001$. The number of pleasant ties appeared to decrease slightly in the course of middle adulthood but to be relatively stable afterwards.

Table 3-1

Parameter estimates and goodness of fit statistics from the univariate dual change score models

	Loneliness	Distressing relationships	Pleasant relationships	Satisfaction family	Satisfaction friendships
Regression of Δy_t on y_{t-1}	-.124 (0.08)	-.080 (0.05)	-.402 (0.11)	.220 (0.11)	.246 (0.13)
Mean intercept	51.048 (0.33)	52.747 (0.50)	50.555 (0.56)	49.386 (0.27)	50.524 (0.24)
Mean slope	6.344 (3.87)	3.762 (2.38)	20.310 (5.31)	-10.843 (5.44)	-12.445 (6.38)
\approx Cohen's d for y_{83} - y_{41} ¹	.01	-.39	-.00	.15	-.14
<i>Variances and indices of model fit</i>					
Intercept variance	151.45 (18.12)	63.70 (10.56)	48.10 (2.37)	48.19 (17.58)	33.88 (5.18)
Slope variance	2.19 (.77)	.19 (.20)	5.46 (1.92)	2.58 (1.74)	2.10 (1.26)
χ^2 /df	3961.69/621	179.12/104	192.83/104	118.22/104	129.13/104
CFI	.84	.90	.91	.99	.97
RMSEA	.02	.01	.01	.00	.01
Linear change only model ² : $\Delta\chi^2/\Delta df$	--	--	14.96/1	10.16/1	6.18/1
No change model ³ : $\Delta\chi^2/\Delta df$	32.70/2	96.96/2	14.98/2	36.12/2	31.36/2

Note. ¹ Values for y_{41} and y_{83} are calculated on the basis of parameter estimates. Standard deviation are set to $SD = 10$ in both age groups.

² Autoregressive parameter (mean regression of Δy_t on y_{t-1}) is constrained to be zero. Tests for non-linearity were not performed in the models for loneliness and distressing relationships as there were no theoretical assumptions with regard to the shape of age-related trajectories for these variables.

³ Both change parameters (mean regression of Δy_t on y_{t-1} and mean slope) are constrained to be zero. All regression weights are unstandardized. Numbers in parentheses display the standard errors. Regression weights are displayed with three decimal places to ensure a sufficient precision. The two change parameters (μ_s and β_i) cannot be interpreted in isolation. Detailed information on the shape and direction of change are provided in Figure 3-3. The sign of \approx Cohen's d indicates the overall direction of change. CFI = comparative fit index. RMSEA = root mean square error of approximation.

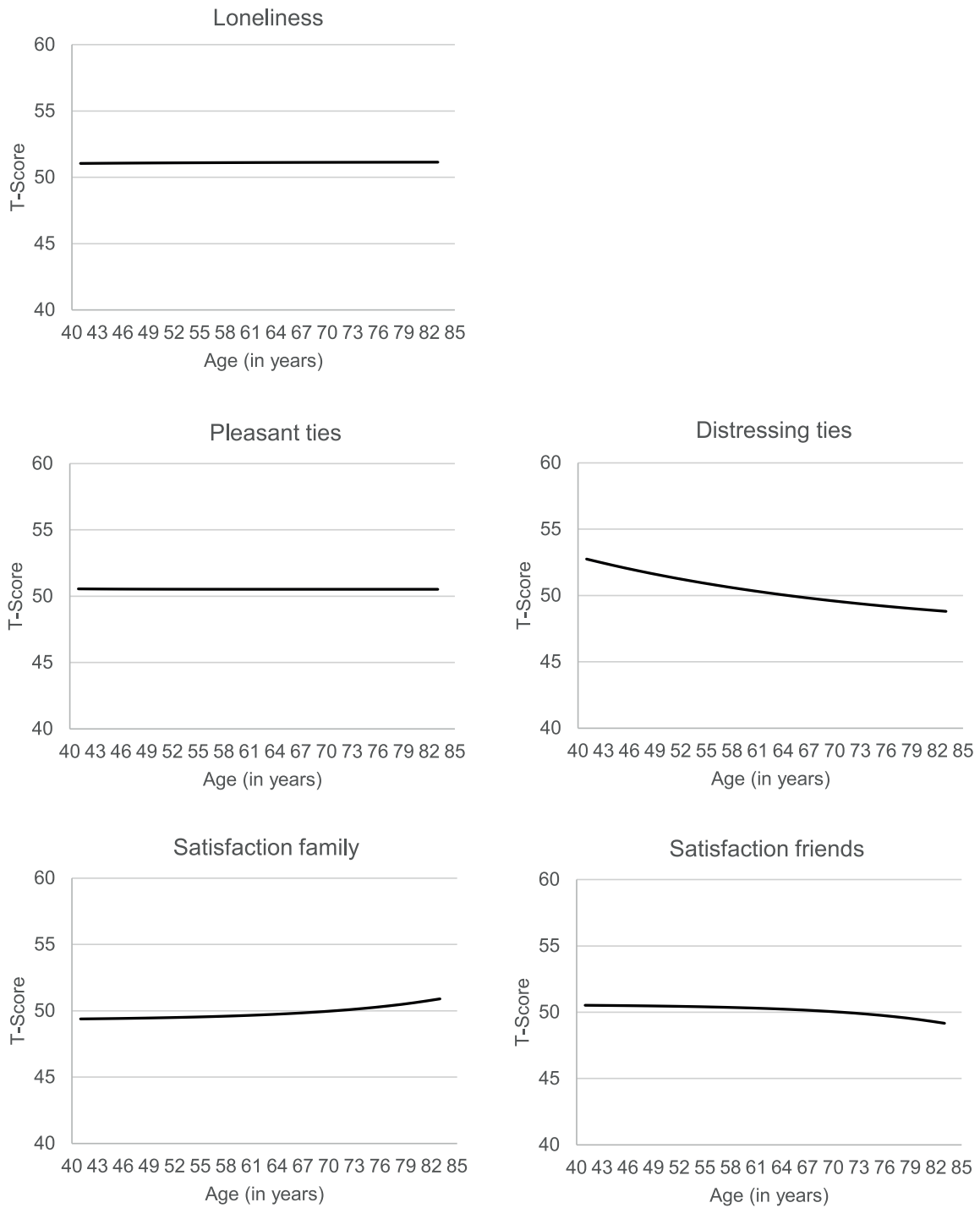


Figure 3-3. Change trajectories for loneliness and emotional qualities of the SNW as they are estimated by the corresponding DCSMs. Controlled for gender, education, region of residence and DEAS cohort affiliation.

Satisfaction with family relations. The adjusted mean trajectory for satisfaction with family relations showed an increase from middle adulthood into old age that was significantly different from zero, $\mu_s = -10.843$, $\beta = 0.220$, $\Delta\chi^2(\Delta df) = 36.12(2)$, $p < .001$, but corresponds to a very small aging effect, \approx Cohen's $d = 0.15$. The change trajectory was of non-linear shape, $\Delta\chi^2(\Delta df) = 10.16(1)$, $p = .001$. Other than expected, satisfaction with family members appeared to be relatively stable until the early years of old adulthood and to increase most strongly in the late years of old adulthood.

Satisfaction with friendships. Other than expected, the adjusted mean trajectory for satisfaction with friendships demonstrated a decrease from middle adulthood into old age, $\mu_s = -12.455$, $\beta = 0.246$, $\Delta\chi^2(\Delta df) = 31.36(2)$, $p < .001$. However, the overall aging effect was again very small in size, \approx Cohen's $d = -0.14$. The change trajectory was of non-linear shape, $\Delta\chi^2(\Delta df) = 6.18(1)$, $p = .013$. The satisfaction with friendships appeared to be relatively stable until the early years of old adulthood whereas it decreased in the late years of old adulthood.

3.3.3 Age-related changes in the association between emotional qualities of the social network and loneliness

The parameter estimates of our ARM for the interrelations between emotional qualities of the SNW and loneliness are displayed in Table 3-2. As can be seen, the table shows exemplar regression coefficients and correlations for the 43-45-year olds¹ along with their standard errors and 95 % bootstrap confidence intervals. The last column provides an overview of the estimated change parameters for regression effects of emotional qualities of the SNW on loneliness. The statement @0 indicates that an effect was constrained to be equal over age groups. This was done in all cases where we made no theoretical assumptions about age-related changes in regression effects. Covariate effects as well as intercorrelations between our indicators of emotional qualities of the SNW are displayed in Appendix B (see Tables B4 and B5).

Average interrelations. As expected, our ARM indicates regression effects of all emotional qualities considered on loneliness. A higher number of pleasant relationships predicted a lower level of loneliness, $\beta = -0.02$, $\Delta\chi^2(\Delta df) = 6.88 (1)$, $p = .010$. In a similar way, a higher satisfaction with family and friend relationships predicted a lower level of loneliness, effect family relationships: $\beta = -0.06$, $\Delta\chi^2(\Delta df) = 31.86 (1)$, $p < .001$; effect friendships: $\beta = -0.07$, $\Delta\chi^2(\Delta df) = 37.74 (1)$, $p < .001$. A higher number of distressing relationships predicted a higher level of loneliness, $\beta = 0.02$.

¹ Note that age group 43-45 was chosen as reference group because all parameters were freely estimated in the very first age group of the 40-42 year olds. Equality constraints as well as linear changes over age groups are set from age group 43-34 to age group 82-84 only (see detailed descriptions in method section).

The comparative fit analysis indicated that this relation was statistically significant, $\Delta\chi^2(\Delta df) = 5.15$ (1), $p = .020$. The lower bound of the 95 bootstrap % confidence interval, however, approached zero, 95% CI [0.00; 0.04]. Thus, this effect should be interpreted with special caution.

Table 3-2

Parameter estimates and goodness of fit indices for the autoregressive model

	b_{44} (SE)	95 % BS CI	Linear change
<i>Autoregressive effects</i>			
Loneliness ₍₄₄₎ → Loneliness ₍₄₇₎	.69 (.02)	[.66;.72]	@0
Pleasant R ₍₄₄₎ → Pleasant R ₍₄₇₎	.34 (.02)	[.31;.37]	@0
Distressing R ₍₄₄₎ → Distressing R ₍₄₇₎	.29 (.02)	[.26;.33]	@0
S. Family ₍₄₄₎ → S. Family ₍₄₇₎	.36 (.02)	[.33;.40]	@0
S. Friendships ₍₄₄₎ → S. Friendships ₍₄₇₎	.31 (.02)	[.27;.35]	@0
<i>Cross-lagged effects</i>			
Pleasant R ₍₄₄₎ → Loneliness ₍₄₇₎	-.02 (.01)	[-.04;-.01]	-.00 (.01)
Loneliness ₍₄₄₎ → Pleasant R ₍₄₇₎	-.18 (.01)	[-.20;-.15]	@0
Distressing R ₍₄₄₎ → Loneliness ₍₄₇₎	.02 (.01)	[.00;.04]	.00 (.01)
Loneliness ₍₄₄₎ → Distressing R ₍₄₇₎	.10 (.01)	[.08;.13]	@0
S. Family ₍₄₄₎ → Loneliness ₍₄₇₎	-.06 (.01)	[-.08;-.04]	-.00 (.01)
Loneliness ₍₄₄₎ → S. Family ₍₄₇₎	-.29 (.02)	[-.32;-.26]	@0
S. Friendships ₍₄₄₎ → Loneliness ₍₄₇₎	-.07 (.01)	[-.09;-.05]	-.00 (.01)
Loneliness ₍₄₄₎ → S. Friendships ₍₄₇₎	-.31 (.02)	[-.35;-.28]	@0
<i>Model fit indices</i>			
χ^2 / df	4064.71/2733		
CFI	.95		
RMSEA	.01		

Note. Displayed are unstandardized regression weights in age group 44 and their 95 % bootstrap confidence intervals [lower bound, upper bound]. The last column displays the average linear change in regression effects from age group 44 to age group 83. @0 indicates that a regression effect is constrained to be equal over age groups due to a lack of theoretical assumptions with regard to age-related changes. Numbers in parentheses display standard errors. Pleasant R = number of pleasant relationships. Distressing R = number of distressing relationships. S. Family = Satisfaction with family relations. S. Friendships = Satisfaction friendships. CFI = comparative fit index. RMSEA = root mean square error of approximation.

As expected, relations between emotional qualities of the SNW and loneliness turned out to be all reciprocal rather than unidirectional. Higher loneliness predicted a higher number of distressing and a lower number of pleasant relationships, effect distressing ties: $\beta = 0.10$,

$\Delta\chi^2(\Delta df) = 78.18 (1), p < .001$; effect pleasant ties: $\beta = -0.18, \Delta\chi^2(\Delta df) = 199.64 (1), p < .001$. In addition, higher loneliness predicted a lower satisfaction with family and friend relationships, effect family relationships $\beta = -0.29, \Delta\chi^2(\Delta df) = 472.20 (1), p < .001$; effect friendships: $\beta = -0.31, \Delta\chi^2(\Delta df) = 504.54 (1), p < .001$.

Age-differentiated interrelations. Against our expectations, there was no indication of a substantial age-moderation of the predictive pathways from emotional qualities of the SNW to loneliness. Allowing for linear age-related changes in the regression effects of distressing relationships did not result in a significant improvement of model fit, $\Delta\beta = 0.00, \Delta\chi^2(\Delta df) = 0.20(1), p = .656$. The same was true when allowing for linear changes in the effect of pleasant relations, $\Delta\beta = -0.00, \Delta\chi^2(\Delta df) = 0.01(1), p = .916$. Similarly, both the satisfaction with family and friend relations were equally predictive of loneliness levels in different age groups, family relationships: $\Delta\beta = -0.00, \Delta\chi^2(\Delta df) = 0.90(1), p = .344$; friendships: $\Delta\beta = -0.00, \Delta\chi^2(\Delta df) = .58(1), p = .446$.

3.4 Discussion

In line with previous studies, we found that the average level of loneliness remained relatively stable from middle adulthood into the beginning of very old age. The aging effect from 40 to 84 years turned out to almost equaling zero. In addition, our results suggest that age-related changes in emotional qualities of the SNW are marked by both gains and losses. There was no indication that the effects that emotional qualities of the SNW exert on loneliness increase from middle adulthood into the beginning of very old age.

3.4.1 Age-related changes in emotional qualities of the social network

Our results on age-related changes in emotional qualities of the SNW do both support and differentiate previous research in this field. The SST suggests that by selecting beneficial social contexts, people are able to actively enhance the quality of their social relations with age (Carstensen et al., 1999). This assumption finds some support in the finding that with increased age, people reported distressing relationships less frequently, whereas the average number of pleasant ties showed only little variation across the second half of life. Both the SST and the SAVI model assume that older adults are more motivated to avoid distressing social exchanges and to maximize pleasant social encounters (Carstensen et al., 1999; Charles, 2010). To fulfill these goals, ageing adults may actively adjust their social behavior and social processing to not only reduce relationship strain but also to increase the extent of positive social experiences (Luong et al., 2010; Reed et al., 2014). Based on these ideas and previous findings we had expected that people may be able to increase both the

number of pleasant relationships and the level of relationship satisfaction from middle adulthood into the early years of old age. This assumption, however, was not supported by the results of our study. An explanation is that not only in old age but also in midlife, emotional qualities of the SNW are not solely driven by the active adaptation of social behaviors and perceptions. Instead, throughout the whole life span, individual efforts to maximize relationship quality have to compete with more or less controllable changes in both social contexts and individual resources. In middle adulthood, people may face fundamental changes in the properties and demands of important family relations. Children are turning into young adults while parents start to develop a greater need for support. Both developments are likely to affect emotional qualities of the SNW (Li & Seltzer, 2003; Shanahan, McHale, Crouter, & Osgood, 2007). In later life, health problems and social losses may start to interfere with the maintenance of pleasant social contacts and activities (Bukov, Maas, & Lampert, 2002; Huxhold et al., 2013). The domain-specific trends for relationship satisfaction indicate that these late-life influences may be more pronounced for friendships than for family ties, which may be attributable to differing properties and demands of these relations. Compared to friendships, familial ties are less strongly based on the principle of reciprocity. Instead, family relations are often marked by a feeling of responsibility and – at least for close family ties – also by a comparatively high acceptance of imbalance in social support (Ikkink & van Tilburg, 1998; Neyer, Wrzus, Wagner, & Lang, 2011). In contrast to friendships, family relations are also more likely to encompass younger social partners, such as children and grand-children. Effects of mortality and health-related impairments may thus be more pronounced for an older adult's friendship network than for his or her family relations.

In sum, our results indicate that age-related changes in emotional qualities of the SNW are not only shaped by active self-regulation but also by partly incontrollable changes in social contexts and individual resources. To gain a comprehensive understanding of how social relations develop over time it may be crucial to gain a better understanding of how both factors interact with each other.

3.4.2 Age-related changes in the association between emotional qualities of the social network and loneliness

All emotional qualities of the SNW assessed in this study were found to be unique predictors of loneliness. This indicates that a person's feeling of integration benefits from both a low level of relationship strain and a high level of positive social exchanges which is in line with results of earlier studies (Fiori & Consedine, 2013). The additional effect of a generally high relationship satisfaction suggests that SNW quality is more than the absence of distress and the presence of joyful experiences. Instead, other aspects such as the level of emotional closeness (Lang & Carstensen, 1994)

are likely to play an important role as well. Also, a high emotional quality of both family and friend relationships was found to be relevant for minimizing loneliness in all age groups. At the same time, satisfaction with both relationship domains was only modestly related. All in all, to sufficiently describe the emotional quality of a person's SNW it may be crucial to consider both multiple characteristics of relationship quality and multiple relationships domains.

Our findings also suggest that the effects of emotional qualities of the SNW on loneliness are best understood with longitudinal data-designs. As expected, loneliness was found to be not only an outcome but also a predictor of relationship quality. This finding supports the notion that feelings of isolation have the potential to trigger a heightened vigilance for social threats as well as antisocial motivations and behaviors (J. T. Cacioppo et al., 2006; S. Cacioppo, Balogh, & Cacioppo, 2015; Park & Baumeister, 2015; Twenge et al., 2007). When experienced over longer periods of time, loneliness may actually increase the occurrence of social strain while reducing positive social experiences and relationship satisfaction.

SST assumes that a high emotional quality of social relations becomes more relevant for maintaining social well-being as people approach the end of their lives. What we found, however, was that from midlife to old age all people benefited similarly from a lower number of distressing ties, a higher number of pleasant ties as well as from a higher relationship satisfaction. In other words, our results provide no indication for a general increase in the relevance of relationship quality with advancing age. In fact, this age-related increase may be restricted to certain relationship contexts. As has been argued before, a lot of older adults have to face constraints and losses that restrict their possibilities for social engagement. In order to satisfy needs for meaningful and positive exchanges, people may thus choose to focus on a very select set of social partners, such as the emotionally closest ones, when growing older (Carstensen et al., 1999). Close relations – in particular those with family members – are most likely to be maintained in the light of age-related restrictions and heightened needs for support (Neyer et al., 2011; Wrzus et al., 2013). Also, as suggested in the SST, close ties may be particularly relevant for fostering a sense of meaning in life (Carstensen et al., 1999). Relations that are emotionally close, however, are not necessarily of positive quality (Fingerman et al., 2004). Accordingly, future studies should investigate how relationship closeness and interaction quality play together in determining older adult's loneliness.

It would also be interesting to address how people in different age groups cope with deteriorations of relationship quality. Research within the framework of the SST focused on how people shape their social relations in response to their changing social goals. It is less well understood how social goal development itself may be driven by involuntary changes in the SNW. Basically, there are two ways of reacting to a decrease in relationship quality: changing the properties of the relationship or changing one's own expectation and standards with regard to this relationship.

Whereas the first strategy may be most effective for an adaptive long-term development of the SNW, the second strategy may be more effective for quickly reducing one's distress. As suggested in the two-process framework for lifespan development, older adults may be more likely than younger adults to adapt their social goals and expectations when facing negative changes in their social context and opportunities (Brandtstaedter & Rothermund, 2002). Thus, even if decreases in emotional qualities of the SNW become more painful and threatening with age, older adults could be able to restore their relationship satisfaction before feelings of integration are substantially impaired by flexibly adapting their social goals and expectations. Due to the relatively long time-lag between age groups, our study is unsuited to shed light on these more immediate reactions to changes in relationship quality and their relevance for preventing loneliness. To do so may be a promising line of inquiry for future studies.

3.4.3 Limitations and future directions

The dataset at hand suffered from a relatively high attrition rate which may restrict the generalizability of our findings. As revealed by our selectivity analyses, however, differences between follow-up participants and those who dropped out were small for all measures of interest. Also, to reduce attrition bias, we included all observations available which helps to not only keep the sample as representative as possible but to also avoid a loss of statistical power that is inherent to complete case analysis (Graham et al., 2013). To handle missing information during model estimation we applied the FIML algorithm that has been shown to yield good parameter estimates and standard errors if patterns of missing data are related to variables in the statistical model (Graham, 2009; Newman, 2003), which is the case in this study.

The sample of our study was restricted to community dwelling adults up to the age of 84 years. In other words, very old adults and people with severe health-impairments are insufficiently represented in our sample. As a consequence, our estimations of age-related changes in means and interrelations might be biased. In fact, changes in both emotional qualities of social relations and loneliness, might turn out to be less beneficial if people with severe health impairments and people in very old age were included into the sample (Aartsen & Jylhä, 2011; Bukov et al., 2002; Huxhold et al., 2013; Pinguart & Sörensen, 2001).

In a similar vein, it should be noted that this study focused on the examination of average interrelations and age-effects that may be more or less representative for different social groups. In our models we controlled for differences according to gender and education as potential confounds of age-differences. Future studies may help to investigate in further detail how emotional qualities of the SNW and their relations to loneliness are moderated by these characteristics.

We applied an accelerated longitudinal data design which is a powerful tool for estimating trajectories and interrelationships over a broad age range. Studies showed accelerated longitudinal data to be capable of approximating true longitudinal changes (Duncan et al., 1996). When there is substantial historical change, however, estimates of age effects may be distorted (Miyazaki & Raudenbush, 2000). For our analysis, we addressed this problem by integrating measurement cohort as a covariate in our models. Future research, however, may allow for a more detailed view on how emotional qualities of the SNW and their associations with loneliness have changed over historical time.

We measured multiple dimensions of emotional relationship quality on the level of a person's SNW. This approach enabled us to show that age-related trajectories in emotional qualities of the SNW are not entirely positive but marked by both gains and losses. As discussed before, however, our variable for relationship distress was highly skewed - a great number of people named no distressing ties at all. This could indicate that our measure was unsuited to cover all forms of relational strain that are relevant for social well-being. In addition, our measures may have been unsuited for assessing variations in the quality of one specific relationship as, for instance, variations in the frequency of distressing or pleasant exchanges with one's partner or best friend.

3.4.4 Conclusion

Based on the SST and the SAVI model, we had assumed that with increasing age emotional qualities of the SNW are both better and more relevant for predicting loneliness. As suggested by our results, however, age-related changes in the emotional quality of social relations encompass both gains and losses. Moreover, we found no evidence in support of the assumption that feelings of integration become more dependent on relationship quality with increasing age. The results indicate that age-related changes in the SNW are shaped by both active self-regulation and changes in a person's conditions of living that are less easy to control. On the one hand, aging adults seem to be able to improve the quality of their family relations and to reduce the extent of distressing relationships. On the other hand, both middle-aged and older adults appear to face constraints on maximizing pleasant social exchanges, in particular in the domain of friendships. For fulfilling social needs, older people may become increasingly focused on social relations that are most easily maintained, such as relations with close family members. Also, instead of changing the properties of their social relations, older people may sometimes choose to adapt their social expectations in order to restore relationship satisfaction. All in all, age-related changes in social integration are likely to be shaped by a complex interplay of changing life contexts, the active selection of beneficial social contexts and the flexible adaption of social goals. Further studies are needed to better investigate how these factors may interact with each other to shape adult social development.

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Chapter 4

The changing relationship between partnership status and loneliness: Effects related to aging and to historical time

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This chapter is a preprint version of the following article which has been accepted for publication after submission of this dissertation in December 2018: Böger, A., & Huxhold, O. (2018). The changing relationship between partnership status and loneliness: Effects related to aging and to historical time. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*. Advance online publication. doi: 10.1093/geronb/gby153.

This chapter does not exactly replicate the final version of the article published in “The Journals of Gerontology”. Please do not copy or cite without author's permission. The final article is available, upon publication, at: <https://doi.org/10.1093/geronb/gby153>

Abstract

Objectives: Partnership status is a central predictor of loneliness. The strength of this predictive relationship, however, may decrease in the course of aging and over historical time due to changes in the quality of partnerships and in the quality of single life.

Method: Longitudinal data from $N = 6.188$ participants (40 to 85 years) of the German Ageing Survey (DEAS) was analyzed with multi-group structural equation models to disentangle aging-related and historical changes in the relationship of partnerships status and loneliness as well as in the average level of satisfaction with partnerships and single life.

Results: With advancing age, partnership status became less predictive of loneliness and the satisfaction of single people increased. Among later born cohorts, the association between partnership status and loneliness was less strong than among earlier born cohorts. Later born single people were more satisfied with their status than their earlier born counterparts. There was neither an aging-related nor a historical decrease in partnership satisfaction.

Discussion: The relevance of partnership status as a predictor of social well-being is not necessarily universal nor stable but appears to change in the course of aging and across historical time.

4.1 Theoretical Background

Romantic partnerships are central for the fulfillment of essential social and emotional needs. Accordingly, the absence of a romantic partner has been shown to be an important predictor of an adult's level of loneliness (Aartsen & Jylhä, 2011; Sundström, Fransson, Malmberg, & Davey, 2009). Currently, it is less clear to what extent the strength of this relationship is affected by age-related differences in people's living conditions. In this study, we examine how the role of partnership changes in the course of aging and over historical time. We assume that partnership status is of reduced relevance for predicting loneliness both among older adults and among adults of later born cohorts due to the following changes. On the one hand, there may be an age-related as well as a historical decrease in the quality of partnerships. On the other hand, there may be an age-related as well as a historical increase in the quality of a life as a single person. To test our assumptions, we examine aging- and cohort-related changes in the relationship of partnership status and loneliness in a large sample of German adults aged 40 to 85 years. We also investigate how satisfaction with a partnership and satisfaction with life as a single person varies both over cohorts and across age groups.

4.1.1 Aging-related changes in the relationship between partnership status and loneliness

If a partnership is marked by high strain and few positive experiences, it is less likely to fulfill a person's social and emotional needs and protect from loneliness (De Jong Gierveld, van Groenou, Hoogendoorn, & Smit, 2009; Hsieh & Hawkley, 2017). Longitudinal studies suggest that partnership quality decreases as partnership duration increases (Birditt, Jackey, & Antonucci, 2009; VanLaningham, Johnson, & Amato, 2001). Also, functional health impairments have been found to associate with lower relationship quality (Wong & Hsieh, 2017) and health problems are more likely to occur as couples grow older. In the light of these age-related developments it could be surmised that the quality of long-term partnerships decreases in the course of aging. In cross-sectional studies, however, older adults have often been found to report happier partnerships than adults in middle adulthood (VanLaningham et al., 2001). In fact, very unhappy partnerships might often be ended before people enter old age, for instance, after shared responsibilities regarding child rearing have lost importance (Birditt, Hope, Brown, & Orbuch, 2012; Bookwala, 2012; Hiedemann, Suhomlinova, & O'Rand, 1998). Partnerships that continue into old age could thus be characterized by a high quality and may be highly resilient to stress. As suggested in the socioemotional selectivity theory (Carstensen, Isaacowitz, & Charles, 1999), people may also perceive their partnerships more positively as they approach the end of their lives, an effect

apparently driven by more selective attention to the positive characteristics of social ties (Story et al., 2007) and by a different response to interpersonal tensions (Birditt, Fingerman, & Almeida, 2005). Overall, it is unclear to what extent an age-related decrease in partnership quality could serve as an explanatory mechanism for age-related changes in the association of partnership status and loneliness.

There is reason to expect, however, that the negativity of life as a single person decreases with age. Tasks related to child rearing tend to lose importance as people move from midlife to old age, which may lead to a decrease in the relevance of a steady partnership. In addition, older people usually entertain high quality relations with long-term friends, children and other close family members (Luong, Charles, & Fingerman, 2011) that provide not only support but also a sense of emotional closeness. With increasing age, people may thus grow less dependent on the presence of a steady partner to feel integrated and supported. At the same time, older single people may be also less willing to compromise their freedom and take on obligations related to a new steady partnership – in particular if it involves strong commitments such as marriage or cohabitation (De Jong Gierveld, 2002; Sassler, 2010; Talbott, 1998). The prospect of caring for a health-impaired spouse, for instance, may serve as barrier to entering a new long-term partnership among older adults (Talbott, 1998). Accordingly, studies suggested that rates of re-partnering and re-marriage are less high in older than younger age groups (Brown & Shinohara, 2013; De Jong Gierveld, 2004). The age-related shift in the prevalence of single and partnered people may serve to further alleviate the loneliness of single people by reducing the social stigma connected to singlehood (see also, Luhmann & Hawkey, 2016). In young adulthood, establishing a long term partnership is a central developmental task and with the transition to middle adulthood it becomes the exception rather than the rule to live without a steady partner (Eckhard, 2015). Along with the experience of an emotional deficit, singlehood may thus give rise to a feeling of social exclusion originating in the perception of deviating from a common social norm. As the frequency of steady partnerships reduces with advancing age, however, the experience of social exclusion among single people may become less and less pronounced. Based on all these ideas, we expect the following aging-related trends in our study:

H1: With increasing age, the relationship between partnership status (presence versus absence of a partner) and loneliness decreases.

H2: With increasing age, single people become more satisfied with their living situation. Given the ambiguous findings regarding partnership satisfaction across the life span, we make no predictions regarding age-related changes in this area.

4.1.2 Historical changes in the relationship between partnership status and loneliness

Emancipation movements and changing gender roles have led to drastic changes in the characteristics of romantic partnerships over the past 50 years. The prevalence and acceptance of divorce has increased and partnership models have become more diverse (Engstler & Klaus, 2017; Kiernan, 2004; Smyth, 2016; Teachman, Tedrow, & Crowder, 2000). At the same time, there have been changes in partnership-related norms and demands. Traditional partnership tended to be focused on providing a reliable basis for mutual support and child rearing. Modern partnerships, in contrast, are expected to be not only be reliable and supportive but also to allow for equality and self-fulfillment of both partners and provide satisfactory emotional benefits in terms of happiness, passion and love (Botkin, Weeks, & Morris, 2000; Campbell & Wright, 2010; Coontz, 2007; De Graaf & Kalmijn, 2006)

The increasing complexity of partnership-related demands may negatively affect partnership satisfaction and partnership stability (Campbell & Wright, 2010; Coontz, 2007). In fact, it may be difficult to reconcile traditional tasks of partnerships, such as the provision of support and child rearing, with an increasing desire for equality, self-fulfillment and ongoing happiness. Studies also suggest that despite an increasing endorsement of egalitarian norms, gender-related inequalities in both employment after child birth and the division of household labor tend to persist in modern partnerships (Bartley, Blanton, & Gilliard, 2005; Benard & Correll, 2010). This imbalance between the ideals and everyday reality of gender-equality may have become a relevant issue of conflict in today's partnerships (Claffey & Mickelson, 2009; De Graaf & Kalmijn, 2006).

At the same time, the increasing flexibility of partnership norms could also have exerted positive effects on partnership quality. As the economic dependence of romantic partners decreases people may be less likely to maintain unhappy or unsatisfactory relationships (Campbell & Wright, 2010; Coontz, 2007; De Graaf & Kalmijn, 2006). Additionally, modern partnerships may be more strongly grounded in characteristics that foster interactional quality, such as a perceived similarity in goals, values and interests or emotional benefits of the relationship (Campbell & Wright, 2010; Coontz, 2007). Finally, as partnerships get less institutionalized, there are more opportunities to individually negotiate the tasks and roles of partners (Smyth, 2016). This may increase the potential for dispute but may also help in the long run to optimize the fit between characteristics of the relationship on the one hand and both partner's goals and needs on the other hand. Overall, it is unclear from a theoretical point of view to what extent a historical decrease in partnership quality could serve as an explanatory mechanism for a weakening of the association between partnership status and loneliness. Initial empirical investigations suggest that there are both positive and negative changes in partnership quality in different domains that may level each

other out to some extent (Amato, Johnson, Booth, & Rogers, 2003).

There is reason to expect, however, that the strain related to a life as single person has decreased over historical time. Specifically, there are several reasons for assuming that adults of later born cohorts may be less dependent on a romantic partner for leading a happy, secure and socially integrated life than adults of earlier born cohorts. First of all, steady partnerships have lost their relevance for providing economic security and financial support due to the rise of female employment rates (Coontz, 2007; Teachman et al., 2000). Studies also suggest that adults today entertain a greater number of emotionally close friendships (Böger, Huxhold, & Wolff, 2017; Suanet, van Tilburg, & Broese van Groenou, 2013) which are likely to foster feelings of support and integration. Friendships resemble partnerships in being freely chosen and being grounded in sympathy as well as a perceived similarity of interests, goals and values. They may thus be particularly effective in providing compensatory support and affection when a romantic partner is absent. Finally, as needs for self-fulfillment and autonomy have increased due to economic growth, educational expansion and emancipation movements (Inglehart, 2008), today's adults may be less bound to partnership-related roles, such as parenting, in order to experience a sense of meaning in life. Instead, work and educational activities may have gained importance for people's psychological well-being. It has been shown, for instance, that parenting is less relevant for meaning in life to women with high education and a high commitment to work (Nomaguchi & Brown, 2011).

As self-fulfillment and autonomy become more relevant, today's adults may be also less willing to enter or maintain partnerships that interfere with the fulfillment of these needs or that provide unsatisfactory emotional benefits (Campbell & Wright, 2010; Coontz, 2007; De Graaf & Kalmijn, 2006). Societal changes in marriage rates, divorces and birth rates appear to mirror these changes. Partnership biographies of today's adults have been found to be less stable and to include more periods of singlehood (Eckhard, 2015). Due to the historical shift in the frequency and stability of partnerships, singlehood may feel less socially excluding among later born than among earlier born cohorts. As shown in a study by van Tilburg and colleagues (2014), for instance, divorcees of later born cohorts report less loneliness than those of earlier born cohorts, a trend that may reflect the improved social position of people choosing to dissolve a committed partnership. Based on these ideas, we expect the following historical trends in our study:

- H1: Among later born cohorts, the relationship between partnership status (presence versus absence of a partner) and loneliness is less pronounced than among earlier born cohorts.
- H2: Single people among later born cohorts are more satisfied with their living situation than single people of earlier born cohorts.

Given the ambiguous lines of argumentation regarding historical changes in partnership

satisfaction and the small number of empirical investigations, we make no predictions regarding differences in this area.

4.2 Method

4.2.1 Sample

Data for this study comes from the nationally representative German Ageing Survey (DEAS), an ongoing study of community-dwelling adults in the second half of life living in Germany (see, Klaus et al., 2017). An ethical approval is not mandatory for general surveys in Germany. The DEAS is approved and funded by the Federal Ministry for Family Affairs, Senior Citizens, Women and Youth (BMFSFJ). Representative baseline cohorts of people aged 40 to 85 years were recruited in 1996, 2002, 2008 and 2014. Available participants from each cohort were re-interviewed in each subsequent wave of 2002, 2008 and 2014. Two additional assessment waves in 2011 and 2017 were restricted to longitudinal participants.

For the present study we used two-wave longitudinal data from $N = 6,188$ participants of the DEAS_08 cohort (49.5 % female, average age at baseline: $M=61.50$ years, $SD=12.10$ years). A total of $n = 2,552$ participants (41.2 % of DEAS_08) could be re-interviewed during the follow-up assessment 6 years later.

Selectivity analyses revealed that people who dropped out of the study were less likely to have a partner than people who remained in the study, effect in logistic regression: $b = 0.41$, $SE = 0.06$, $p < .001$, correlation coefficient $\varphi = .08$. Single people who dropped out of the study were less satisfied with their situation than single people who participated at follow up, $t(940,86) = -4.09$, $p < .001$, Cohen's $d = -0.23$. Partnership satisfaction did not differ between participants who dropped out and those that remained in the study, $t(4346.10) = -0.78$, $p = .435$, Cohen's $d = -0.02$. Participants who dropped out of the study reported a slightly lower level of loneliness than people participating at the follow-up, $t(4371.23) = -2.97$, $p = .003$, Cohen's $d = -0.09$.

4.2.2 Measures

Partnership status. Participants were asked to report their marital status by choosing one of six categories: 1 = Married, living together with spouse, 2 = Married, living separated from spouse, 3 = Divorced, 4 = Widowed, 5 = Single, 6 = Civil union. Participants who choose either category 1 or category 6 were assigned the status “partnered”. All other participants were asked whether they had a steady partner at the moment or not. Participants who answered this question with “yes” were added to the category “partnered” (variable value 1). Participants who answered with no were classified as “single” (variable value 0). In the follow-up assessment of 2014, the partnership status of the previous wave was confirmed or updated if necessary.

Satisfaction with partnership. All participants who stated that they had a partner at the time of assessment were asked to evaluate the quality of their partnership on a scale from 1 (*very good*) to 5 (*very bad*). The score for this item were reversed so that higher values indicate a higher partnership satisfaction.

Satisfaction with single life. All participants who were classified as single were asked to evaluate their current living situation without a partner on scale from 1 (*very good*) to 5 (*very bad*). Again, the scores were reversed so that higher values indicate a higher satisfaction with single life.

Loneliness. To assess feelings of loneliness a modified version of the six item De Jong Gierveld loneliness scale was used (De Jong Gierveld & Van Tilburg, 2006). The scale includes different statements about a person's social integration (see Appendix C, Table C1 for a full item list). Participants reported on a scale from 1 (*strongly agree*) to 4 (*strongly disagree*) how much a statement applied to their social lives. Whenever necessary, agreement scores for single items were recoded so that a higher score indicated a higher level of loneliness. The 6-item scale had a good internal consistency at both time-points (Cronbach's α at 2008 = .83; Cronbach's α at 2014 = .84).

Covariates. Several studies suggest that partnership-related experiences differ by gender. As selective mortality may lead to aging-related changes in the distribution of men and women in our sample, gender was included as covariate in all our models.

4.2.3 Analyses

Logic of statistical modeling and data preparation. To examine our research questions, we applied a statistical model that allowed us to differentiate to what extent cross-sectional age differences in correlations and means are due to aging-related processes on the one hand and historical changes on the other hand (Spuling, Wurm, Tesch-Römer, & Huxhold, 2015). The approach has three main assumptions. The first assumption is that cross-sectional age group differences in some parameter p result from the additive effects of aging-related changes in p and historical differences in p . The second assumption is that the extent of aging-related changes in p can be estimated by measuring intra-individual changes in p over some time interval t . The third assumption is that if the extent of aging-related change in p over time interval t is known, historical differences can be inferred by computing the difference between the extent of cross-sectional age group differences in p and the extent of longitudinal changes in p . The precondition for doing so is that cross-sectional age differences in p can be expressed for an age-span that equals the distance between longitudinal measurements.

In the dataset at hand, the distance between baseline (t_0) and follow up (t_1) is 6 years. Individual observations were thus assigned to one of seven age groups with an age-span of 6 years (age groups specific means and standard deviations of all variables are reported in Table C2 and

Table C3 in Appendix C). To estimate the change parameters of interest, we used multi-group structure equation models. All models were implemented in Mplus Version 7.4 (Muthén & Muthén, 1998-2012). Data preparation was done in R Version 3.1.0 (R Development Core Team, 2014). Prior to model estimation, all metric variables were converted to a common T-Metric ($M=50$, $SD=10$) with the means and standard deviation of the baseline sample serving as points of reference. Scores for gender were centered around the age group specific mean value to statistically equalize the gender ratio over age groups.

Model for changes in the relationship of partnership status and loneliness. To determine changes in the relationship between partnership status and loneliness, we specified a regression model where the level of loneliness (LO) at one time point j was predicted by partnership status (PS) at the same time point (see Figure 4-1 and Supplementary Syntax 1 in Appendix C). The corresponding regression coefficient (b_{tj}) was estimated separately for every age group i at both time points. Aging effects were defined as the age group specific differences between regression coefficients at both time points leading to a total number of seven change parameters ΔAb_k defined as:

$$\Delta Ab_k = b_{i_{t1}} - b_{i_{t0}} \text{ (Equation 1.1)}$$

Change parameters were allowed to vary linearly over age groups to account for non-linearity in the aging effect that would occur, for example, if the rate of change accelerated across the age range under observation.

In addition to aging-related change parameters, a total of 6 cross-sectional difference parameters ΔCb_k were specified to describe deviations between regression coefficients of subsequent age groups within one time point:

$$\Delta Cb_k = b_{(i+1)_{tj}} - b_{i_{tj}} \text{ (Equation 1.2)}$$

Again, the difference parameters were allowed to show linear variations over age groups to allow for non-linearity in the overall ageing and the overall historical effect. Historical differences in b (ΔHb_k) were derived indirectly via the estimates for ΔCb_k and ΔAb_k :

$$\Delta Hb_k = \Delta Cb_k - \Delta Ab_k \text{ (Equation 1.3)}$$

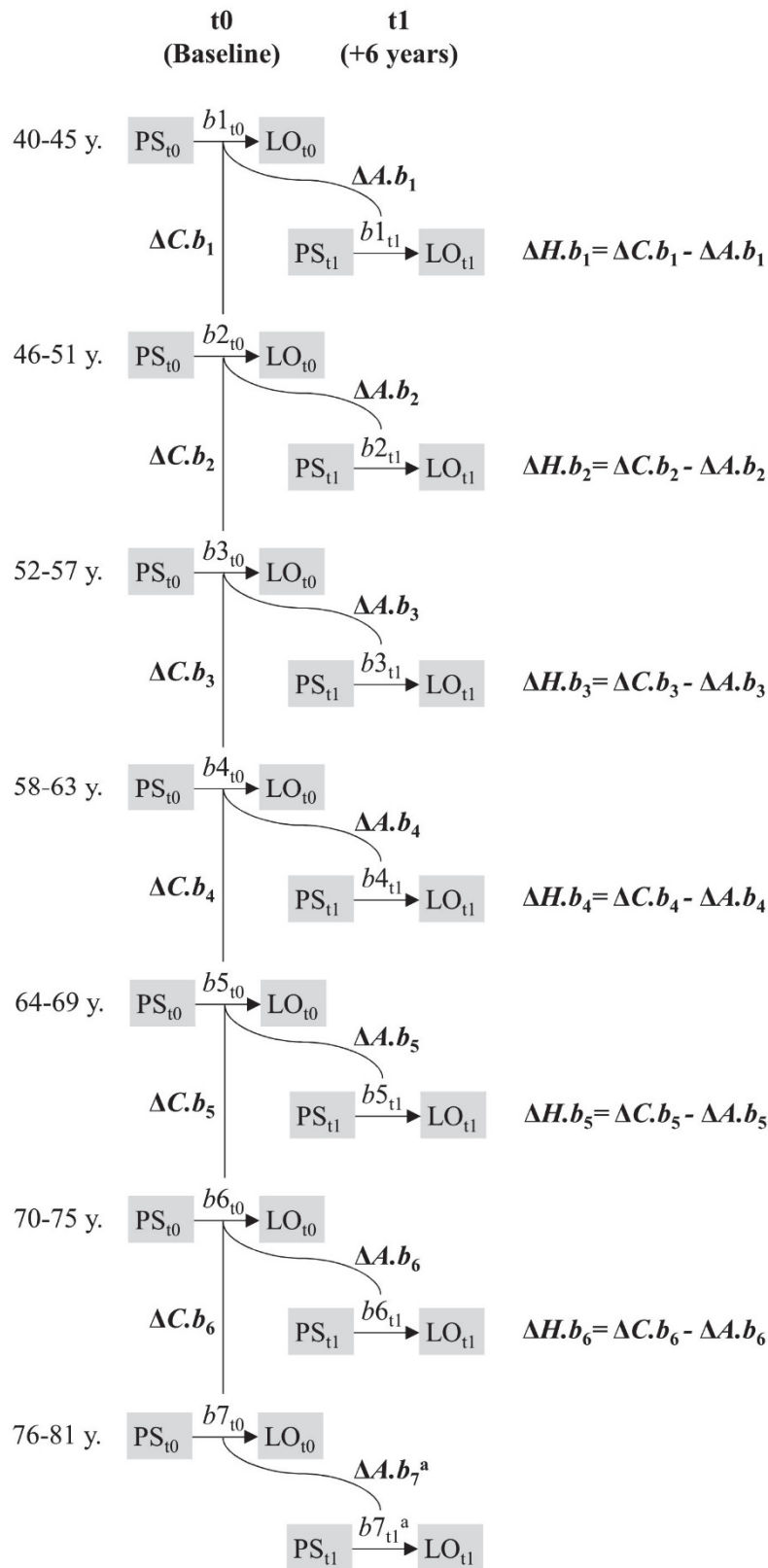


Figure 4-1. Model for disentangling aging-related and historical changes in the regression effect (b) of partnership status (PS) on loneliness (LO). ΔCb_k = cross-sectional age group differences in regression weight. ΔAb_k = within-group changes in regression weight over 6 years. ΔHb_k = historical changes in regression weight. ^a Regression weight and change parameter are freely estimated (see also Supplementary Syntax 1 in Appendix C). One-headed arrows = regression effects, lines without arrowhead = difference parameters.

Model for changes in the mean level of partnership satisfaction and the satisfaction of single people. To determine aging-related and historical changes in the satisfaction with partnership and the satisfaction with single life, we specified multi-group latent-change models (see, McArdle, 2009). As can be seen in Figure 4-2 (see also Supplementary Syntax 2 in Appendix C), our model estimated means at baseline (Mi_{t0}) separately for each age group i as well as the age group specific differences between means at $t1$ and $t0$, leading to a total number of six aging-related change parameters (ΔAM_k) in the form of:

$$\Delta AM_k = Mi_{t1} - Mi_{t0} \text{ (Equation 2.1)}$$

Again, aging-related changes were allowed to vary linearly over age groups.

A total of six cross-sectional difference parameters (ΔCM_k) described differences between means of subsequent age groups within one time-point:

$$\Delta CM_k = M(i + 1)_{tj} - Mi_{tj} \text{ (Equation 2.2)}$$

The difference parameters were allowed to vary linearly over age groups. Historical differences in means (ΔHM_k) were derived indirectly via estimates of ΔCM_k and ΔAM_k :

$$\Delta HM_k = \Delta CM_k - \Delta AM_k \text{ (Equation 2.3)}$$

Handling of missing data. We included all available observations of the 2008 baseline sample, irrespective of whether people participated at the follow-up assessment or not. Studies showed that selectivity biases in parameter estimates are less severe if a statistical model is based on all available observations rather than solely on observations of people with complete longitudinal data (Graham, 2009). At the same time, the use of all available observations helps to maximize statistical power. To handle missing information during parameter estimation the full information maximum likelihood (FIML) was applied. The FIML algorithm has been shown to yield good parameter estimates and standard errors if patterns of missing data are related to variables in the statistical model (Graham, Cumsille, & Shevock, 2013). As suggested in our selectivity analyses, variables in our model relate to drop-out patterns to some extent. In addition to model variables, further indicators associated with drop-out in the DEAS (health, education and social integration) were included as auxiliary predictors of missing data in our models. Information on the operationalization of missing-data predictors are provided in Appendix C (see Table C4).

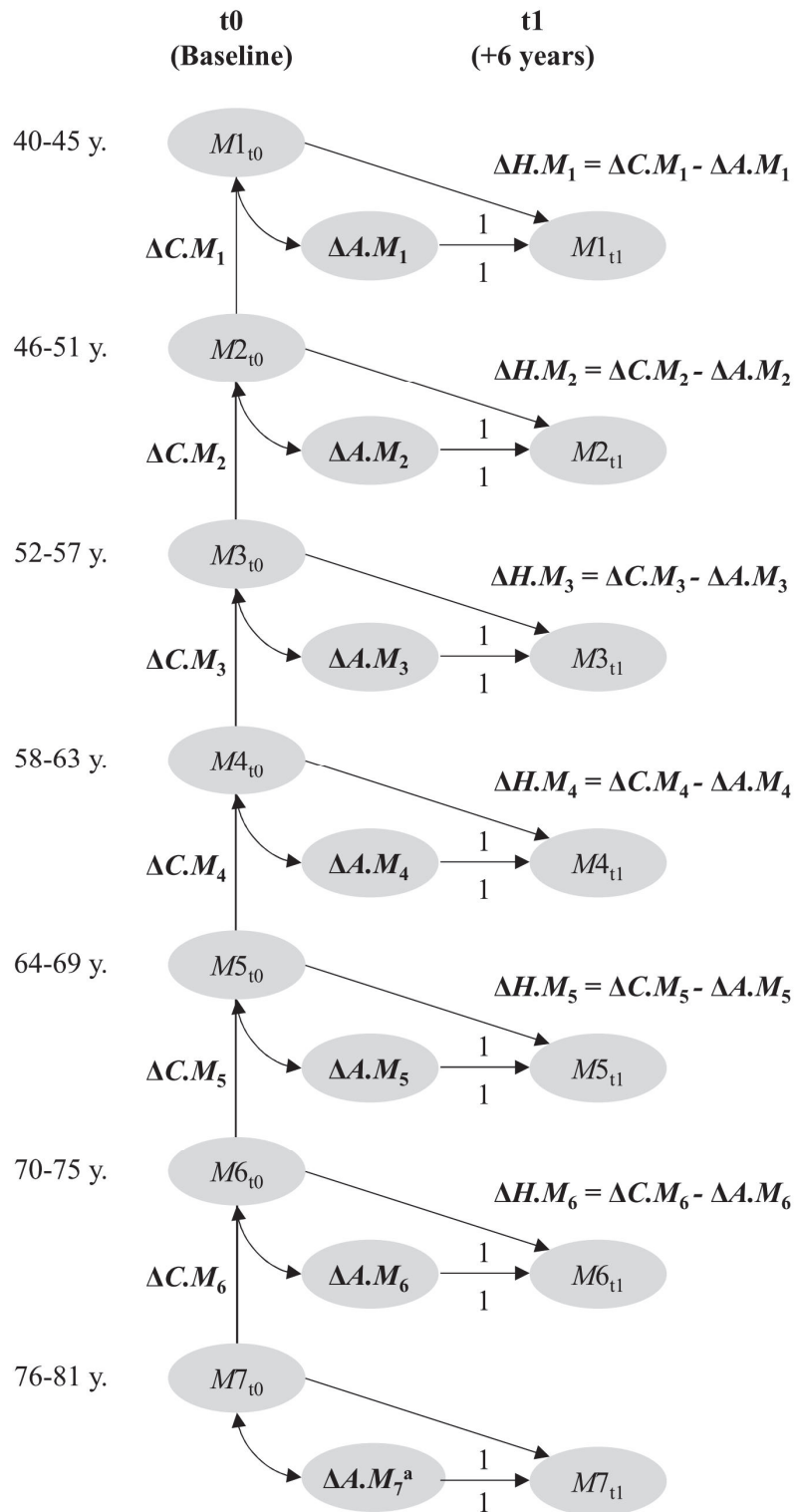


Figure 4-2. Model for disentangling aging-related and historical changes in mean levels (M) of satisfaction with partnerships and satisfaction with single life. $\Delta C.M$ = cross-sectional age group differences in mean level. $\Delta A.M$ = within-group changes in mean level over 6 years. $\Delta H.M$ = historical changes in mean level. ^aChange parameter is freely estimated (see also Supplementary Syntax 2 in Appendix C). One-headed arrows = regression effects, double-headed arrows = covariances, lines without arrowhead = difference parameters.

Hypotheses testing. Comparative fit analyses using χ^2 difference tests were used to test for statistical significance of aging-related and historical changes in regression coefficients and means. Model comparisons proceeded in four steps. In a first step, both cross-sectional differences and aging-related changes in the parameter p (either b or M) were set to 0 (M1: $\Delta Cp_k = \Delta Cp_{k+1} = \Delta Ap_k = \Delta Ap_{k+1} = 0$). This model would provide the best fit to the data if there were neither aging-related nor historical changes in p . In a second step, we allowed for cross-sectional differences and aging-related changes in p but with the following constraints: a) the extent of cross-sectional differences is similar to the extent of aging-related changes and b) cross-sectional differences as well as aging-related changes are constant over age groups (M2: $\Delta Cp_k = \Delta Cp_{k+1} = \Delta Ap_k = \Delta Ap_{k+1}$). This model would provide the best fit to the data if there was a linear aging-effect but no historical change in p . In the third step, we allowed for differences in the extent of cross-sectional differences and the extent of aging-related changes. As in model two, however, cross-sectional differences and aging-related changes were constrained to be constant over age groups (M3: $\Delta Cp_k \neq \Delta Ap_k$, $\Delta Cp_k = \Delta Cp_{k+1}$, $\Delta Ap_k = \Delta Ap_{k+1}$). This model would provide the best fit to the data if there was not only a linear aging effect but also linear historical change in p . In the fourth and final step, we tested for age-moderations in both aging and historical effects, by allowing for variations in cross-sectional differences and aging-related changes over age groups respectively (M4: $\Delta Cp_k \neq \Delta Ap_k$, $\Delta Cp_k \neq \Delta Cp_{k+1}$, $\Delta Ap_k \neq \Delta Ap_{k+1}$).

4.3 Results

The following result section is focused on aging-related and historical changes in the variables of interest. Information on gender differences can be found in Appendix C (see Table C5).

Relationship of partnership status and loneliness. Our model comparisons indicated that the relationship between partnership status and loneliness was best described by a model that allowed for both linear aging effects and linear historical change, fit of final model: $\chi^2(43) = 34.36$, CFI = 1.00, RMSEA = .00; χ^2 compared to that of M1: $\Delta\chi^2(2) = 11.90$, $p = .003$. Parameter estimates of this model are displayed in Figure 4-3. There is a negative relationship between partnership status and loneliness in all age groups, indicating that partnered adults (variable value 1) are significantly less lonely than adults living as singles (variable value 0). This negative relation decreases in strength as people grow older, $\Delta Ab = 1.59$. Cross-sectional age group differences in b are significantly smaller than what would be expected from the size of within age group changes, $\Delta Cb = 0.23 < \Delta Ab = 1.59$; $\Delta\chi^2(1) = 7.50$, $p = .006$, indicating the presence of significant historical change. In fact, the negative relationship between partnership status and loneliness was stronger among earlier born cohorts than among later born ones, $\Delta Hb = -1.37$.

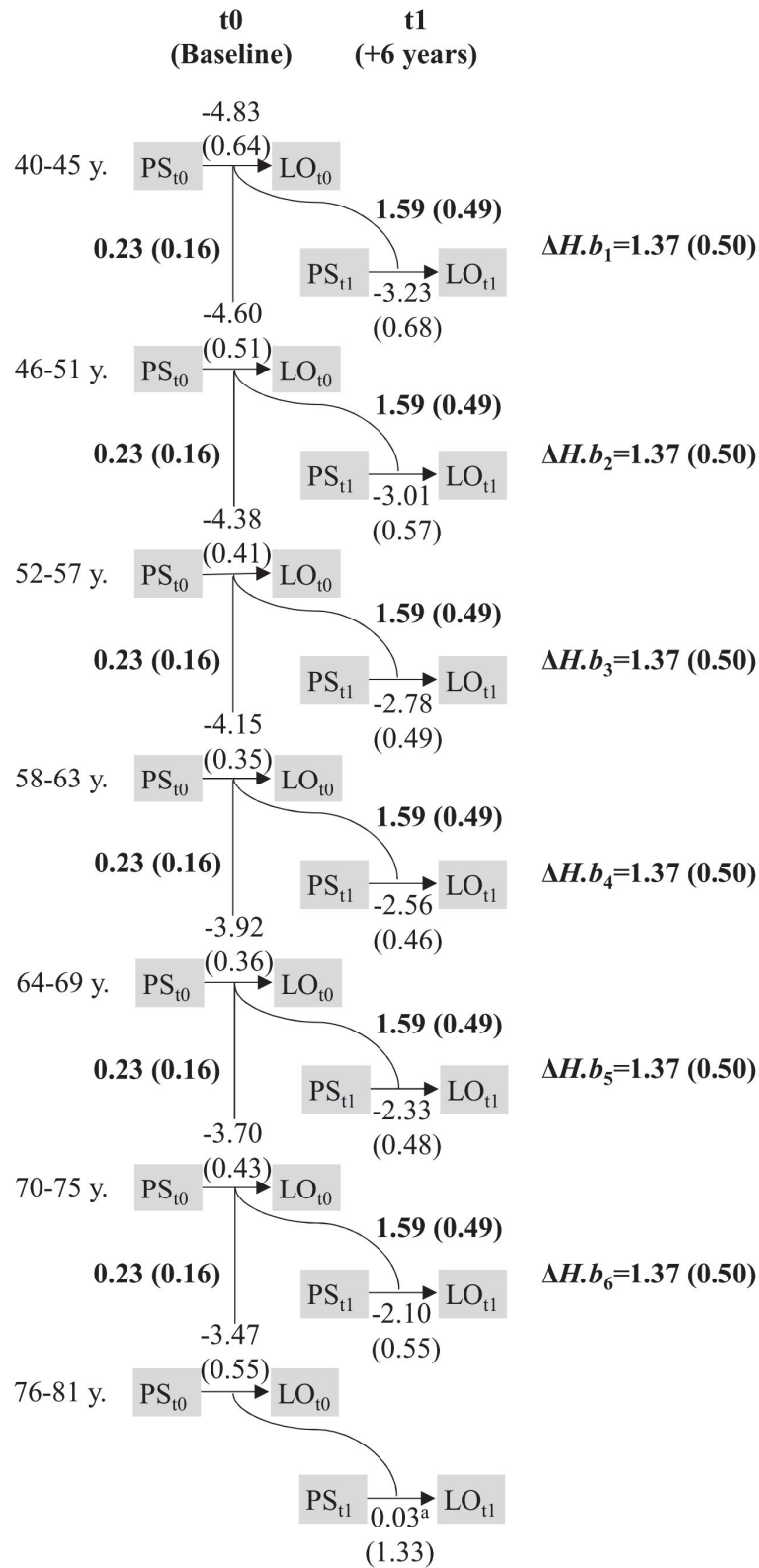


Figure 4-3. Results of model for aging-related and historical changes in the regression effect of partnership status (PS) on loneliness (LO). Displayed are the unstandardized regression effects and standard errors in brackets. Numbers in bold show estimates for the group-specific differences and changes in regression effect b and their standard errors in brackets (cross-sectional differences, aging-related changes and historical changes respectively, from left to right). ^aChange parameter is freely estimated (see also Supplementary Syntax 1 in Appendix C). One-headed arrows = regression effects, lines without arrowhead = difference parameters.

Partnership satisfaction. Mean levels of partnership satisfaction were best described by a model that allowed for non-linear aging-related change but no historical change, fit of final model: $\chi^2(22) = 24.45$, CFI = 1.00, RMSEA = .02; χ^2 compared to M1: $\Delta\chi^2(2) = 5.83$, $p = .054$. Parameter estimates from this model are displayed in Figure 4-4. Partnership satisfaction decreases among adults in middle adulthood, $\Delta AM_1 = -0.70$, but increases again among older adults, $\Delta AM_6 = 0.53$. Cross-sectional age group differences were found to mimic the pattern of within age group changes, $\Delta\chi^2(2) = 2.97$, $p = .227$. In other words, our analysis indicated a U-shaped variation of partnership satisfaction with age but did not provide any indication of historical change in partnership satisfaction.

Satisfaction of single people. Mean levels of satisfaction with single life were best described by a model that allowed for linear aging-related as well as linear historical change, fit of final model: $\chi^2(22) = 19.25$, CFI = 1.00, RMSEA = .00; χ^2 compared to M1: $\Delta\chi^2(2) = 15.54$, $p < .001$. Parameter estimates from this model are displayed in Figure 4-5. The satisfaction of single people increases significantly as people grow older, $\Delta AM = 1.99$. Cross-sectional age group differences, however, go in the opposite direction, $\Delta CM = -0.29 < \Delta AM = 1.99$; $\Delta\chi^2(1) = 15.48$, $p < .001$, indicating the presence of a significant historical change in satisfaction levels. In fact, the satisfaction with being single appears to be lower among earlier born cohorts than among those born later, $\Delta HM = -2.29$.

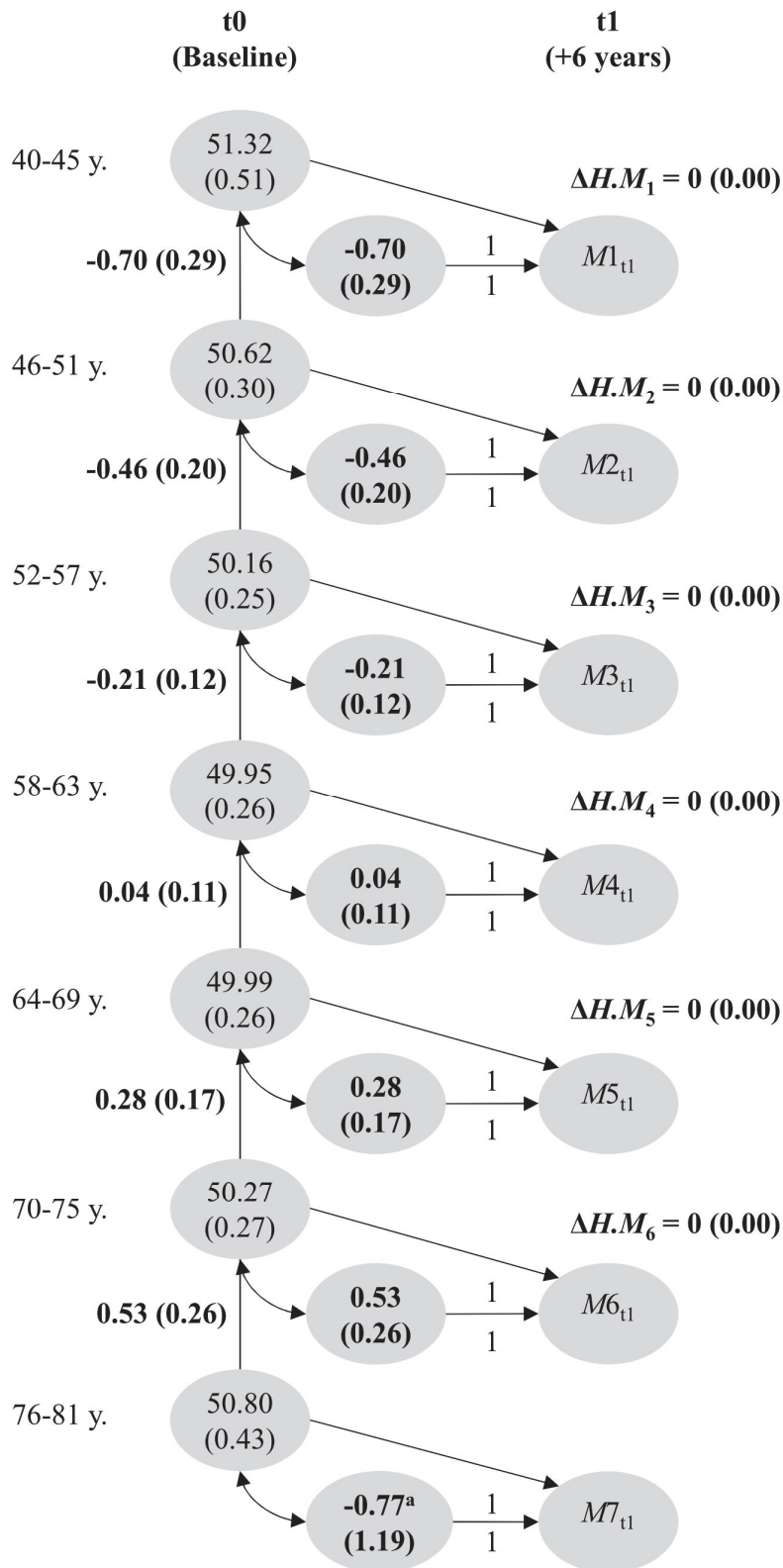


Figure 4-4. Results of model for aging-related and historical changes in the mean level of partnership satisfaction. Displayed are the age group specific intercepts and their standard errors in brackets. Numbers in bold show estimates for the group-specific differences and changes in mean levels and their standard errors in brackets (cross-sectional differences, aging-related changes and historical changes respectively, from left to right). ^aChange Parameter is freely estimated (see also Supplementary Syntax 2 in Appendix C). One-headed arrows = regression effects, double-headed arrows = covariances, lines without arrowhead = difference parameters.

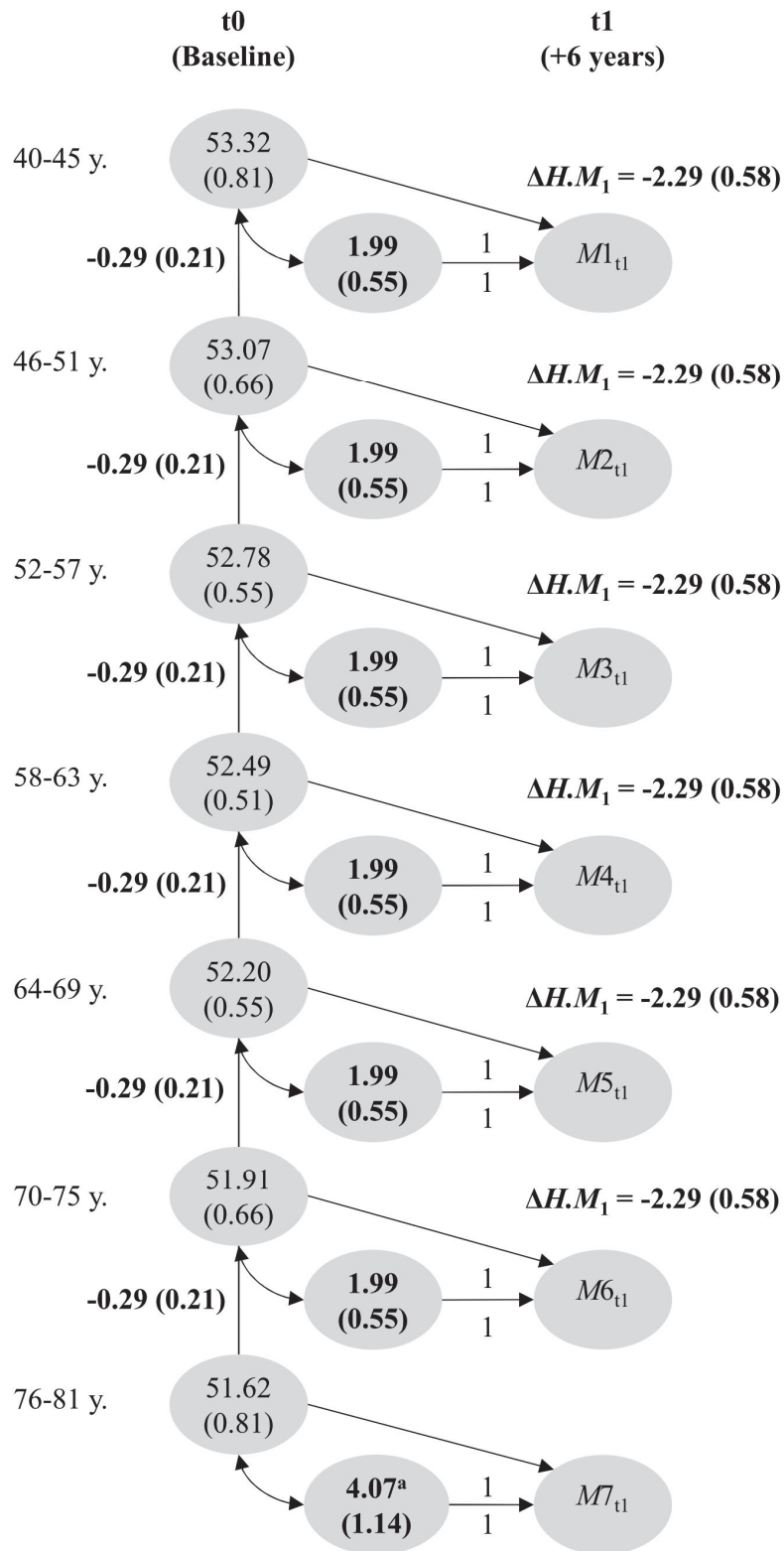


Figure 4-5. Results of model for aging-related and historical changes in the mean level of satisfaction with single life. Displayed are the age group specific intercepts and their standard errors in brackets. Numbers in bold show estimates for the group-specific differences and changes in mean levels and their standard errors in brackets (cross-sectional differences, aging-related changes and historical changes respectively, from left to right). ^aChange Parameter is freely estimated (see also Supplementary Syntax 2 in Appendix C). One-headed arrows = regression effects, double-headed arrows = covariances, lines without arrowhead = difference parameters.

4.4 Discussion

The results of this study suggest that both with increasing age and over historical time partnership status becomes less predictive of differences in loneliness. The results further indicate that this change may relate to increased satisfaction of single people in older age groups and among later born cohorts. We find no indication of a decrease in partnership satisfaction either in the course of aging or over historical time.

4.4.1 Aging-related changes in the relationship between partnership status and loneliness

With advancing age, the relationship between partnership status and loneliness appears to grow less strong. We find no support for the assumption, however, that partnered people get less satisfied with their relationship when growing older. Instead, aging-related changes in partnership satisfaction were found to follow a non-linear pattern. Over a time-frame of six years, partnership satisfaction decreased among middle aged adults but increased among people in old age. The decrease in partnership satisfaction among middle-aged adults may relate to a number of critical events and changes that are experienced by a majority of couples during this phase of life. In the course of middle adulthood, children are growing more and more autonomous, for instance, which may lead parents to reprioritize their life goals. While parenting-related tasks are likely to lose importance, self-fulfillment and partnership-related experiences may gain importance. Through this goal shift, some people may start to see their partnership in a new light and unsatisfactory partnerships may be more likely to be ended (Birditt et al., 2012; Hiedemann et al., 1998). Long-term partnerships that continue into very old age, in contrast, may be marked by a particularly high quality as well as a high resilience to stress. The challenges of old age, such as deteriorating health or an increased need for support and care, may be less likely to affect satisfaction levels within these resilient partnerships. In fact, couples that stay together after their children have moved out have been shown to grow increasingly satisfied with their relationship (Gorchoff, John, & Helson, 2008). This could help to explain why partnership satisfaction develops more positively among older adults. Re-partnering after the dissolution of an unsatisfactory long-term partnership may be another reason for the positive trends of relationship satisfaction after midlife. As found in a study by Birditt and colleagues (2009), newly formed partnerships tend to show more positive trajectories of relationship quality over time than stable long-term partnerships with the same partner.

In contrast to the level of partnership satisfaction, the satisfaction with being single increased uniformly over a time frame of 6 years in all age groups under study. This trend may reflect a general decrease in the relevance of committed partnerships with age. Tasks such as child

rearing that are strongly tied to partnerships, lose importance as people grow older. In addition, living in a romantic partnership is less of a social norm among older adults than among younger ones. In midlife, romantic partnerships tend to be ubiquitous within one's social comparison group (Eckhard, 2015). With advancing age, however, the number of single people increases, which may reduce the experience of social stigma connected to a life without a romantic partner. In part, the increasing satisfaction with single life may also reflect a successful adaptation process among single people for whom the partnership dissolution had been a recent event. As shown in previous studies, the dissolution of a partnership is often associated with an initial drop in well-being followed by an adaptation phase, during which a person's level of well-being increases again (Soons, Liefbroer, Kalmijn, & Johnson, 2009).

4.4.2 Historical changes in the relationship between partnership status and loneliness

As expected, our results suggest that the association of partnership status and loneliness is less pronounced among later born cohorts than among those born earlier. We find no indication, however, that the level of partnership satisfaction has decreased over the past decades. Instead, today's adults and adults from earlier born cohorts appear to be equally satisfied with their partnerships. The stability in partnership satisfaction could be attributable to the fact that there are both positive and negative changes in partnership characteristics that level each other out (Amato et al., 2003). On the one hand, today's partnerships are characterized by a high complexity of demands that may increase the potential for conflict and relationship dissolution (Campbell & Wright, 2010; Coontz, 2007; Smyth, 2016). On the other hand, the increasing flexibility of partnership-related norms may also allow for a better alignment of characteristics of the partnership on the one hand and both partner's goals and needs on the other hand.

The results suggest, however, that single people today may be more satisfied with their situation than those of earlier birth cohorts. This could indicate that partnerships have become less relevant for leading an integrated and meaningful life. Due to the increase in female employment, romantic partnerships have become less important for providing economic security and instrumental support (Coontz, 2007; Teachman et al., 2000). Moreover, while autonomous and self-fulfilling activities (e.g. work) may have gained importance as a source of meaning in life (Inglehart, 2008), partnership-related roles (e.g. parenting), could have grown less relevant in this regard. Due to the increasing number of single people and the decreasing stability of partnerships (Eckhard, 2015), committing to a partnership may also be less of a social norm for today's adults than for adults of earlier birth cohorts. As a consequence, single people today may be less taxed by their situation than single people of earlier birth cohorts for whom the absence of a long-term

partner may be more of a social stigma (van Tilburg et al., 2014).

4.4.3 Limitations and future directions

Our longitudinal sample showed a relatively high attrition rate which could have biased our estimates of aging-related effects. As indicated by our selectivity analysis, however, attrition effects were small in size. In addition, we applied different strategies to minimize the effects of attrition bias during parameter estimation. First, we included all cases from the 2008 baseline cohort instead of cases with complete longitudinal information only. Second, to handle missing data during model estimation, we applied the FIML algorithm that has been shown to yield good parameter estimates if patterns of missing data relate to the variables in the statistical model (Graham et al., 2013). Third, to enhance the quality of the FIML based estimations, we included additional indicators known to predict drop-out in the DEAS as auxiliary variables in our statistical models.

Apart from drop-out, our results may be limited by a lack of information on short-term changes in a person's partnership status. In fact, some single people may have been engaged in a temporary partnership between the two assessment waves of this study and some partnered people may have experienced a break-up and a subsequent re-partnering. These temporary changes in a person's relationship situation may have been overlooked by simply comparing a person relationship status between both time points. A more fine-grained assessment of partnership biographies has been recently implemented in the DEAS questionnaire and will help to better capture short-term dynamics of partnerships in future studies. Unfortunately, the comprehensive tracking of changes in partnership status was not yet applied for all respondents of the DEAS_08 cohort.

Finally, our findings are limited by a lack of measures for social goals and norms that would allow us to further explore mechanisms behind the aging-related and historical differences observed in this study. Examining how partnership-related goals and norms are shaped by changing social contexts both in the course of aging and over historical time clearly remains an important task for future research.

4.4.4 Conclusion

Previous studies showed that partnership status is an important predictor of loneliness. In this study, we asked to what extent the relevance of romantic partnerships may be influenced by aging-related and historical changes in a person's social context. Our results suggest that with advancing age, partnership status grows less important as a predictor of loneliness while satisfaction of single people increases. In a similar vein, we found the association of partnership status and loneliness to be less pronounced among later born cohorts than among those born earlier and single people of

today were also more satisfied with their status than those from earlier birth cohorts. The results indicate that partnership-related goals are neither stable nor universal but that they vary with individual development and over historical time. Additional studies are needed to better understand the way in which contextual characteristics and social norms contribute to aging-related and historical changes in the importance of different social relationships. In sum, to gain a better understanding of loneliness, a person's social resources and social needs should be considered in the light of his or her wider social context.

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Chapter 5

How Does Loneliness Affect Social Approach and Avoidance Goals? The Role of Interactional Context and Age

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Abstract

Objectives: Previous studies showed that social goals influence social behavior and a person's level of loneliness. Here we investigated how the motivation to avoid negative social outcomes (e.g. rejection) and the motivation to approach positive social outcomes (e.g. feelings of belongingness) are in return shaped by changes in loneliness. More specifically, we investigated how the socio-motivational consequences of loneliness varied with characteristics of the interactional context (emotional valence, emotional closeness of the interaction partner) and across the adult life span.

Method: Data were collected in three independent studies with $N_1=744$, $N_2=135$ and $N_3=496$ young (18-39 years), middle-aged (40-59 years) and older (60 + years) German adults. In *Study 1* we analyzed data from a diary study to examine how deviations from a person's typical level of loneliness affected social approach and avoidance goals in next day's social interactions. In *Study 2* we developed a task for manipulating people's momentary level of loneliness in the frame of experimental studies. In *Study 3* we applied the experimental manipulation of *Study 2* to examine how a temporarily heightened level of loneliness affected people's social approach and avoidance goals in different social scenarios.

Results: In *Study 1* we found that a heightened level of loneliness on one day was related to stronger avoidance goals in social interactions on the following day. Effects of loneliness on social approach goals depended on the emotional closeness to the interaction partner. The motivational effects of loneliness did neither vary with the emotional valence of the situation nor with age. In *Study 2* we found that the developed loneliness manipulation was effective for increasing the momentary level of loneliness among young, middle-aged and older adults. As found in *Study 3*, however, the loneliness manipulation exerted no significant effect on the strength of people's social approach and avoidance goals in different social scenarios.

Discussion: Taken together, the findings suggest that feelings of loneliness are most likely not only an outcome but also an antecedent of people's social goals. Further studies are needed to confirm the motivational effects found in *Study 1* as well as to gain a better understanding of both the personal and contextual characteristics influencing people's socio-motivational reactions to loneliness.

5.1 Theoretical Background

Results from previous research on the consequences of loneliness suggest that a persistent feeling of loneliness poses a substantial risk to people's psychological and physical health (for a review see, Hawkley & Cacioppo, 2010). Hence, in a number of studies researchers tried to identify factors contributing to the emergence and maintenance of loneliness over time (for summaries of this research see for instance, De Jong Gierveld & Tesch-Römer, 2012; Marangoni & Ickes, 1989). Many loneliness researchers examined associations between different relationship deficits (e.g. a low number of emotionally close ties) and a person's level of loneliness. Loneliness, however, may not only depend on characteristics of a person's social relationships but also on his or her *social goals*. The cognitive discrepancy approach to loneliness, for instance, proposes that social goals set the standards against which people evaluate their existing social relationships (Peplau & Perlman, 1982). In support of this assumption, results from empirical studies suggest that social goals moderate the association between different relationship characteristics and loneliness (e.g., Zhang, Yeung, Fung, & Lang, 2011).

In addition to that, social goals are likely to influence a person's level of loneliness by shaping his or her social behavior (for a summary of findings see Nikitin & Schoch, 2014). Empirical findings suggest, for instance, that the goal to approach positive social outcomes (e.g. a feeling of integration) relates to more active social behavior and a higher relationship satisfaction (Gable, 2006; Nikitin & Freund, 2010), while the goal to avoid negative social outcomes (e.g. a rejection) appears to relate to more passive social behavior, a more negative view on the social world and lower relationship satisfaction (Gable, 2006; Nikitin & Freund, 2010, 2015; Strachman & Gable, 2006). Over time, a predominant motivation to avoid negative compared to approach positive social outcomes may thus contribute to a heightened level of loneliness (Gable, 2006; Nikitin & Freund, 2017).

While the effects of social approach and avoidance goals on loneliness are relatively well established, less is known about the way in which social approach and avoidance goals are in return shaped by feelings of loneliness. Researchers proposed that heightened loneliness may strengthen not only the goal to approach positive social outcomes but also the goal to avoid negative social experiences (Cacioppo et al., 2006; Goossens, 2018). Up to this point, however, socio-motivational effects of loneliness have been hardly examined in empirical studies. Existing research focused on how the experience of social exclusion or rejection affects people's pro-social or affiliative behavior (for summaries of this research see, DeWall & Richman, 2011; Gerber & Wheeler, 2009). It is possible, however, that socio-motivational reactions to subjective feelings of loneliness differ from reactions to social exclusion/rejection. Moreover, measures of pro-social and affiliative behavior

provide limited insights into people's underlying social approach and avoidance goals. A lack of affiliative behavior, for instance, may be driven by a lack of interest to actively engage with others (i.e. a low social approach motivation) or by the wish to avoid negative social events (i.e. a high social avoidance motivation). To disentangle both effects, more direct measure of social approach and avoidance goals are needed.

In sum, socio-motivational reactions to subjective feelings of loneliness are insufficiently understood at this point. The present chapter introduces three studies addressing this research gap by investigating how a temporarily heightened level of loneliness affects the strength of social approach and avoidance goals in upcoming social interactions. Moreover, we were interested to explore how socio-motivational effects of loneliness vary across different interactional contexts (interactions of positive versus negative emotional valence, interactions with close versus peripheral social ties) and across the adult life span. In *Study 1* we used data from a diary study to investigate how heightened loneliness affects social approach and avoidance goals in different social interactions of daily life. In *Study 2* we developed an experimental manipulation to enhance the momentary level of loneliness among people from different age groups. In *Study 3* we applied the experimental loneliness manipulation from *Study 2* to examine how a temporarily heightened level of loneliness affects the strength of social approach and avoidance goals in different social scenarios. Another goal of *Study 3* was to develop a questionnaire for assessing a broad spectrum of social approach and avoidance goals within a concrete social interaction.

5.1.1 Social approach and avoidance goals as distinct dimensions of social motivation

Previous research in the field of motivation suggests that motives to approach desired end-states and motives to avoid undesired end-states may be distinct and largely independent motivational systems (for a summary of relevant research see Gable, 2006). Drawing on these more general theories of motivation, Gable (2006) proposed that wishes to approach positive social outcomes and wishes to avoid negative social outcomes constitute two independent dimensions of people's social motivations. In her model, Gable (2006) differentiates between global *social (approach and avoidance) motives* on the one hand and concrete *social (approach and avoidance) goals* on the other hand. Social motives are conceptualized as affectively based dispositions introducing continuity in a person's social behavior and perceptions in different social situations (Elliot, Gable, & Mapes, 2006; Gable, 2006). Social goals, in contrast, are thought to represent cognitively based representations of desired social outcomes that help to regulate concrete social situations (Elliot et al., 2006; Gable, 2006). Thus, other than social motives, social goals vary with characteristics of the social context.

In our studies, we investigated people's concrete social goals within a given social situation and how they were shaped by fluctuations in loneliness.

Studies suggest a relatively small (negative) correlation between a person's social approach motive and his or her social avoidance motive (Gable, 2006). In contrast to that, there appears to be a relatively strong positive correlation between the strength of social approach and social avoidance goals (Elliot et al., 2006; Gable, 2006). In other words, people with strong approach goals in a social situation are likely to also have strong avoidance goals in this situation. Still, studies suggest that social approach and avoidance goals shape a person's social experiences and social well-being in differential ways. Specifically, studies found that stronger social approach goals predict a more positive view on social relationships as well as a more active social behavior and higher relationship satisfaction (Gable, 2006; Nikitin & Freund, 2010). Stronger social avoidance goals, in contrast, have been found to relate to a more negative view on social relationships as well as more passive social behavior and lower relationship satisfaction (Gable, 2006; Nikitin & Freund, 2010, 2015; Strachman & Gable, 2006). All in all, research indicates that social approach and avoidance goals are strongly correlated but constitute independent dimensions of a person's situational social motivation. To gain a comprehensive understanding of the socio-motivational effects of loneliness it is thus crucial to consider both social approach and social avoidance goals as outcomes.

5.1.2 How does loneliness affect social approach and avoidance goals in different social situations?

Loneliness has been defined as the subjective experience that one's network of social relationships is deficient in quantity or quality (Perlman & Peplau, 1981). Research suggests that there are both person- and situation-related antecedents of loneliness (for a summary of previous research see De Jong Gierveld, Van Tilburg, & Dykstra, 2006). On the one hand, there appear to be stable between-person differences in the level of loneliness that are associated to socially relevant traits (e.g. shyness, rejection sensitivity) and genetic dispositions (Boomsma, Willemsen, Dolan, Hawkley, & Cacioppo, 2005; Distel et al., 2010; Jackson, Soderlind, & Weiss, 2000; Jones, Freemon, & Goswick, 1981; Watson & Nerdale, 2012). On the other hand, a person's level of loneliness also shows within-person variations over time that can be driven by larger life events, such as the transition to college (Shaver, Furman, & Buhrmester, 1985) or the loss of one's romantic partner (Aartsen & Jylhä, 2011; Dykstra, van Tilburg, & De Jong Gierveld, 2005). In addition to that, feelings of loneliness may also fluctuate from day to day as a function of variations in everyday social experiences. The level of loneliness may be higher on days when people had fewer

meaningful social contacts than usual, for instance, or on days with a below average quality of social exchanges. The momentary level of loneliness may also be enhanced when people encounter a situation where they feel rejected, ignored or excluded by others.

To date, short-term variations in loneliness have been hardly addressed in empirical studies. Specifically, there is little insight into how short-term fluctuations in loneliness affect a person's social goals in upcoming social interactions. From a theoretical point of view, a temporarily heightened level of loneliness can be expected to trigger an increased motivation to approach positive social outcomes in order to re-establish a satisfying quantity and quality of social contact (Cacioppo et al., 2006; Goossens, 2018). Supporting this assumption, laboratory studies found socially excluded people to show an increased attention to smiling faces (DeWall, Maner, & Rouby, 2009), to form a more positive impression of novel social partners and to have more interest in making new friends than non-excluded people (Maner, DeWall, Baumeister, & Schaller, 2007). However, a heightened level of loneliness may also increase the motivation to avoid negative social experiences (Cacioppo et al., 2006; Goossens, 2018). Specifically, socially excluded people have been found to be more motivated to prevent negative events (Park & Baumeister, 2015), to be more sensitive towards potential sources of aggression (DeWall, Twenge, Gitter, & Baumeister, 2009) and to show less prosocial behavior than non-excluded people (Twenge, Baumeister, DeWall, Ciarocco, & Bartels, 2007). As argued in the evolutionary model of loneliness (see, Cacioppo et al., 2006), sufficient social integration has been of utmost importance for the survival and reproductive fitness of our ancestors. Therefore, human beings could be hard-wired to feel unsafe when feeling lonely which may lead to defensive motivations and behaviors. Moreover, a rejection by others has been found to threaten a person's self-esteem as well as his or her sense of control (see, Gerber & Wheeler, 2009) which may lead to a general feeling of uncertainty.

Taken together, previous research suggests that a heightened level of loneliness may lead to ambivalent social goals within the individual (see, Goossens, 2018). On the one hand, the lonely person may be more motivated to approach positive social outcomes, such as acceptance or emotional support. On the other hand, that person may also try to avoid negative social experiences, such as a conflict or a rejection by others. Accordingly, we made the following predictions regarding the motivational effects of loneliness:

H1 A heightened level of loneliness predicts an increased strength of approach goals in upcoming social interactions.

H2 A heightened level of loneliness predicts an increased strength of avoidance goals in upcoming social interactions.

The strength of both motivational effects, however, may vary across interaction contexts. If the

situation endorses a high risk for unpleasant or distressing social encounters, avoidant goals of lonely people may outweigh their approach goals. Attractive opportunities for pleasant social contact, in contrast, may foster prevailing approach goals among people feeling lonely. Supporting these assumptions, previous research provided indications of contextual differences in reactions to social exclusion and rejection (see, DeWall & Richman, 2011; Gerber & Wheeler, 2009). Studies showed, for instance, that socially excluded people show more affiliative behavior than non-excluded people but only in interactions with social partners that had not been part of the exclusion experienced before (see, Gerber & Wheeler, 2009).

Both opportunities for positive social contact and risk for negative social encounters may be manifested in different characteristics of the social situation. One relevant feature of the context could be the emotional valence of a given situation. Specifically, positive social situations (e.g. pleasant conversations) may be more likely to provide attractive opportunities for pleasant social outcomes than negative situations (e.g. conflicts or disputes). The risk for distressing or unpleasant social outcomes, in contrast, should be higher in negative social situations than in positive ones. Thus, we make the following predictions regarding the motivational effects of loneliness in positive and negative social situations:

H3 Increased social approach goals in response to heightened loneliness are more pronounced in positive than in negative social situations.

H4 Increased social avoidance goals in response to heightened loneliness are more pronounced in negative than in positive social situations.

Opportunities for pleasant social outcomes as well as the risk for unpleasant social events may also vary with characteristics of one's interaction partner. Interactions with emotionally close ties, for instance, may offer different opportunities and risks than interactions with peripheral ties. Compared to peripheral relationships, close relationships are more intimate and stable and hence more relevant for providing support and affection (Fingerman, 2009; Morgan, Neal, & Carder, 1997). Moreover, interactions with close ties may be more predictable and easier to navigate than interactions with peripheral social ties (Carstensen, Isaacowitz, & Charles, 1999). Due to their high intimacy and emotional meaning, close relationships are likely to provide attractive opportunities for establishing pleasant social experiences, such as a feeling of acceptance, which may strengthen social approach goals of people feeling lonely. Moreover, as close relationships are more predictable and stable, conflicts may occur less surprisingly and may also be less threatening to the relationship – a situation that may lead to weaker avoidance goals among people feeling lonely. Based on these ideas we make the following predictions regarding the motivational effects of loneliness in interactions with close and peripheral social ties:

H5 Increased social approach goals in response to heightened loneliness are more pronounced in interactions with close ties than in interactions with peripheral ties.

H6 Increased social avoidance goals in response to heightened loneliness are more pronounced in interactions with peripheral ties than in interaction with close ties.

5.1.3 Do the socio-motivational effects of loneliness vary across the adult life span?

In previous studies researchers investigated how emotional reactions to negative social encounters, such as ostracism or the reception of disparaging remarks by others, differ between age groups (Charles & Carstensen, 2008; Hawkley, Williams, & Cacioppo, 2010). Age-related differences in the socio-motivational reactions to loneliness, in contrast, are hardly understood at this point.

Considering previous research on age-related changes in personal goals, it might be hypothesized that both avoidance and approach responses to loneliness intensify with increasing age. Socio-emotional selectivity theory (SST) proposes that people place more importance on happiness and a feeling of meaning in life when approaching the end of their lives (Carstensen et al., 1999). As a consequence, both pleasant social relationships and positive emotional states may be prioritized goals among older adults (Carstensen et al., 1999). Loneliness - that is the emotionally unpleasant experience that one's social relationships are deficient - may thus be more threatening to the general well-being of older adults compared to that of younger ones. As a result, older adults may be more motivated than younger adults to avoid further deteriorations in their social relationships when feeling lonely. At the same time, they may also be more motivated to seek out positive social experiences that help to fulfil their prioritized goals of positive emotional states and pleasant relationships.

It is also possible, however, that approach goals in response to loneliness are of decreased rather than increased strength as people grow older. Age-related increases in health-related impairments, for instance, may limit older adult's possibilities for coping with loneliness. People with restricted mobility and health may find it more difficult to actively tackle a feeling of loneliness by engaging in new social activities or establishing new social relationships (Bukov, Maas, & Lampert, 2002; Huxhold, Fiori, & Windsor, 2013). In a similar vein, important antecedents for increased loneliness in old age, such as bereavement or health problems, may be rather difficult to influence. Therefore, compared to younger adults, older adults may be more likely to prefer passive, emotion-focused over active, problem-focused strategies for dealing with loneliness. Instead of adapting their social behavior, older adults may downgrade their social expectations, for instance, or apply strategies of distraction to escape their feelings of loneliness (see also, Brandtstaedter & Rothermund, 2002; Charles, 2010).

Finally, it is also possible that basic socio-motivational effects of loneliness remain relatively stable across ontogeny. As argued by Cacioppo and colleagues (Cacioppo et al., 2006; Goossens, 2018), immediate approach and avoidance reactions to loneliness may represent an evolutionary ingrained automatism, developed to rapidly protect a person from the negative consequences of social isolation. Inter-individual differences in people's immediate reactions to loneliness may be to a large extent attributable to genetically determined dispositions (Boomsma et al., 2005) that remain stable across the life span. As a consequence, the direct socio-motivational effects of loneliness may show little change as people grow older.

All in all, different theories and findings on loneliness and socio-emotional ageing lead to opposing predictions regarding age-related differences in the motivational effects of loneliness. In absence of pertinent empirical evidence, age-related differences in the socio-motivational effects of loneliness are examined exploratively with the question:

Q1 Do motivational effects of loneliness (i.e. strengthened approach goals, strengthened avoidance goals) vary across the adult life span?

5.1.4 Overview of the present research

Aim of the present chapter is to examine how loneliness affects social approach and avoidance goals in upcoming social interactions and how these effects vary across interactional contexts (positive and negative interactions, interactions with close and peripheral social partners) and age groups (young, middle and old adults). To investigate the research questions, we conducted three different studies. In *Study 1* we examined how deviations from one's typical level of loneliness affect social approach and avoidance goals in positive and negative social encounters of daily life. Data for this study came from a diary study in which young, middle-aged and older adults gave daily reports on their social well-being and social goals in an online questionnaire. In *Study 2* we developed and evaluated an experimental loneliness manipulation during which young, middle-aged and old adults had to visualize and describe a moment of their life in which they had felt very lonely. In *Study 3* we used the loneliness manipulation from *Study 2* to alter people's momentary level of loneliness. To examine motivational effects of loneliness, we developed a questionnaire assessing different social approach and avoidance goals within the frame of visualized social situations with friends.

5.2 Study 1

Participants of *Study 1* gave reports on their daily level of loneliness on seven consecutive days. Moreover, every participant described his or her most positive and most negative social interaction of the day. Participants then rated the strengths of their approach and avoidance goals during both situations and reported whether the interactions were experienced with a close or a peripheral social tie. We hypothesized that, people feeling lonelier than usual on one day, would report both stronger approach and stronger avoidance goals during social interactions on the following day. The cross-day relationship between heightened loneliness and enhanced approach goals was expected to be more pronounced for positive than for negative interactions, while the cross-day relationship between heightened loneliness and enhanced avoidance goals was expected to be more pronounced for negative than for positive interactions. In addition, the cross-day relationship between heightened loneliness and enhanced approach goals was expected to be more pronounced for interactions with close ties than for interactions with peripheral ties, while the cross-day relationship between heightened loneliness and enhanced avoidance goals was expected to be more pronounced for interactions with peripheral ties than for interactions with close ties.

5.2.1 Method

Sample. Participants for the study were recruited via a German online recruitment service. A total of $N=880$ young (18-39 years), middle-aged (40-59 years) and older adults (60 years or more), agreed to participate in the study in exchange for monetary reimbursement. Seventy-six participants of the initial sample were excluded due to incorrect answering of at least one of two control items stating: "For technical purposes, please click on the '5'". The control items had been embedded into the online questionnaire to identify people who simply clicked through the responses without actually reading the items. Two additional participants of the middle-aged group were excluded because their reported birthyear implied a chronological age outside of the chosen age group. Finally, $n=58$ participants had to be excluded because they filled out the Pretest questionnaire but did not complete any of the diaries. The final sample encompassed $N=744$ participants ($n=239$ young adults, $n=253$ middle-aged adults, $n=252$ old adults) who completed a total of $N=4.202$ diaries with an average of $M=5.24$ diaries per person (young adults=4.86, middle-aged adults=5.24, older adults=5.60). The age of the final sample ranged from 18 to 83 years ($M=49.28$ years, $SD=16.51$ years). For a more detailed sociodemographic description of the sample see Nikitin and Freund (2018).

Procedure. At the beginning of the study, participants completed a pretest questionnaire that assessed different personal data, such as subjective health status, subjective well-being, sociodemographic characteristics and social motives. Approximately one week later, participants started to complete the online diaries on seven consecutive days (beginning on Monday). In every diary, participants gave reports on their emotional well-being and their level of loneliness during the past 24 hours. In addition, all participants had to visualize and describe their most positive and their most negative social interaction of the past 24 hours. For both situations, participants rated the strength of their approach and avoidance goals and reported the emotional closeness to the interaction partner of this situation.

Measures. Loneliness. At the beginning of each diary, participants reported how often they had felt loved, integrated, lonely and rejected during the past 24 hours. Responses were given on a scale ranging from 0 (*never*) to 6 (*all the time*). The mean score over all four items was used as indicator of a person's daily level of loneliness. Scores for the items "integrated" and "loved" were reversed so that higher mean scores indicated a higher level of loneliness.

Social approach and avoidance goals. For both, the most positive and the most negative social situation of the past 24 hours, participants indicated to what extent they tried to achieve something positive and to what extent they tried to avoid something negative during that situation. Responses were given on a scale from 0 (*not at all*) to 6 (*very much*) and served as indicators for the strength of social approach and social avoidance goals, respectively.

Closeness of the interaction partner. In addition to their approach and avoidance motivation, participants reported whether the interaction partner/interaction partners of the situations was/were (1) very close, (2) close, (3) less close or (4) (a) new contact/contacts. For the analyses, close and very close interaction partners were summarized under the category *close tie* (variable value 0) while less close interaction partners and new contacts were summarized under the category *peripheral tie* (variable value 1).

Analyses. We applied a multi-level model to test how deviations from a person's typical level of loneliness on one day affected approach and avoidance goals in positive and negative interactions on the following day. Multi-level models were estimated separately for either approach or avoidance goals as outcomes. To model average regression effects from one day to another, we created two variables for every construct of interest. The first variable coded values at day_t and included all observations from Monday to Saturday. The second variable coded values at day_{t+1} and included all observations from Tuesday to Sunday. Data preparation and analyses were done

with R version 3.3.2 (R Developmental Core Team, 2016). Multilevel models were estimated with the lme4 package Version 1.1-17 (Bates, Maechler, Bolker, & Walker, 2015). Model estimation proceeded in four steps.

In a first step, we created a measure for daily loneliness that was controlled for both stable inter-individual differences and systematic week trends in loneliness. To do so, we modelled loneliness for person i at day_t as a function of the person-specific loneliness mean and the day in study (with values of this variable ranging from 0 for Monday to 6 for Sunday).

$$lone_{it} = \beta_{0i} + \beta_{1i}(day_t) + rlone_{it} \text{ (Equation 1)}$$

The residuals $rlone_{it}$ of this model were saved to be used as predictors of social goals at day_{t+1} .

In the second step, we used the same procedure to create residualized scores for approach and avoidance goals in positive and negative situations for person i at day_t .

$$goalx_{it} = \beta_{0i} + \beta_{1i}(day_t) + rgoalx_{it} \text{ (Equation 2)}$$

The residual scores $rgoalx_{it}$ were entered as control variables in the corresponding model to account for the influence of social events that may simultaneously affect loneliness at day_t as well as social goals at day_t and day_{t+1} .

In the third step, we modelled how approach and avoidance goals at day_{t+1} were predicted by the trend-controlled deviations from the typical loneliness level at day_t ($rlone_{it}$). The estimate was controlled for both week trends in approach goals/avoidance goals and the residual score for approach goals/avoidance goals at day_t , respectively. The model for a given social goal x of a person i at day_{t+1} had the following structure:

$$goalx_{it+1} = \beta_{0i} + \beta_{1i}(day_{t+1}) + \beta_{2i}(rgoalx_{it}) + \beta_{3i}(rlone_{it}) + rgoalx_{it+1} \text{ (Equation 3)}$$

In the fourth and final step, we modelled moderating effects of the emotional valence of the situation ($savl$), of the interaction partner ($spart$) and age on both the intercept and the regression effect of loneliness-deviations at day_t . Age was entered as continuous variable. Prior to model estimation, all moderator variables were centered around their grand means. The full model had the following structure:

$$goalx_{it+1} = \beta_{0i} + \beta_{1i}(day_{t+1}) + \beta_{2i}(rgoalx_{it}) + \beta_{3i}(rlone_{it}) + \beta_{4i}(sval_{it+1}) + \beta_{5i}(rlone_{it})(sval_{it+1}) + \beta_{6i}(spart_{it+1}) + \beta_{7i}(rlone_{it})(spart_{it+1}) + rgoalx_{it+1} \text{ (Equation 4)}$$

$$\beta_{3i} = \gamma_{30} + \gamma_{31}(age_i) + u_{3i} \text{ (Equation 5)}$$

5.2.2 Results

Preliminary analyses and descriptive statistics. Table 5-1 provides means, standard deviations and between-person correlations of loneliness, approach goals and avoidance goals aggregated across the week. Table 5-2 provides a comparison of the aggregated approach and avoidance goals in situations with differing valence and in situations with differing interaction partners. As can be seen in Table 5-1, there was a strong, positive correlation of the average strength of approach and avoidance goals across the week. Thus, people who – in relation to others - reported a stronger approach motivation across the week, also reported a stronger avoidance motivation. The loneliness level was rather low on average, suggesting that most people felt well integrated during the time of the study. On a between-person level, higher loneliness was related to significantly stronger avoidance goals, but was unrelated to the average strength of approach goals.

Table 5-1

Means (M), standard deviations (SD) and between-person correlations (r) of loneliness, approach goals and avoidance goals (aggregated across the week)

Variable	M (SD)	Correlations <i>r</i> (<i>p</i>)		
		1	2	3
1. Loneliness	1.46 (1.07)	-	-.06 (.107)	.13 (.001)
2. Approach goals	3.33 (1.26)		-	.68 (<.001)
3. Avoidance goals	2.55 (1.35)			-

As can be seen in Table 5-2, the on average approach goals were stronger in positive than in negative situations, while avoidance goals were stronger in negative than in positive situations, supporting the assumption, that positive and negative social contexts may lead to differential social motivations. Almost half of the reported social situations (44 %) involved peripheral (that is less close or new) social partners. The average strength of approach goals was higher in situations with close social partners than in situations with peripheral social ties. The average strength of avoidance goals, in contrast, did not differ significantly between interactions with close and peripheral social partners.

Table 5-2.

Comparisons of means (M) and standard deviations (SD) of approach and avoidance goals (aggregated across the week) in situations of differing valence (positive versus negative) and in situations with differing interaction partners (close versus peripheral)

Variable	Situation valence				Interaction partner			
	M_{pos} (SD_{pos})	M_{neg} (SD_{neg})	t (df)	p	M_{clo} (SD_{clo})	M_{per} (SD_{per})	$t(df)$	p
Approach goals	3.79 (1.44)	2.88 (1.50)	11.93 (1483.60)	<.001	3.81 (1.40)	2.71 (1.50)	14.24 (1381.59)	<.001
Avoidance goals	2.20 (1.63)	2.89 (1.53)	-8.43 (1479.40)	<.001	2.55 (1.65)	2.51 (1.59)	0.46 (1403.29)	.645

Note. Pos=Positive situation, neg=negative situation, clo=situation with close partner, per=situations with peripheral partner.

Table 5-3 lists the amount of within- and between person variation in all daily measures as they were estimated through multi-level modelling. The analyses revealed, that about one third (29%) of the total variation in loneliness was located within persons. For approach and avoidance goals, the share of within-person variance on the overall variance was 74% and 72 %, respectively. Thus, all variables – and social goals in particular – demonstrated a substantial within-person variation across the time of study

Table 5-3

Between- and within-person variation of loneliness, approach goals and avoidance goals (variance [Var], standard deviation [SD], proportions of within-person and between-person variance on overall variance)

Variable	SD_{with}	SD_{bet}	Var_{with}	Var_{bet}	$Var_{with}/$ $Var_{overall}$	$Var_{bet}/$ $Var_{overall}$
Loneliness	0.62	1.05	0.38	1.10	.26	.74
Approach goals	1.83	1.10	3.36	1.20	.74	.26
Avoidance goals	1.92	1.19	3.67	1.42	.72	.28

Note. with=within, bet=between.

Effects of within-person variations in loneliness on next day's social goals. Table 5-4 provides the parameter estimates for the effects of loneliness on next day's social goals as well as for the moderating effects of situation valence, interaction partner and age as they were obtained through multi-level modelling. Figure 5-1 and 5-2 illustrate differences in approach and avoidance goals for people with average and with heightened loneliness at t0.

Approach goals. As can be seen in Table 5-4 (see also Figure 5-1), within-person variations in loneliness exerted no significant effect on the average strength of approach goals in next day's

social situations. This effect did not differ statistically for positive and negative situations. There was, however, a significant moderation effect of the closeness to the interaction partner. As can be seen in Figure 5-1, heightened loneliness was related to increased approach goals in next day's social interactions with peripheral ties but not in interactions with close ties. There were no significant age-differences in the cross-day relationship of daily loneliness and daily approach goals.

Avoidance goals. As expected, an above average level of loneliness at one day predicted an increased strength of avoidance goals in next day's social interactions. This effect was similar for situations of differing valence and for situations with differing interaction partners. Moreover, there were no significant age-differences in the cross-day relation of daily loneliness and daily avoidance goals.

Table 5-4

Parameter estimates from multi-level models with approach and avoidance goals at day t+1 as outcome, the trend-controlled deviation from the average loneliness score at day t as predictor and situation valence, interaction partner and age as moderators

Variable	Approach goals		Avoidance goals	
	<i>b</i> (<i>SE</i>)	<i>p</i>	<i>b</i> (<i>SE</i>)	<i>p</i>
intercept	3.20 (0.06)	<.001	2.48 (0.06)	<.001
day	0.04 (0.01)	.001	0.03 (0.01)	.069
rgoal _{t0}	0.06 (0.01)	<.001	0.08 (0.01)	<.001
rlone _{t0}	0.05 (0.04)	.174	0.11 (0.04)	.009
intercept × sval _{t+1}	-0.57 (0.04)	<.001	0.69 (0.05)	<.001
rlone _{t0} × sval _{t+1}	0.01 (0.08)	.895	0.10 (0.08)	.210
intercept × spart _{t+1}	-0.87 (0.05)	<.001	-0.32 (0.06)	<.001
rlone _{t0} × spart _{t+1}	0.19 (0.08)	.020	-0.01 (0.09)	.937
intercept × age	-0.00 (0.00)	.824	-0.00 (0.00)	.803
rlone _{t0} × age	-0.00 (0.00)	.885	-0.00 (0.00)	.862

Note. day = day in study (centered around day 1), rgoal_{t0} = trend-controlled deviation from the average goal strength at previous day, rlone_{t0} = trend-controlled deviation from the average loneliness score at previous day, sval = valence of the situation (centered around the grand mean), spart = closeness of the interaction partner (centered around the grand mean). Age is centered around the grand mean.

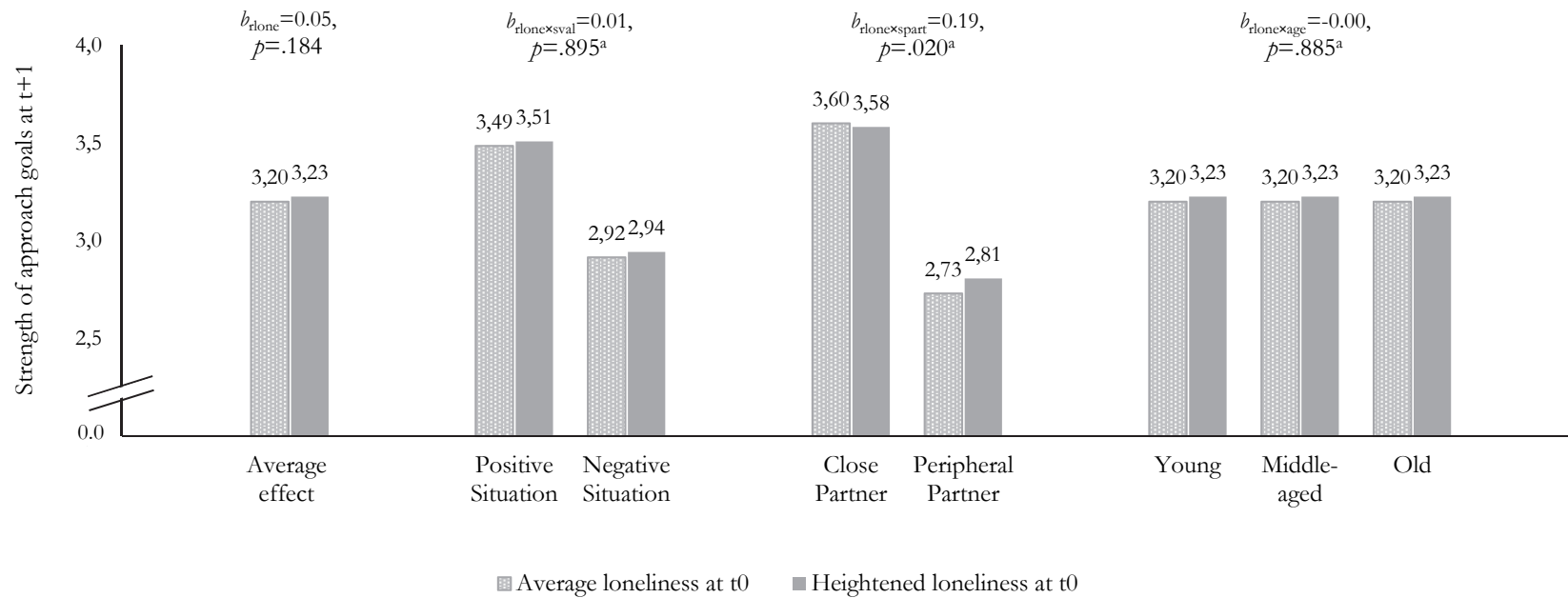


Figure 5-1. Average strength of approach goals after days with average loneliness level ($r_{lonc_{t0}} = 0$) and after days with heightened loneliness ($r_{lonc_{t0}} = 0.50$). The figure shows the average effect, the effect compared for positive and negative situations, the effect compared for situations with close and peripheral ties and the effect compared for different age groups. The value for heightened loneliness represents the average strength of positive deviations from the person-mean for loneliness across all persons. Middle-aged = 49.28 years (grand mean), young = 32.77 years (grand mean - 1SD), old = 65.79 years (grand mean + 1 SD). ^aRegression coefficient and p refers to interaction effect.

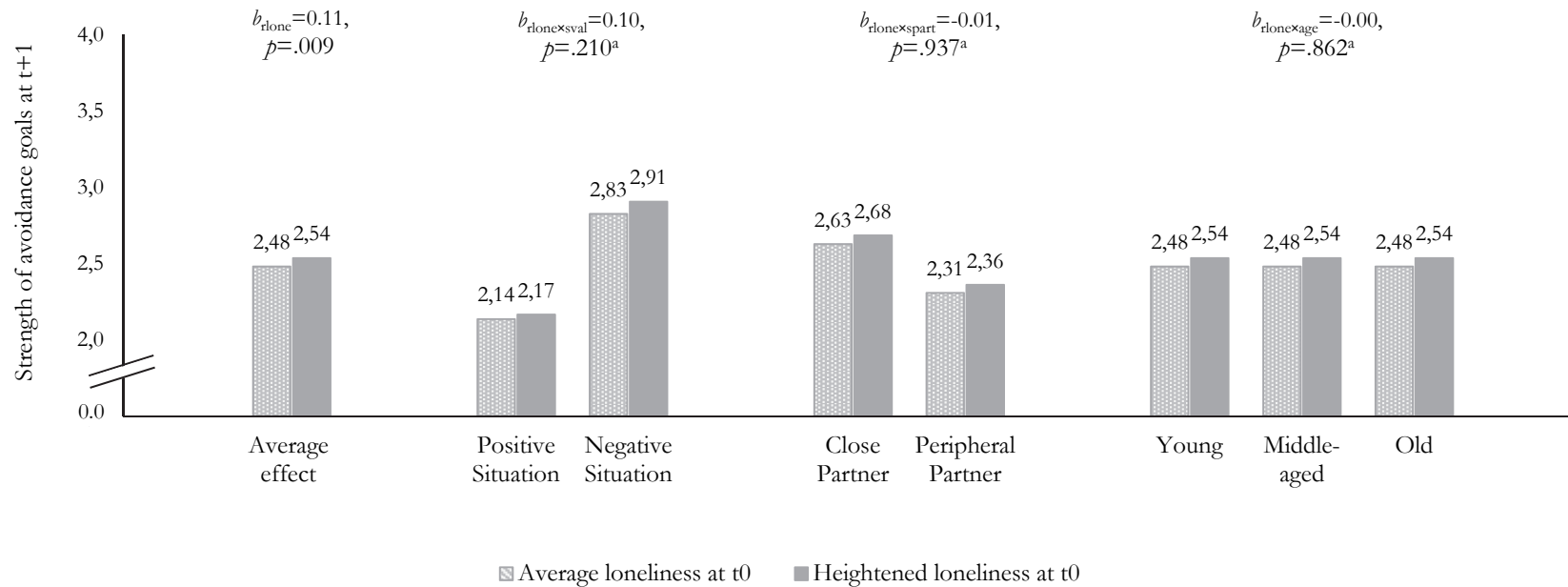


Figure 5-2. Average strength of avoidance goals after days with average loneliness level ($r_{lonc_{t0}} = 0$) and after days with heightened loneliness ($r_{lonc_{t0}} = 0.50$). The figure shows the average effect, the effect compared for positive and negative situations, the effect compared for situations with close and peripheral ties and the effect compared for different age groups. The value for heightened loneliness represents the average strength of positive deviations from the person-mean for loneliness across all persons. Middle-aged = 49.28 years (grand mean), young = 32.77 years (grand mean - 1SD), old = 65.79 years (grand mean + 1 SD).^aRegression coefficient and p refers to interaction effect.

5.2.3 Discussion

In sum, the results of *Study 1* indicate that heightened loneliness may lead to a general strengthening of avoidance goals in upcoming social interactions. Contrary to our expectations, this effect was found to be similar for positive and negative social situations. Moreover, there was no indication that avoidant reactions to loneliness differ by age or interaction partner. In contrast to that, effects of heightened loneliness on subsequent approach goals were found to be influenced by the emotional closeness of the interaction partner. Whereas within-person deviations in loneliness appeared to be unrelated to approach goals in next day's interactions with close ties, heightened loneliness was related to an increased strength of approach goals in next day's interactions with peripheral ties. This indicates that for people with heightened loneliness, interactions with peripheral social ties are of particular attractiveness for re-establishing a feeling of integration. There was no indication that approach responses to loneliness may depend on the emotional valence of the interactional context or on a person's age.

Study 1 helped to gain first insights into the socio-motivational consequences of loneliness but has also a number of limitations that may have prevented the detection of existing effects. First of all, daily variations in loneliness may have been too small to trigger the whole range of motivational reactions to loneliness, such as, for instance, an increased approach motivation in interactions with close ties. Secondly, the time-span between the assessment of loneliness and the assessment of social goals may have been too large to detect more immediate and rather short-term reactions to loneliness. Finally, both intra- and inter-individual differences in the nature and intensity of reported positive and negative social situations may have been quite large. For some people, the most negative social encounter of the day may have been the interaction with an unfriendly cashier, for instance, while other people may have encountered a huge fight with their romantic partner. To address these shortcomings, we used an experimental design in *Study 3* allowing us to better control for both the nature of social situations and the time lag between changes in loneliness and social goal assessment. To manipulate people's momentary level of loneliness, we used a loneliness visualization task developed and evaluated in *Study 2*.

5.3 Study 2

The goal of *Study 2* was to develop a task for inducing a temporary increase in the momentary level of loneliness among young, middle-aged and older adults. To do so, half of the participants of *Study 2* visualized and described a moment of their life during which they had felt very lonely (*lonely group*). The other half of the participants described the house or flat that they lived in (*control group*). We hypothesized that participants of the lonely group would experience a significant increase in their momentary level of loneliness, while participants of the control group would experience no change in their momentary level of loneliness in response to the visualization task. Moreover, we expected that changes would be similar for young, middle-aged and older adults.

5.3.1 Method

Sample. Participants for the study were recruited via the same online recruitment service as participants for *Study 1*. Ethical approval for the study was provided by the Ethics Committee of the Faculty of Arts and Social Sciences of the University of Zurich. A total of $N=160$ young (18-39 years), middle-aged adults (40-59 years) and older adults (60 years or more) agreed to participate in the study in exchange for monetary reimbursement. Nine participants had to be excluded because they provided no valid description of a loneliness experience or of their house/flat. Further $n=16$ participants had to be excluded because they stated that they were unable to remember a moment during which they had felt very lonely. Participants with and without a loneliness memory did not differ significantly in their reported level of loneliness before and after the manipulation. The final sample encompassed $N=135$ participants ($n=45$ young, $n=43$ middle-aged and $n=47$ older adults).

Procedure. At the beginning of the study, participants reported their momentary level of loneliness. Afterwards, participants of the lonely group had to visualize and describe a moment of their lives during which they had felt very lonely. The instruction was as follows:

“In his or her life, everybody once experiences a moment in which he or she feels extremely lonely. This can be a moment in which we feel left alone because there is nobody that we can turn to. Or also a moment in which we have the feeling that we are left out, rejected or abandoned by others. In the following, please remember the last time when you have felt very lonely. Please try to relive this moment as closely as possible to shortly describe it afterwards. While remembering, please try to focus on how this moment felt. How did the feeling of loneliness make itself noticeable? Did you have a particular emotion or a particular thought? Did you feel the loneliness somewhere in your body? Please take 2-3 minutes to describe your imagination in the following text-box.”

Participants of the control group were asked to visualize and describe the house or flat that they lived in. The instruction was as follows:

“In the following, please think about the house or the flat that you live in. Please try to visualize this place as pictorial as possible, for instance, by imagining that you walk down the last meters of your way home from the front door into your living area. What does your house look like from the outside? In case you live in an apartment building, which floor is your flat on and what does the staircase look like? How many rooms does your house/flat have and how are the rooms arranged? Please take 2-3 minutes to describe your imagination in the following text-box.”

After providing their descriptions, participants reported how lonely they felt while visualizing the given situation. At the end of the study, participants of the lonely group received a counter-manipulation in which they were asked to visualize and describe a moment during which they had felt socially integrated or connected to others.

Measures. Before the visualization task, participants reported to which extent they felt loved, integrated, rejected or lonely at the moment. Answers were given on a scale from 0 (*not at all*) to 6 (*very much*). The mean score over all four items served as indicator for the baseline level of loneliness. Scores for the items “loved” and “integrated” were reversed so that higher composite scores indicate higher levels of loneliness. After providing the description of their loneliness memory or of their house/flat, participants rated on the same scale how loved, integrated, rejected and lonely they felt when thinking about the given situation. The mean score over the four items was used as indicator for the post-manipulation level of loneliness.

Analyses. We applied a multifactorial mixed analysis of variance (ANOVA) to examine how the different visualization tasks affected momentary feelings of loneliness. The model included age group (young, middle-aged, old) and condition (lonely versus control) as between-subjects factors and time point (pre versus post) as within-subject factor. Data preparation and analyses were conducted with R version 3.3.2 (R Developmental Core Team, 2016). To run the ANOVAS in R the ez package version 4.4-0 was used (Lawrence, 2016).

5.3.2 Results

The ANOVA revealed significant main effects of condition, $F(1,129)=46.32$, $p<.001$, Cohen’s $d=1.16$, and time point, $F(1,129)=101.88$, $p<.001$, Cohen’s $d=0.59$, on momentary feelings of loneliness, as well as a significant interaction between condition and time point, $F(1,129)=90.89$, $p<.001$.

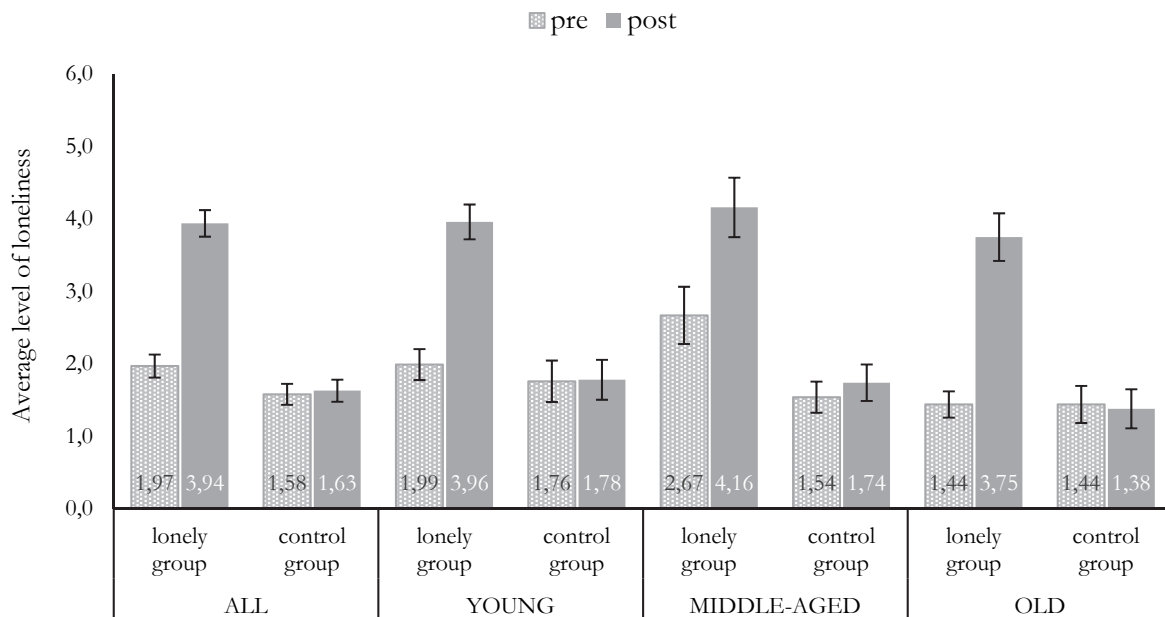


Figure 5-3. Average level of loneliness before and after the visualization task compared for participants in the lonely group and participants in the control group. The figure shows differences across all participants and differences separately for young (18-39 years), middle-aged adults (40-59 years) and older adults (60 years or more). Error bars display the standard errors.

As can be seen in Figure 5-3, among participants of the lonely group, the post-manipulation level of loneliness was substantially higher than the pre-manipulation level of loneliness, $M(SD)_{pre}=1.97(1.22)$, $M(SD)_{post}=3.94(1.41)$, $t(58)=9.67$, $p<.001$, Cohen's $d=1.5$. There was no substantial difference, however, between the pre- and the post-manipulation level of loneliness among participants of the control group, $M(SD)_{pre}=1.58(1.26)$, $M(SD)_{post}=1.63(1.33)$, $t(75)=0.84$, $p<.403$, Cohen's $d=.04$. There was no indication that group differences varied between age groups, (age \times condition: $F(2,129)=0.86$, $p=.426$, age \times time point: $F(2,129)=0.67$, $p=.513$, age \times condition \times time point: $F(2,129)=2.56$, $p=.082$).

5.3.3 Discussion

Results of *Study 2* indicate that the visualization and description of a lonely moment from one's life constitutes an effective method for inducing a temporary increase in people's level of loneliness. Moreover, results suggest that this method leads to similar effects in young, middle-aged and older adults. In *Study 3*, we used the visualization task to examine how a temporary increase in loneliness affected social approach and avoidance goals in different social scenarios.

5.4 Study 3

Participants of *Study 3* visualized a positive or a negative social situation that involved either a new or a close friend and reported to which extent they would endorse different approach and avoidance goals during this situation. Before doing so, half of the participants visualized a lonely moment (*lonely group*) while the other participants visualized their house/flat (*control group*). We hypothesized that across all social scenarios, participants of the lonely group would report both stronger approach and stronger avoidance goals than participants of the control group. We also expected, that the loneliness effect on approach goals would be more pronounced among participants who imagined a positive interaction than among participants who imagined a negative interaction. In contrast to that, the loneliness effect on avoidance goals was expected to be more pronounced among participants who imagined a negative interaction than among participants who imagined a positive interaction. Moreover, we expected that the loneliness effect on approach goals would be more pronounced among participants who imagined an interaction with a close friend than among participants who imagined an interaction with a new friend. Finally, we expected that the loneliness effect on avoidance goals would be more pronounced among participants who imagined an interaction with a new friend than among participants who imagined an interaction with a close friend.

5.4.1 Method

Sample. Participants for the study were recruited via the same online recruitment service as participants for *Study 1* and *Study 2*. As in *Study 2*, ethical approval for the study was provided by the Ethics Committee of the Faculty of Arts and Social Sciences of the University of Zurich. A total of $N=619$, young (18-39 years), middle-aged (40-59 years) and older adults (60 years or more) agreed to participate in the study in exchange for monetary reimbursement. The sample was systematically stratified by sex, age group and condition (type of manipulation \times situation valence \times interaction partner). Forty-seven participants of the initial sample had to be excluded because they provided no valid answers to one or both of the descriptions required (description of either loneliness experience or house/flat, description of imagined social situation). Seventy-six additional participants had to be excluded because they stated that they were unable to visualize a loneliness experience and/or the required social situation (no loneliness experience: $n=47$, no social situation: $n=20$, no loneliness experience and no social situation: $n=9$). The final sample encompassed a total of $N=496$ participants ($n=168$ young, $n=153$ middle-aged and $n=175$ old adults). The age of the final sample ranged from 18 to 87 years ($M=48.87$ years, $SD=16.86$ years). Table 5-5 provides detailed information on the sociodemographic characteristics of the sample.

Table 5-5
Sociodemographic description of the sample of Study 3 by age group (percentage of participants in each category)

Variable	Young (n=168)	Middle-aged (n=153)	Old (n=175)
Gender			
<i>Male</i>	46.4	50.3	49.1
Partnership status			
<i>Single</i>	32.7	22.2	6.9
<i>Widowed</i>	0.0	1.3	8.0
<i>Divorced</i>	0.0	14.4	12.6
<i>Married</i>	22.6	46.4	62.9
<i>Not married but stable partnership</i>	44.6	15.7	9.7
Parental status			
<i>One or more children</i>	31.0	62.1	81.1
<i>No children</i>	69.0	37.9	18.9
Education			
<i>Basic education</i>	11.9	12.4	17.2
<i>Vocational training</i>	60.1	59.5	53.7
<i>University</i>	28.0	28.1	29.1
Employment status ^a			
<i>Employed</i>	67.3	75.8	29.1
<i>Unemployed</i>	4.8	5.2	1.1
<i>Pupil/ Student/ Trainee</i>	28.6	1.3	0.6
<i>Retired</i>	0.6	11.1	72.6
<i>Housewife/ Househusband</i>	3.6	7.8	3.4

Note. ^aMultiple answers possible

Procedure. The study had two assessment points. At the beginning of the first assessment point, participants received either the loneliness or the control manipulation. To keep the time interval between the manipulation and the social goal assessment as short and uninterrupted as possible, we assessed no additional manipulation check in this study. After the manipulation, participants thought about their last new friendship (peripheral tie condition) or a good friend of theirs (close tie condition) and wrote down the initials of this friend. We decided to fix the relationship type across conditions to control for relationship characteristics other than emotional closeness, such as kinship or romantic engagement. Friendship was chosen as relationship type because this relationship appears to be relevant to adults of different age groups (e.g., Huxhold, Miche, & Schuz, 2014). After naming the friend, participants were asked to visualize and describe a positive or negative situation with this person. The instruction for a positive situation with a close friend was as follows:

“Please imagine the following situation. You meet up with XY to do something together. The atmosphere is relaxed from the beginning on and soon you have a pleasant conversation about various things. Please try to imagine how this situation could look like exactly. What are you and XY doing? What are you talking about? How do you experience this situation? What do you think and what do you feel? Please take 1-2 minutes to describe this situation in the following text-box”.

The instruction for a negative situation with a close friend read:

“Please imagine the following situation. You meet up with XY to do something together. The whole time, there is a certain tension between you, for instance, because you are annoyed by each other, because you disagree about a certain topic or decision or because XY does or says something that makes you feel angry or hurt. Please try to imagine how this situation could look like exactly. What are you and XY doing? What are you talking about? How do you experience this situation? What do you think and what do you feel? Please take 1-2 minutes to describe this situation in the following text-box”.

Instructions for the new friend condition were similar except for the second sentence. Instead of “You meet up with XY to do something together” the second sentence read: “Imagine that you and XY just made friends and now you meet up to do something together”. This extension was added to make sure that people thought about a situation during which they were not yet very familiar with their last new friend. After writing down their descriptions, participants rated to which extent they would endorse different approach and avoidance goals during this situation. Participants also rated to which extent they expected that something positive and something negative would happen during the imagined social situation. As in *Study 2*, participants of the lonely group received a counter-manipulation at the end of the assessment.

The second assessment point started about two weeks later. A total of $n=439$ participants (88.5 %) from the first assessment re-participated during the follow-up. In the second measurement point we assessed self-reports of social motives and trait loneliness. We decided to assess these questionnaires separately from the other tasks because we expected that reflections on social motives and trait loneliness may be influenced by or exert influence on a person’s momentary level loneliness as well as on his or her momentary social goals.

Measures. *Social approach and avoidance goals.* To measure the participant’s approach and avoidance goals we developed a questionnaire with 22 items designed to cover different domains of potentially relevant interactional goals. For choosing relevant domains, we oriented towards the social production function (SPF) theory that postulates three overarching social needs, the need for status, the need for behavioral confirmation and the need for affection (see, Steverink & Lindenberg, 2006). The need for status is thought to represent the wish to be in control of a given situation as well as the wish to be treated respectfully by others and to receive acknowledgment

for one's achievement. The need for behavioral confirmation is thought to represent the wish to act in line with prevailing social norms as well as the wish to contribute to a wider social group or a common goal. Finally, the need for affection represents the wish to establish and maintain meaningful relationships with other people that provide support, understanding, emotional closeness and acceptance. We formulated 11 items to measure social approach goals and 11 items to measure social avoidance goals in these different domains. Item examples for each domain are provided in Table 5-6. The items were formulated so that they applied to both positive and negative social contexts as well as to interactions with both new and close friends. Answers were given on a scale from 0 (not at all) to 6 (very much). As we did not have any hypotheses regarding domain-specific effects of loneliness, we considered scores for the overarching strengths of approach and avoidance goals in our analyses. Both variables were modelled as latent factors with three parcels per factor (information on the reliability of scales and results from the confirmatory factor analyses are provided in the preliminary results section). In addition to the social goal questionnaire, we assessed global ratings for the situational social approach and avoidance motivation. The items for assessing these ratings were the same as in Study 1. The global ratings were used to explore the validity of our social goal questionnaire.

Expectation of pleasant and unpleasant events. To test if the visualized social scenarios differed in their subjective potential for pleasant and unpleasant social events, we included two validation items. The items asked participants to rate the likelihood that something pleasant and something unpleasant would happen during the imagined social situation. Answers were given on a scale from 0(not at all likely) to 100(entirely likely).

Social motives. To assess a person's approach and avoidance motive, the Belongingness Orientations Scale (Lavigne, Vallerand, & Crevier-Braud, 2011) was used. The scale includes ten different statements indicating why social relationship could be important to a person. Five of these statements assess a person's approach motive (e.g., "My interpersonal relationships are important to me because I find it exciting to discuss with people on numerous topics."), while the other five statements assess a person's avoidance motive (e.g., "My interpersonal relationships are important to me because I don't want to be alone."). Participants rated each statement on a scale from 0 (*totally disagree*) to 6(*totally agree*). Answers to the different items were aggregated to composite scores for a person's social approach and social avoidance motive, respectively. To model both variables as latent factors, we created three parcels per variable.

Table 5-6

Item examples from the social goal questionnaire

Domain	Approach goals	Avoidance goals
<i>In this situation I will try to...</i>		
Status	...do or say something that XY will admire. ...influence the course of the situation.	...not do or say something embarrassing. ...not be patronized or ordered around.
Behavioral confirmation	...do or say something that will leave a good impression. ...do or say something through that XY will have a high opinion of me.	...not do or say something that is inappropriate. ...not do or say something through that XY may start to think bad of me.
Affection	...share my emotions so that we get closer to each other. ...make use of the opportunity to improve our relationship.	...not reveal any emotions or thoughts that would leave me vulnerable. ...avoid any event that would change my opinion of XY.

Note. XY is a placeholder for the initials of the friend chosen by the participants. The initials were entered by the participants before filling out the social goal questionnaire and were added automatically while presenting the items.

Trait loneliness. The trait level of loneliness was measured with the German version of the UCLA loneliness scale (Döring & Bortz, 1993). The scale consists of 20 items assessing a person's general feeling of isolation as well as his or feelings of emotional and social connectedness (e.g. "I lack companionship", "There is no one I can turn to", "I feel in tune with the people around me"). Every statement was rated on a 5-point scale (*totally disagree* to *totally agree*). The mean score over all 20 items served as indicator for a person's trait level of loneliness. To model trait loneliness as latent factor we created four parcels with 5 items per parcel.

Analyses. Multi-group structural equation models were applied to explore the validity and reliability of the social goal questionnaire and to test how people in the lonely group and people in the control group differed in their approach and avoidance goals. To test if parameters differed significantly from zero or between groups we used chi square difference tests. Data preparation and analyses were conducted using R version 3.3.2 (R Developmental Core Team, 2016). To estimate the SEMs in R the lavaan package Version 0.5-23.1097 was used (Rosseel, 2012).

5.4.2 Results

Preliminary analyses and descriptive statistics. In preliminary analyses, we explored the reliability and validity of the newly developed social goal questionnaire. Moreover, we tested to which extent the perceived likelihood of pleasant and unpleasant social experiences differed between positive and negative social scenarios as well as between scenarios with close and new friends.

Properties of the social goal questionnaire. The developed scales for social approach and social avoidance goals both showed a high internal consistency (Cronbach's $\alpha=.87$ for approach scale, Cronbach's $\alpha=.90$ for avoidance scale), suggesting that the subscales were unidimensional. A SEM with two correlated factors revealed a strong positive correlation of the overall strength of approach and avoidance goals ($r=.84$, fit of the two-factor model: $\chi^2(8)=130.46, p<.001, CFI=.95, SRMR=.04$), indicating that participants who reported stronger approach goals than others were also likely to report stronger avoidance goals than others.

We tested for measurement invariance of both scales over age groups as well as over the different experimental conditions of our study (type of manipulation, interaction partner, situation valence). The tests revealed strong measurement invariance (equal loadings and intercepts) for both the approach and the avoidance motivation scale across age groups (results of the difference test for approach: $\Delta\chi^2(8)=11.54, p=.173$; results of the difference test for avoidance: $\Delta\chi^2(8)=13.20, p=.105$), loneliness conditions (results of the difference test for approach: $\Delta\chi^2(4)=5.26, p=.262$;

results of the difference test for avoidance: $\Delta\chi^2(4)=6.17, p=.187$) and interaction partner conditions (results of the difference test for approach: $\Delta\chi^2(4)=6.22, p=.184$; results of the difference test for avoidance: $\Delta\chi^2(4)=5.09, p=.287$). There was, however, significant invariance in the loadings and intercepts of approach and avoidance parcels over valence conditions (results of the difference test for approach: $\Delta\chi^2(4)=27.02, p < .001$; results of the difference test for avoidance: $\Delta\chi^2(4)=23.57, p < .001$). Thus, it cannot be assumed that the scales for approach and avoidance goals measured the same construct in positive and negative social scenarios. Additional post-hoc explorations showed that the intercorrelations of approach goal parcels appeared to be higher in positive than in negative social situations. The same was true for the intercorrelations of avoidance goal parcels. This could indicate that in negative situations of our study, the social goals of participants were more differentiated than in positive situations of the study.

To examine the validity of our questionnaire, we tested how the scale values for approach and avoidance goals correlated with social traits (social motives, trait loneliness), the global situational approach and avoidance motivation (single item measures) and the perceived potentials for pleasant and unpleasant events. Correlations were estimated with SEMs. Social goals, social motives and loneliness were modeled as latent variables. The estimated correlations are displayed in Table 5-7. The correlational pattern suggests that – despite the high intercorrelation between scale scores – the two subscales of our questionnaires measured different social goal facets. Compared to the avoidance goals scale, the approach goals scale showed stronger positive correlations with a person's approach motive as well as with his or her global approach motivation and the perceived potential for pleasant events during the imagined situation. The avoidance goals scale, in contrast, showed stronger positive correlations with the global avoidance motivation and the perceived potential for unpleasant social events during the imagined situation than the approach goals scale. Both scales also showed differential associations with the trait level of loneliness. While a higher trait level of loneliness was related to a higher scale score for avoidance goals, it was related to a lower scale score for approach goals. However, the scale scores for approach and avoidance goals were found to show similar associations with a person's avoidance motive. In particular, a higher avoidance motive was related similarly to both a higher scale score for approach goals and a higher scale score for avoidance goals.

Table 5-7

Correlations of latent scale scores for situational approach and avoidance goals with social traits (approach motive, avoidance motive, trait loneliness), with global ratings of situational approach and avoidance motivation (single item measures) and with the perceived likelihood for pleasant and unpleasant social experiences during the imagined social situation

Validation Measure	Approach goals (scale)	Avoidance goals (scale)	Test of difference between correlations	
	Correlation <i>r</i>	Correlation <i>r</i>	$\Delta\chi^2$	<i>p</i>
<i>Trait measures</i>				
Approach motive	.30	.12	18.04	<.001
Avoidance motive	.48	.39	1.72	.189
Trait loneliness	-.10	.07	20.61	<.001
<i>Situational measures</i>				
Global approach motivation (single item)	.48	.20	37.98	<.001
Global avoidance motivation (single item)	.38	.49	13.72	<.001
Likelihood pleasant events	.31	.03	54.39	<.001
Likelihood unpleasant events	.05	.23	28.87	<.001

Perceived likelihood of pleasant and unpleasant events. Among participants who visualized a positive social situation, the perceived likelihood for pleasant events during this situation was significantly higher than among participants who visualized a negative social situation, $M(SD)_{\text{pos}}=77.20(19.79)$, $M(SD)_{\text{neg}}=63.78(26.77)$, $\Delta\chi^2(1)=71.05$, $p<.001$, Cohen's $d=0.58$. Participants who visualized a negative social situation, in contrast, saw a higher likelihood for unpleasant events in this situation than participants who visualized a positive social situation, $M(SD)_{\text{neg}}=38.41(27.05)$, $M(SD)_{\text{pos}}=20.87(18.73)$, $\Delta\chi^2(1)=77.12$, $p<.001$, Cohen's $d=0.77$. Neither the perceived likelihood of pleasant events nor the perceived likelihood of unpleasant events differed significantly between social scenarios that involved either a close or a new friend (likelihood pleasant event: $M(SD)_{\text{close}}=72.50(24.99)$, $M(SD)_{\text{new}}=69.14(23.56)$, $\Delta\chi^2(1)=2.98$, $p=.084$, Cohen's $d=.14$; likelihood unpleasant event: $M(SD)_{\text{close}}=27.72(25.69)$, $M(SD)_{\text{new}}=30.72(23.60)$, $\Delta\chi^2(1)=1.84$, $p=.175$, Cohen's $d=-0.12$).

Strength of approach and avoidance goals in the lonely group and the control group.

Figure 5-4 and 5-5 illustrate how participants of the lonely group and the control group differed in their approach and avoidance goals and how these differences varied with situation valence, interaction partner and age groups.

Differences in approach goals. The average strength of approach goals did not differ significantly between participants who encountered the loneliness manipulation and participants who encountered the control manipulation (effect size for overall group difference: Cohen's $d=.13$). There was no indication that group differences in approach goals differed significantly between positive and negative social scenarios (effect size in positive condition: Cohen's $d=.04$, effect size in negative condition: Cohen's $d=.27$). In a similar vein, there was no indication that loneliness effects differed significantly between scenarios with new and close friends (effect size in close friend condition: Cohen's $d=.20$, effect size in new friend condition: Cohen's $d=.05$). Finally, group differences appeared to be similar for young, middle-aged and older adults (effect size for young adults: Cohen's $d=.20$, effect size for middle-aged adults: Cohen's $d=-.05$, effect size for old adults: Cohen's $d=.23$).

Differences in avoidance goals. The average strength of avoidance goals did not differ significantly between participants who encountered the loneliness manipulation and participants who encountered the control manipulation (effect size for overall group difference: Cohen's $d=.08$). Again, there was no indication that group differences in avoidance goals differed significantly between positive and negative social scenarios (effect size in positive condition: Cohen's $d=-.02$, effect size in negative condition: Cohen's $d=.22$). There was also no indication that loneliness effects differed significantly between scenarios with new and close friends (effect size in close friend condition: Cohen's $d=.08$, effect size in new friend condition: Cohen's $d=.08$). Finally, group differences in avoidance goals appeared to be similar for young, middle-aged and older adults (effect size for young adults: Cohen's $d=.04$, effect size for middle-aged adults: Cohen's $d=.09$, effect size for old adults: Cohen's $d=.13$).

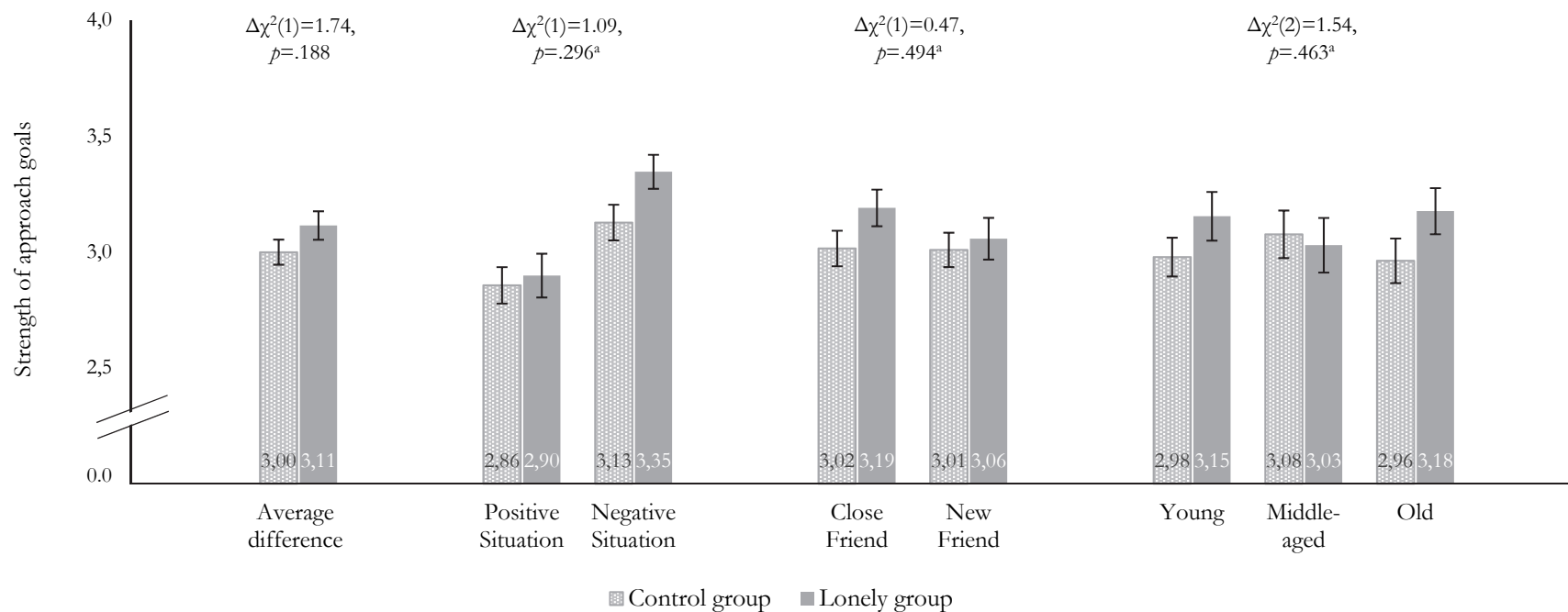


Figure 5-4. Average strength of approach goals (latent scale score) in control group and in loneliness group. The figure shows overall group means as well as group means compared in positive and negative scenarios, in scenarios with close and new friends and in different age groups. Error bars display the estimated standard errors. ^aValues for χ^2 and p refer to the interaction effect.

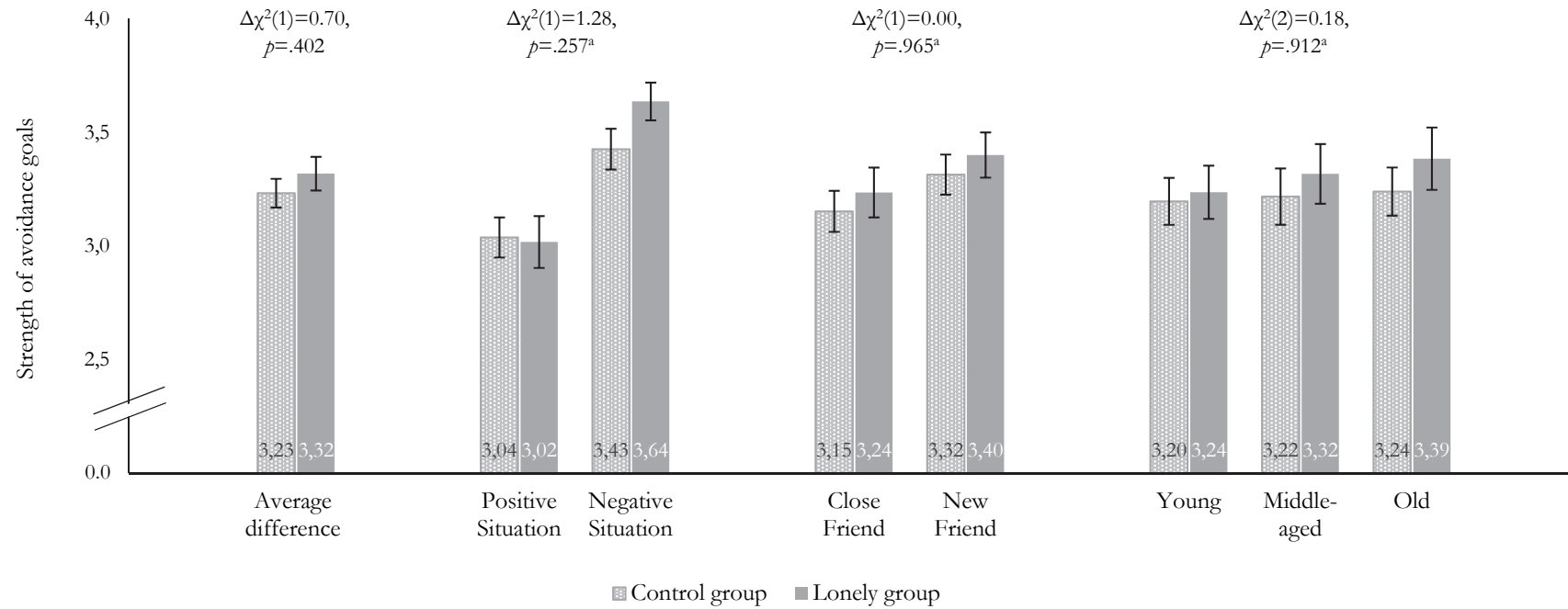


Figure 5-5. Average strength of avoidance goals (latent scale score) in control group and in loneliness group. The figure shows overall group means as well as group means compared in positive and negative scenarios, in scenarios with close and new friends and in different age groups. Error bars display the estimated standard errors. ^aValues for χ^2 and p refer to the interaction effect.

5.4.3 Discussion

Results from *Study 3* suggest that the newly developed social goal questionnaire constitutes a reliable and valid measure of the overall strengths of approach and avoidance goals in different age groups. As indicated by the analyses of measurement invariance, however, the meaning of the scale scores for both approach and avoidance goals may differ between positive and negative social situations. In line with findings from previous studies, the CFA revealed a strong positive correlation between the strength of situational approach and situational avoidance goals. As proposed by Gable (2006), this correlation may reflect individual differences in the subjective importance of social situations. More specifically, people who found the visualized social situation important may have reported both strong approach and strong avoidance goals. People who found the social situation less relevant, in contrast, may have been less likely to set specific (approach and avoidance) goals for the interaction.

Other than expected, there was no indication that social approach and avoidance goals changed in response to increased loneliness through the visualization task. Specifically, both approach and avoidance goals were found to be of similar strength for participants in the control group and participants in the lonely group. A potential explanation is that the imagined social scenarios may have served as counter-manipulation to the loneliness visualization task. More specifically, to think about a friend and to imagine a social situation with him or her may have helped to downregulate the feelings of loneliness that had been induced through the visualization task. Hence, a social scenario approach may be unsuited to reveal motivational effects of momentary increases in loneliness.

5.5 General Discussion

Previous research identified social approach and avoidance goals as independent dimensions of social motivations. Moreover, studies showed that both dimensions of social goals influence not only social behavior but also people's feeling of loneliness. The aim of the studies presented in this chapter was to examine how social approach and avoidance goals are in return shaped by changes in loneliness. Additional aims were to develop a visualization task to induce loneliness in different age groups as well as an age group invariant questionnaire for situational social approach and avoidance goals.

Findings from *Study 1* suggest that heightened loneliness leads to enhanced avoidance goals in social interactions of daily life. Effects on social approach goals, in contrast, were found to depend on the emotional closeness of the interaction partner. In particular, heightened loneliness predicted enhanced approach goals in daily interactions with peripheral ties but not in daily

interactions with close ties. Results from *Study 2* suggest that the visualization and description of a lonely moment from one's life constitutes an effective method for inducing feelings of loneliness in young, middle-aged and older adults. As indicated by *Study 3*, however, the loneliness visualization task exerted no significant effects on social approach and avoidance goals in different social scenarios. The absence of significant motivational effects in *Study 3* may be attributable to the fact that the social scenarios themselves functioned as manipulation of loneliness. Specifically, the visualization of social interactions with friends may have led to a decrease in the momentary level of loneliness. To circumvent this problem, future studies may need to assess social goals in different interaction contexts, such as face-to-face interactions in the laboratory or virtual interactions (e.g. through chat programs) with either real or artificial social partners.

5.5.1 How does loneliness affect social approach and avoidance goals in different social situations?

Results from *Study 1* indicate that heightened loneliness may increase the goal to avoid negative social outcomes in subsequent social interactions. As discussed above, this effect could not be replicated with the experimental design of *Study 3*. The finding of enhanced avoidance goals in response to loneliness, however, is in line with previous research showing that social exclusion promotes a person's motivation to prevent negative events (Park & Baumeister, 2015) as well as his or her sensitivity to potential sources of aggression (DeWall et al., 2009). In fact, feelings of loneliness and rejection may lead to lowered self-esteem and a general feeling of threat (Cacioppo et al., 2006; Gerber & Wheeler, 2009). As a consequence, lonely people may adopt a defensive mode during which they are motivated to avoid further negative social encounters (Cacioppo et al., 2006; Goossens, 2018).

We had hypothesized that to re-establish a satisfactory level of social integration, loneliness may also enhance the goal to approach positive social outcomes, such as acceptance or support. Neither *Study 1* nor *Study 3*, however, provided evidence suggesting that heightened loneliness relates to a generally enhanced approach motivation in upcoming social interaction. A potential explanation is that, compared to avoidant responses to loneliness, approach responses are more differentiated over persons and contexts. As argued by Cacioppo and colleagues (2006), defensive reactions to loneliness could have evolved among our ancestors to protect a person from the aversive and potentially life-threatening consequences of social isolation. To efficiently detect potential sources of social threat defensive responses may show relatively automatically in a broad spectrum of social situations. In contrast to that, approach reactions to loneliness may be more dependent on perceived opportunities and risks of a social situation. When lonely people see a high likelihood that their social behavior will lead to positive social outcomes, their approach goals

may be enhanced. When there is a high subjective risk to encounter aggression or rejection, however, approach goals of lonely people may even be diminished. In fact, previous studies found evidence for both increased and reduced affiliative behavior in response to social exclusion (see, DeWall & Richman, 2011; Gerber & Wheeler, 2009). Whether people show one reaction or the other may depend on personal dispositions, such as a person's fear of negative evaluation (Maner et al., 2007). Additionally, approach responses to loneliness may depend on characteristics of a given social situation, such as the interaction partner (Gerber & Wheeler, 2009; Maner et al., 2007). We had expected that approach responses to loneliness are most strongly pronounced in the context of positive social situations, for instance, during a pleasant leisure activity with others. Avoidant responses to loneliness, in contrast, were expected to be most strongly pronounced in negative social situations, such as an interpersonal conflict. Results from *Study 3* suggest that positive and negative social situations differed in their perceived potentials for pleasant and unpleasant social events. Moreover, a higher subjective likelihood for unpleasant events was found to be related to stronger avoidance goals, whereas a higher subjective likelihood for pleasant events was found to be related to stronger approach goals. Still, neither *Study 1* nor *Study 3* found evidence in support of the assumption that motivational effects of heightened loneliness varied with the emotional valence of the situation. The absence of a significant moderation effect could be attributable to methodological problems of both studies, such as a high heterogeneity of positive and negative social situations in *Study 1* or the potential downregulation of loneliness during the visualization of social situations with friends in *Study 3*. It is also possible, however, that positive and negative social situations differed not only in their likelihood of pleasant and unpleasant social events but also in other characteristics, such as the subjective importance. A negative social situation, such as a disagreement with a friend, for instance, may feel more important to the person than a positive social situation because a bad handling of the negative situation is probably more damaging to the relationship than a bad handling of the positive situation. Thus, people feeling lonely may generally invest more effort into negative social situation than into positive social situations manifesting in both stronger avoidance and stronger approach goals.

In addition, socio-motivational reactions to loneliness may also depend on the relationship with the interaction partner. Contrary to our predictions, heightened loneliness related to stronger approach goals in upcoming interactions with peripheral ties but not in upcoming interactions with close ties in *Study 1*. This could indicate that compared to interactions with close ties, interactions with peripheral ties provide better opportunities for attaining positive social experiences for people feeling lonely. In fact, interactions with peripheral social partners grant the possibility to gain a new positive and meaningful relationship which may be of particular value for people with heightened loneliness. Moreover, it is possible that daily increases in loneliness are more often triggered by

dissatisfying exchanges with close ties than by dissatisfying experiences with peripheral ties. Thus, the absence of enhanced approach motivation in interaction with close ties may also represent people's unwillingness to reach out to the perpetrator of their loneliness. Previous studies found that rejected people are more likely to show increased approach behavior when interacting with new ties but not when interacting with people that were involved in the rejection experienced before (Gerber & Wheeler, 2009). Reasons for short-term variations in loneliness, however, have been hardly examined in empirical studies up to this point. Future research needs to clarify whether exchanges with close ties are in fact a more common source for daily fluctuations in loneliness than exchanges with peripheral ties.

The moderation effect of relationship closeness could not be replicated with the data of *Study 3*. Again, this may be attributable to the fact that the visualization of social scenarios interfered with our manipulation of loneliness. In addition, the new friend and the close friend condition may not have been different enough to show differential effects of loneliness. It cannot be ruled out that even people's latest friendship had been established for several years at the time of assessment. In fact, the validation items of *Study 3* suggested that the new and the close friend conditions did not differ in their perceived potentials for pleasant and unpleasant social experiences. Future studies may need to involve social ties that differ more clearly regarding their emotional closeness to the participant.

5.5.2 Do the socio-motivational effects of loneliness vary across the adult life span?

Previous research showed that compared to younger adults, older adults are less reactive to negative social events that may lead to loneliness, such as a rejection or negative feedback by others (Charles & Carstensen, 2008; Hawkey et al., 2010). If older adults are aware of a rejection or exclusion, however, their immediate reactions may resemble that of younger ones (Cheng & Grühn, 2015; Löckenhoff, Cook, Anderson, & Zayas, 2013). In fact, neither study 1 nor study 2 provided evidence suggesting that the effects of heightened loneliness on subsequent approach and avoidance goals differed between young, middle-aged and old adults. Thus, basic socio-motivational consequences of loneliness may be quite stable across the adult life span. As argued in the evolutionary model of Cacioppo and colleagues (2006), inter-individual differences in immediate reactions to loneliness may be most strongly determined by genetically ingrained dispositions, such as rejection sensitivity, that may show little variation across ontogeny. It might well be, however, that the same socio-motivational reactions to loneliness exert different effects on the social behaviors and social networks of younger and older adults. Compared to the social involvement of younger adults, social contacts of older adults tend to be more strongly governed by individual efforts and less strongly governed by social roles, such as employment (see, Freund,

Nikitin, & Ritter, 2009). Therefore, defensive or avoidant behavior in response to loneliness may be more likely to lead to social isolation among older adults than among younger ones. In fact, previous research found that an increased trait level of loneliness is related to stronger decreases in personal network size and social activities as people grow older (Böger & Huxhold, 2018). Future studies are needed to gain a better understanding of how immediate reactions to heightened loneliness may differentially affect social behaviors and social networks of older and younger adults over time.

5.5.3 Strengths and limitations

We investigated motivational consequences of loneliness in two independent studies that both involved large samples with a broad age range from young adulthood into old age. In *Study 1* we investigated consequences of heightened loneliness in social interactions of daily life. This constitutes an important contribution to previous research that most often relied on laboratory settings with unknown or virtual social partners as well as unfamiliar social settings. Moreover, we developed an effective and age-invariant manipulation for increasing subjective feelings of loneliness (as opposed to experiences of social exclusion/rejection) as well as an age-invariant questionnaire for social approach and social avoidance goals within a concrete social interaction.

However, our studies also have some shortcomings that need to be discussed. The samples stemmed from a wealthy Western society and were most likely biased towards a relatively high health status as well as a high level of education. Due to the computerized method of assessment, the bias towards healthy, well-educated people may be particularly evident for the older age groups in our samples. Future studies are needed to examine to what extent our findings generalize to other cultures as well as to adults with health impairments and low socio-economic status.

Moreover, age-related developments were explored via cross-sectional age group comparisons. Therefore, it is possible that existing age-related changes in the socio-motivational consequences of loneliness have been masked by opposing cohort differences in the socio-motivational consequences of loneliness. Longitudinal studies are needed to test whether people's motivational reactions of loneliness do in fact remain invariant over time.

As discussed before, the reported studies also had some methodological limitations that could have prevented the detection of existing differences and effects. More specifically, in *Study 1* loneliness variations may have been too small and time distances too long to reveal all motivational effects of loneliness. Additionally, people's daily social events may have been too heterogeneous to show the moderating influence of the emotional valence of the situation. In *Study 3* the visualization of social scenarios may have interfered with the experimental manipulation of loneliness. To gain a better understanding of how loneliness affects social goals in different

interactional contexts, future studies may need to involve face-to-face interactions or virtual (e.g. chat program based) social exchanges with either real or artificial social partners. Compared to social scenarios, both face-to-face and virtual interactions may be less likely to interfere with experimental manipulations of loneliness. Moreover, studies with face-to-face interactions may help to gain better insight into how people's motivational reactions to loneliness affect their overt social behavior. Both of our studies assessed social goals with self-reports. Compared to behavioral measures, self-reports have the great advantage of directly assessing people's goals and intentions instead of inferring them indirectly. The flipside is that the overt behavioral manifestations of the reported motivations remain unclear. In fact, the same motivational reaction to loneliness may lead to quite different behavioral consequences. Heightened avoidant motivation in response to loneliness, for instance, may result in passive social behavior, such as a withdrawal from social activities or a less active involvement during an interaction with others. It is also possible, however, that heightened avoidant goals manifest in considerate behavior towards one's interaction partner that helps to preserve harmony and to circumvent conflicts within a social situation. Future studies are needed to examine the behavioral reactions to loneliness and how these reactions vary over social contexts and age groups.

Finally, future studies on the socio-motivational effects of loneliness should pay greater attention to the subjective importance of social situations and its influence on social goal setting. Specifically, it would be interesting to investigate to what extent the subjective importance of a social situation depends on age and characteristics of the context. Moreover, it should be examined how the subjective importance of different social situations changes in response to increased loneliness.

5.5.4 Conclusion

In this chapter we examined how a momentary increase in loneliness affected people's goals to approach positive and to avoid negative social outcomes in subsequent interactions and how these motivational effects varied across social contexts and age groups. The results of *Study 1* suggest that increases in loneliness may lead to a generally heightened motivation to avoid negative social encounters. Whether loneliness leads to increased approach goals, in contrast, may depend on characteristics of the social situation, such as one's interaction partner. Results of *Study 2* suggest that the visualization of a lonely moment from one's life leads to a substantial increase in the momentary level of loneliness among young, middle-aged and older adults. As suggested by the results of *Study 3*, however, the loneliness visualization exerted no effect on social goals in visualized social scenarios. Taken together, the findings provide further evidence suggesting that feelings of loneliness may not only be an outcome but also an antecedent of people's social

behavior. Further studies are needed to expand the understanding of the socio-motivational consequences of loneliness as well as their variation over persons and contexts. Specifically, future research needs to examine to what extent motivational consequences of loneliness differentially affect a person's social behaviors in different social contexts and age groups.

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Chapter 6

Loneliness and Adult Development: Discussion and Implications of the Findings of this Dissertation

6.1 Loneliness across The Adult Life Span: Findings of This Dissertation

In this dissertation I aimed to demonstrate how a developmental research perspective can help to enrich the understanding of the antecedents and consequences of loneliness. Most previous studies on loneliness used cross-sectional datasets and age-homogenous samples. Therefore, little has been known about the way in which age-related changes in time perspective, biological capacities and social context may affect the experience of loneliness across adulthood. In particular, it was not yet sufficiently understood to what extent the average level of loneliness remains stable or increases from midlife to old age (*research question 1*). Moreover, it was a largely open question whether the social antecedents of loneliness change with age (*research question 2*). Finally, there was limited understanding of how loneliness affects a person's social goals and how the socio-motivational consequences of loneliness change with age (*research question 3*).

In Chapter 2 through 5 I presented five empirical studies designated at providing first answers to this three research questions (see Table 6-1 for a summary of the main findings from all studies). The studies were based on different datasets. The analyses presented in Chapter 2 through 4 used data from the German Ageing Survey (DEAS), a nationally representative study of German adults in the second half of life (see, Klaus et al., 2017). The investigation of the socio-motivational consequences of loneliness (Chapter 5) was based on datasets from a daily diary study and two experimental studies with young, middle-aged and older adults.

In the following, I first summarize and discuss the findings from Chapter 2 to 5 before I address their wider implications for research on adult social development (Section 6.2) and research on loneliness (Section 6.3). In the remainder of this chapter I will address central limitations of the empirical studies and directions for future research (Section 6.4) as well as practical implications of the findings (Section 6.5). I will close with an overall conclusion (Section 6.6).

Table 6-1.

Summary of the assumptions, analyses and findings of this dissertation.

Assumptions	Empirical Analyses & Data	Findings	Conclusion
Research questions 1: Does the average level of loneliness change between midlife and old age? (Chapters 2 & 3)			
<p>The average level of loneliness may not only vary with age but also over historical time. Thus, results from previous cross-sectional studies on age-differences in loneliness may grant limited insight into how the level of loneliness changes from midlife to old age.</p>	<p><i>Chapter 2</i> compared average loneliness rates among independent cohorts of older adults to gain insights into cohort differences in loneliness. The analyses used cross-sectional data from DEAS waves 1996, 2002, 2008 & 2014 (age range of sample: 40-85 years).</p> <p><i>Chapter 3</i> estimated age-related changes in the average level of loneliness from midlife into old age using an accelerated longitudinal design. The analyses used data from DEAS waves 2002, 2008 & 2011 (age range of sample: 40 to 83 years).</p>	<p>Among adults aged 72 years or more, loneliness was less prevalent in later born cohorts. There were no cohort differences in loneliness rates among adults aged 40-71 years.</p> <p>The average level of loneliness increased slightly from midlife into old age. The effect size of the overall change approximated zero.</p>	<p>The average level of loneliness shows little change from midlife into old age. Cohort differences in the prevalence of loneliness may affect the results of cross-sectional age group comparisons in late old adulthood.</p>
Research questions 2: Do the social antecedents of loneliness change with age? (Chapters 3 & 4)			
<p>Other than social network size, the overall quality of a person's social network may improve with age. Due to shifting relationship goals, the strengths of predictive relationships between different aspects of social relationships and loneliness may change with age.</p>	<p><i>Chapter 3</i> analyzed:</p> <ol style="list-style-type: none"> (1) Age-related changes in different aspects of social network quality and (2) Age-related changes in the predictive relationships between different aspects of social network quality and loneliness from midlife into old age using an accelerated longitudinal design. <p>The analyses used data from DEAS waves 2002, 2008 & 2011 (age range of sample: 40 to 83 years).</p> <p><i>Chapter 4</i> analyzed age-related changes in the relationship between partnership status and loneliness from midlife into old age. The analyses used longitudinal data from DEAS waves 2008 & 2014 (age range of sample: 40 to 83 years).</p>	<p>Age-related changes in different aspects of social network quality encompassed both gains and losses. There was no indication that the relationships between different aspects of social network quality and loneliness changed from midlife into old age.</p> <p>Partnership status lost relevance for predicting loneliness from midlife into old age.</p>	<p>Not all aspects of relationship quality appear to improve with age. Due to shifting goals and norms some relationship deficits, such as the absence of a romantic partner, may grow less straining with increasing age.</p>

Table 6-1 (continued).

Assumptions	Empirical Analyses & Data	Findings	Conclusion
Research questions 3: Do the socio-motivational consequences of loneliness change with age? (Chapter 5)			
Increased loneliness may affect the strengths of people's social approach and social avoidance goals. The socio-motivational effects of loneliness may change with age.	<i>Chapter 5</i> analyzed age-related differences in the relationships between heightened loneliness and the strengths of social approach and avoidance goals in different social situations. The analyses used cross-sectional data from a daily diary study (<i>Study 1</i> , age range of sample: 18 to 83 years) and two experimental studies conducted online (<i>Study 2</i> , age range of sample: 20 to 85 years and <i>Study 3</i> , age range of sample: 18 to 87 years).	<p><i>Study 1:</i> Heightened loneliness led to enhanced avoidance goals in social interactions of daily life. Effects on social approach goals depended on the emotional closeness of the interaction partner.</p> <p><i>Study 2:</i> The visualization of a lonely moment led to increased feelings of loneliness among young, middle-aged and older adults.</p> <p><i>Study 3:</i> The loneliness visualization task exerted no significant effect on social approach and avoidance goals in different social scenarios. A potential explanation is that social scenarios functioned as counter-manipulation of loneliness.</p>	Increased loneliness may lead to a generally amplified avoidance motivation. This effect may be relatively stable from young adulthood to old age. The visualization of a lonely moment appears to constitute an effective method for inducing feelings of loneliness in experimental studies with young, middle-aged and older adults.

6.1.1 Research question 1: Does the average level of loneliness change between midlife and old age?

First aim of this dissertation was to gain a better understanding of how the average level of loneliness develops between midlife and old age, independent of potential changes in loneliness across historical time. The findings regarding research question 1 are summarized in Figure 6-1.

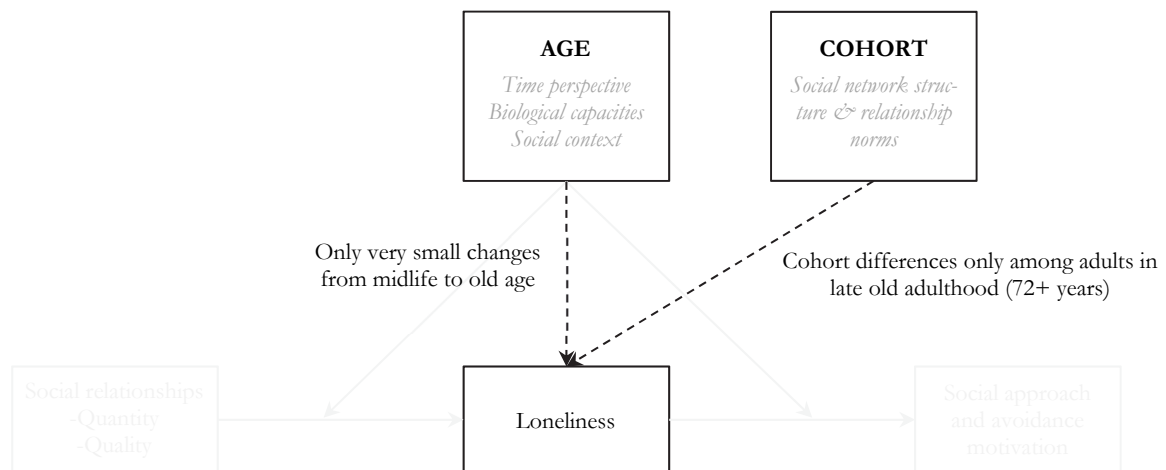


Figure 6-1. Illustration of results from Chapter 2 and 3. The average level of loneliness remains relatively stable from midlife to old age. Cohort difference in the prevalence of loneliness are observed for adults in late old adulthood but not for adults in middle adulthood and early old age.

Most previous studies on age-related variations in the level of loneliness relied on cross-sectional datasets (e.g., Luhmann & Hawkey, 2016; Tesch-Römer, Wiest, Wurm, & Huxhold, 2013). The experience of loneliness, however, may not only change in the course of ageing but also across historical time. Among middle-aged adults, the stability of romantic partnerships has decreased while the prevalence of childlessness has increased throughout the past decades (Eckhard, 2015; Engstler & Tesch-Roemer, 2010; Mahne & Motel-Klingebiel, 2010). At the same time, there appears to be a growing geographical distance between family members (Mahne & Motel-Klingebiel, 2010). Due to these changes, loneliness may be more prevalent among adults from later born cohorts than among adults from earlier born cohorts.

Chapter 2 compared data from four independent cohorts of the DEAS (aged 40 to 85 years) to examine how the prevalence of loneliness has changed between 1996 and 2014. The results suggest that historical trends in loneliness differ between age groups. Among adults aged 40 to 71 years, the prevalence of loneliness remained relatively stable between 1996 and 2014. Among adults aged 72 years or more, in contrast, the prevalence of loneliness decreased across historical time. The age-differentiated trends in the prevalence of loneliness appear to mirror age-

differentiated trends in different characteristics of social relationships. The social well-being of adults in late old adulthood may benefit most strongly from increases in longevity and functional health across historical time (Wolff, Nowossadeck, & Spuling, 2017) resulting in decreased and/or delayed experience of widowhood (Engstler & Klaus, 2017) as well as a longer maintenance of social activities with friends (Böger, Huxhold, & Wolff, 2017). In middle adulthood and early old age, changes in social relationships across historical time appear to encompass both gains, such as an increasing number of supportive friendships (Böger et al., 2017), and losses, such as a decreasing stability of partnerships (Eckhard, 2015; Engstler & Klaus, 2017), which may lead to stability in loneliness rates.

In sum, results from Chapter 2 suggest that – at least in old adulthood - cohort differences in the experience of loneliness may affect the results from cross-sectional age group comparisons of loneliness. Therefore, longitudinal studies are crucial to gain a better understanding of how the average level of loneliness changes with increasing age. Chapter 3 used an accelerated longitudinal design and dual change score modeling (DCSM) to estimate how the average level of loneliness changes across the second half of life. Data came from three Waves of the DEAS. The results suggest that, on average, the level of loneliness remains fairly stable from midlife to the beginning of old age. Among the whole age range from 40 to 83 years there was a statistically significant increase in the average level of loneliness. As indicated by effect size analyses, however, the overall age-effect was very small limiting its practical impact. All in all, the longitudinal results confirm findings from previous cross-sectional studies suggesting few age-related changes in loneliness between midlife and the beginning of very old age. It is possible, however, that loneliness increases after the age of 83 when both bereavements and health-related restrictions tend to accumulate (Pinquart & Sörensen, 2001). Further longitudinal studies are needed to examine how the average level of loneliness changes in the course of very old age.

6.1.2 Research question 2: Do the social antecedents of loneliness change with age?

Previous studies found the number of social relationships and the frequency of social activities to decrease with advancing age (Huxhold, Fiori, & Windsor, 2013; Wrzus, Hanel, Wagner, & Neyer, 2013). In the light of these findings, it is somewhat surprising that the average level of loneliness appears to remain relatively stable from midlife to old age. Thus, the second aim of this dissertation was to explore whether or not there are age-related changes in the social antecedents of loneliness that may contribute to stability in loneliness between midlife and old age.

Results from previous studies suggest that older adults may be more likely than younger adults to show social behavior that maximizes the quality of social relationships, such as selecting emotionally-benefitting social ties or avoiding open arguments (Birditt, Fingerhant, & Almeida,

2005; Carstensen, Isaacowitz, & Charles, 1999). Therefore, other than the quantity of social relationships, the quality of social relationships may increase with advancing age (Luong, Charles, & Fingerman, 2010). In addition, social relationship quality may gain relevance for predicting a person's social well-being with increasing age due to age-related changes in the priority of relationship goals (Carstensen et al., 1999). Chapter 3 used longitudinal data from three waves of the DEAS and an accelerated longitudinal design to analyze (1) age-related changes in different aspects of social network quality (number of distressing ties, number of pleasant ties, satisfaction with family relationships, satisfaction with friendships) as well as (2) age-related changes in the effects that variations in these aspects of social network quality exert on loneliness. Age-related changes in different aspects of social network quality were analyzed with DSCM, while age-related changes in predictive effects were analyzed with autoregressive structural equation models (ASEM).

The results suggest that age-related changes in social network quality are not entirely positive but encompass both gains and losses (for a summary of the findings see Figure 6-2).

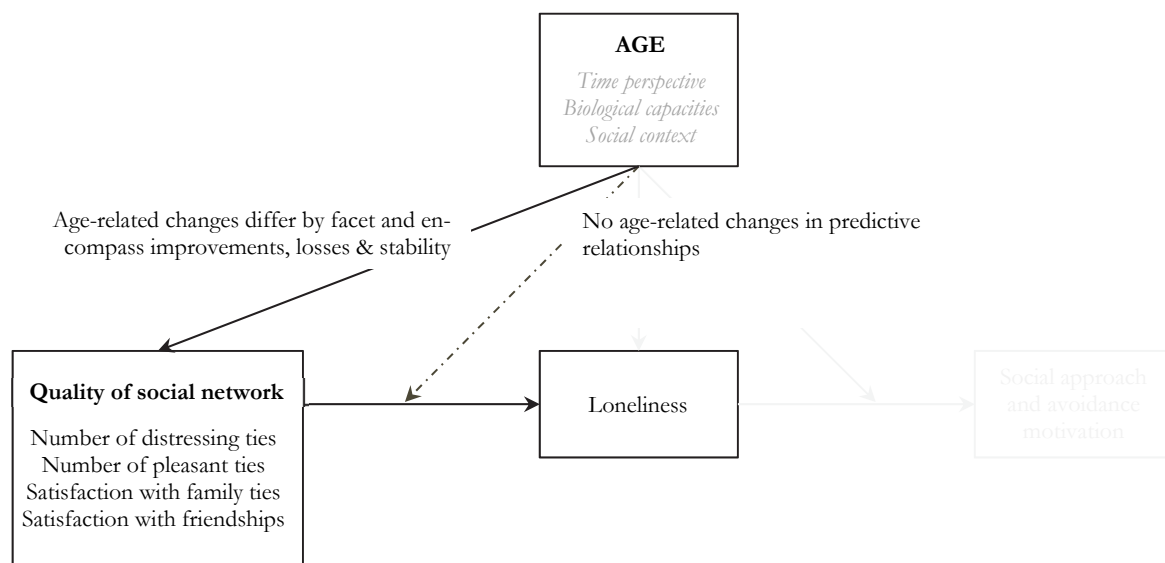


Figure 6-2. Illustration of results from Chapter 3. With increasing age, the number of distressing ties decreases and the satisfaction with family relationships increases. The satisfaction with friendships decreases with increasing age. The number of pleasant relationships remains relatively stable from midlife to old age. The predictive effects of the different aspects of social network quality on loneliness were similar from middle adulthood into old age.

On the one hand, the number of distressing relationships decreases and the satisfaction with family relationships increases as people grow older. On the other hand, people are less and less satisfied with their friendships from midlife into old age. The average number of pleasant relationships appears to remain relatively stable between midlife and old age. The results suggest that people's efforts to maximize the quality of their social network compete with partly uncontrollable changes in social relationships occurring across the life span. Attempts to maintain satisfying friendships, for instance, may be hindered by age-related reductions in functional health limiting opportunities for mutual leisure activities and the exchange of social support (Bukov, Maas, & Lampert, 2002). Moreover, compared to intergenerational family networks, friendship networks may suffer more strongly from increased mortality rates in old age.

The analyses of Chapter 3 found no indication of an age-related strengthening of the relationships between the different aspects of social network quality and loneliness. From midlife to old age, all people benefited similarly from a lower number of distressing ties, a higher number of pleasant ties and from a higher relationship satisfaction. Hence, there was no evidence suggesting that older adults place higher importance on qualitative aspects of their social relationships than middle-aged adults.

It is possible that age-related increases in the relevance of relationship quality are restricted to close ties, such as one's romantic partner or one's children, that are potentially most relevant for providing social support and a sense of meaning in life (Carstensen et al., 1999). The quality of relationships with acquaintances or distal family members, in contrast, could even lose importance as people grow older. Moreover, older people may show a flexible adjustment of relationship goals that helps to maintain social well-being after experiencing involuntary deteriorations of social network quality (see, Brandtstaedter & Rothermund, 2002). When experiencing a reduced number of pleasant leisure activities with friends, for instance, older adults may adapt their standard regarding what constitutes an appropriate frequency of mutual leisure activities instead of trying to engage into new social activities.

Thus, the social well-being of older adults may be stabilized by changed expectations and goals regarding their social relationships rather than by increased relationship quality. To enlarge upon this idea, Chapter 4 used longitudinal data from two Waves of the DEAS and a multi-group SEM to examine whether the absence of a romantic partner starts to be both less straining and less relevant for predicting loneliness with increasing age (for a summary of the results see Figure 6-3).

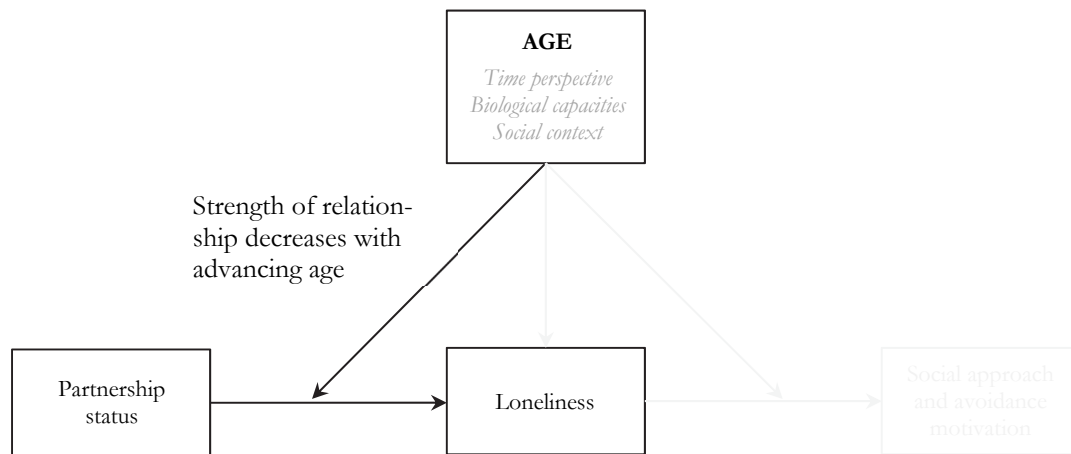


Figure 6-3. Illustration of results from Chapter 4. With increasing age, the strength of the predictive relationship between partnerships status and loneliness decreases.

As expected, the results suggest an age-related decrease in the strength of the relationship between partnership status and loneliness. Moreover, single people in old age were found to be more satisfied with their situation than single people in middle adulthood. The results may suggest that having a romantic partner is less of a social norm for older adults than for middle-aged adults (see also, Luhmann & Hawkey, 2016). Moreover, compared to younger adults, older adults may be less dependent on the presence of a steady partner to feel integrated and supported. Some functions of partnerships, such as mutual child rearing, tend to lose relevance as people move from midlife to old age. In addition, compared to middle-aged adults, older adults may have more high-quality relationships with (other) family members, such as children and grand-children, that provide compensatory support and a sense of emotional closeness when a romantic partner is absent (Luong et al., 2010).

Taken together the findings from the analyses on social antecedents of loneliness suggest that only some aspects of social network quality, such as the quality of family relationship, improve with age. Other aspects, such as the satisfaction with friendships, may actually deteriorate from midlife to old age. While aspects of social network quality appear to be of similar importance for the perceived integration of middle-aged and older adults, the absence of a romantic partner may grow less relevant for predicting differences in loneliness with increasing age.

6.1.3 Research question 3: Do the socio-motivational consequences of loneliness change with age?

As suggested in the evolutionary model of loneliness, to feel lonely may not only be a consequence but also an antecedent of people's social goals and social behavior (see, Cacioppo et al., 2006; Goossens, 2018). Compared to the social antecedents of loneliness, however, the social

consequences of feeling lonely are not yet well examined at this point. Specifically, there is little knowledge on how social effects of loneliness may vary with age. Hence, third and final aim of this dissertation was to examine socio-motivational effects of loneliness in different age groups. Specifically, the studies in Chapter 5 investigated how loneliness affected goals to approach positive and to avoid negative social outcomes among young, middle-aged and older adults (for a summary of the findings see Figure 6-4).

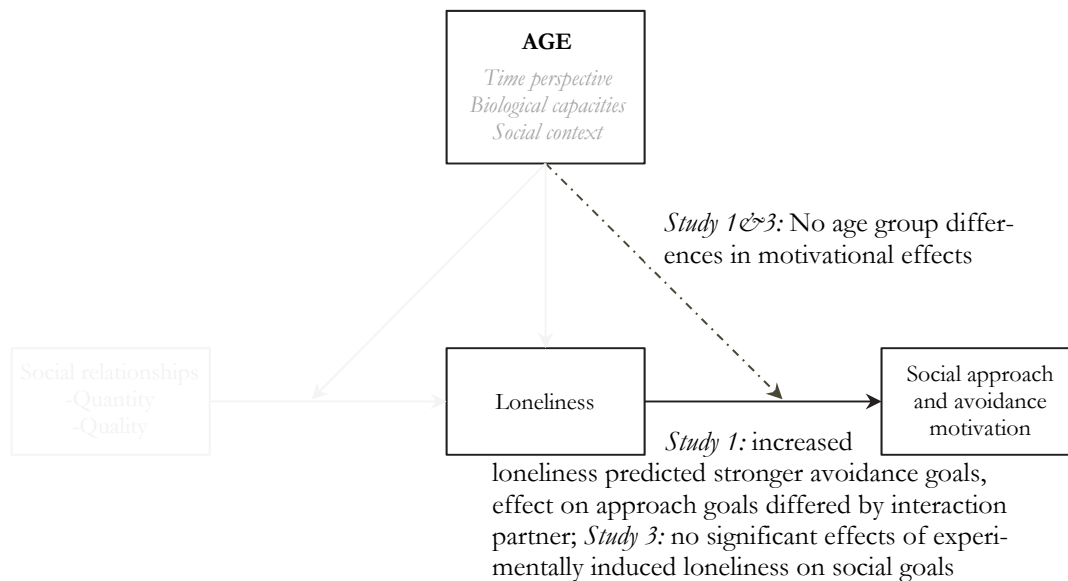


Figure 6-4. Illustration of results from Chapter 5. In *Study 1*, increased loneliness predicted stronger avoidance goals in upcoming social interactions. Moreover, heightened loneliness predicted enhanced approach goals in interactions with peripheral ties but not in interactions with close ties. In *Study 3*, the visualization of a lonely moment exerted no effect on social approach and avoidance goals in different social scenarios. Neither *Study 1* nor *Study 3* found evidence suggesting age-related differences in socio-motivational responses to loneliness.

Existing studies examined how social exclusion or rejection by others affects a person's attention for social stimuli as well as his or her pro-social and affiliative behavior (see, DeWall & Richman, 2011; Gerber & Wheeler, 2009). Results from this research suggest that social exclusion/rejection may lead to a decrease in prosocial behavior (Twenge, Baumeister, DeWall, Ciarocco, & Bartels, 2007) as well as an increased motivation to prevent negative events (Park & Baumeister, 2015). At the same time, social exclusion/rejection has been also found to relate to an increased attention to smiling faces (DeWall, Maner, & Rouby, 2009) as well as more interest in making new friends (Maner, DeWall, Baumeister, & Schaller, 2007). The studies presented in Chapter 5 contributed to this previous research in four important ways. First of all, Chapter 5 examined people's socio-motivational reactions to subjective feelings of loneliness as opposed to their reactions to social exclusion/rejection by others. Secondly, the studies in Chapter 5 used direct

measures of social approach and avoidance goals (as opposed to behavioral measures) as outcomes. Thirdly, the studies considered contextual moderators of socio-motivational reactions to loneliness, such as the emotional valence of the situation and the emotional closeness of the interaction partner. Finally, the studies included adults from young to old adulthood to explore how socio-motivational reaction to loneliness vary with age.

Study 1 was a diary study with young, middle-aged and older adults that assessed a person's daily level of loneliness as well as his or her social approach and avoidance goals in everyday social interactions on seven consecutive days. Multi-level models analyzed how deviations from a person's average level of loneliness on one day affected the strength of his or her social approach and avoidance goals in social interactions on the following day. The results suggest that heightened loneliness led to a generally increased motivation to avoid negative social outcomes. This finding is in line with results from previous studies showing that social exclusion promotes a person's motivation to prevent negative events (Park & Baumeister, 2015) as well as his or her sensitivity to potential sources of aggression (DeWall, Twenge, Gitter, & Baumeister, 2009). The relationship between loneliness and social approach goals, in contrast, was found to depend on the emotional closeness of the interaction partner. Specifically, heightened loneliness predicted an increased motivation to approach positive social outcomes in next day's interactions with peripheral ties but not in next day's interactions with close ties. This result may indicate that compared to close ties, peripheral ties provide better opportunities for attaining positive social experiences for people feeling lonely. In fact, interactions with peripheral social partners grant the possibility to gain a new, meaningful relationship (see also, Fingerman, 2009) – a prospect that may be of particular value for people feeling lonely. Moreover, increases in loneliness may be more often triggered by dissatisfying exchanges with close ties than by dissatisfying exchanges with peripheral ties. Thus, the absence of enhanced approach goals in interaction with close ties may in part also represent the unwillingness of people feeling lonely to reach out to the perpetrator of their loneliness (Gerber & Wheeler, 2009).

In another study with young, middle-aged and older adults (*Study 3*), we aimed to replicate the findings from *Study 1* with an experimental design. Before doing so, we conducted an independent pre-study (*Study 2*) to develop a visualization task suitable to enhance people's momentary level of loneliness. In the study, half of the participants visualized and described a moment during which they had felt very lonely (*loneliness manipulation*) while the other half of participants described the house or flat that they live in (*control manipulation*). Results from *Study 2* showed that the visualization and description of a lonely moment from one's life was effective for inducing a temporary increase in people's level of loneliness. Moreover, effects were found to be similar for young, middle-aged and older adults.

In *Study 3*, we used the visualization task to examine how a temporary increase in loneliness affected people's social approach and avoidance goals in different social scenarios. Participants of this study visualized a positive or negative social situation with a new or close friend and reported to which extent they would endorse different approach and avoidance goals during this situation. Before doing so, half of the participants did the loneliness visualization task (*lonely group*) while the other half of participants did the control visualization task (*control group*). *Study 3* found no evidence suggesting that the loneliness visualization task affected people's social approach and avoidance goals in the different social scenarios. Across all conditions, social goals were found to be of similar strength for participants in the control group and participants in the lonely group. The absence of significant differences may be attributable to the fact that the social scenarios themselves functioned as a manipulation of loneliness. Specifically, the visualization of social interactions with friends may have led to a decrease in people's momentary level of loneliness. To avoid this problem, future experimental studies may need to rely on different interaction contexts, such as face-to-face interactions in the laboratory or virtual (i.e. computerized) interactions with either real or artificial social partners.

Neither *Study 1* nor *Study 3* provided evidence suggesting that the relationships between loneliness and social goals differed between age groups. This may indicate that the immediate socio-motivational consequences of loneliness remain relatively stable from young to old adulthood. The analysis of age group differences relied on cross-sectional data, however, and additional longitudinal studies are needed to test whether or not motivational effects of loneliness remain invariant over time. Moreover, it is possible that the same socio-motivational reaction to loneliness has different consequences for social behavior and social relationships across the adult life span. Thus, other than the immediate socio-motivational consequences of loneliness, long-term social consequences of feeling lonely may actually differ between age groups (see also, Böger & Huxhold, 2017). As people get older, social contacts tend to grow more dependent on individual efforts and less dependent on societal tasks, as, for instance, employment (Freund, Nikitin, & Ritter, 2009). Therefore, avoidance motivations in response to loneliness may be more likely to lead to a decrease in social engagement and social relationships as people grow older. Future studies are needed to investigate how socio-motivational reactions to loneliness influence social behavior and the development of social relationships in different age groups.

In sum, the findings from Chapter 5 provide further evidence suggesting that loneliness is not only an outcome but also an antecedent of people's social goals and social behavior. Specifically, increased loneliness may amplify people's motivation to avoid negative social outcomes and this effect may be quite similar for adults from different age groups. The effect that loneliness exerts on social approach goals, in contrast, may depend on characteristics of the social situation, such as

the interaction partner. Future studies are needed to replicate the findings from Chapter 5 and to understand how motivational consequences of loneliness affect social behavior and social relationships across the adult life span.

6.2 Implications for Research on Adult Social Development

Previous research in the field of adult development provided a paradoxical finding: despite an accumulation of biological and social losses in later life there appears to be no substantial deterioration of people's subjective well-being with increasing age (Carstensen, Pasupathi, Mayr, & Nesselrode, 2000; Diener & Eunkook Suh, 1997). Results of this dissertation suggest a similar paradox for the experience of loneliness. Specifically, analyses from Chapter 3 suggest that the average level of loneliness remains relatively stable from midlife to old age, although both the number of social relationships and the frequency of social activities appear to reduce with age (Huxhold et al., 2013; Wrzus et al., 2013). Meta-theories of adult development, such as the model of selective optimization with compensation (SOC model see, Baltes, 1997) or the two-process model of developmental regulation (Brandtstaedter & Rothermund, 2002), suggested a number of regulatory processes that may help to maintain well-being in the face of age-related losses. As suggested in the motivational theory of life-span development (Heckhausen, Wrosch, & Schulz, 2010), regulatory processes can be categorized into *selectivity processes* on the one hand and *compensation processes* on the other hand. Selectivity processes encompass the selection and prioritization of goals as well as the selective investment of individual resources (e.g. time, effort) to attain selected goals. Selectivity processes help to proactively shape one's development in a time- and resource-limited environment (see, Baltes, 1997; Heckhausen et al., 2010). Compensation processes, in contrast, encompass the recruitment of external resources for goal pursuit (e.g. social support) and strategies of goal distancing (e.g. downgrading the importance of a goal) and are crucial for managing losses and failures across the life span (see, Baltes, 1997; Heckhausen et al., 2010).

To date, researchers in the field of adult social development have tended to emphasize the role of selectivity processes to explain age-related changes in social relationships. The SST, for instance, proposes that age-related changes in social networks are the result of proactive goal selection and selective resource investment rather than of involuntary social losses (see, Carstensen et al., 1999). More specifically, the SST assumes that due to age-related changes in future time perspective, older people selectively invest their resources into social relationships that will most likely satisfy their prioritized emotional needs. As a result, people may actively reduce the number of social relationships to improve the emotional quality of the social network with increasing age.

Findings from this dissertation provide only limited support for the propositions of the SST. First of all, there was no indication that aspects of emotional relationship quality gain relevance for assuring social well-being with increasing age. Secondly, not all aspects of the emotional quality of a person's social network were found to improve with age. This indicates that - apart from selectivity processes - age-related changes in social networks are also shaped by age-related losses and contextual limitations. Based on these findings it can be concluded that selectivity processes are insufficient to explain age-related stability in loneliness and social satisfaction.

To broaden our understanding of adult social development, future studies should pay greater attention to compensatory processes potentially contributing to the maintenance of social well-being across adulthood. There is little knowledge, for instance, on how people prevent increases in loneliness in the face of social losses. People may be able to maintain social well-being by building new relationships and activities. It is likely, however, that new social partners and activities provide only restricted compensation for relationships and activities that had been entertained for several years or even decades. Therefore, people may also apply strategies of goal adaption (see, Brandtstaedter & Rothermund, 2002). When health problems interfere with the maintenance of social leisure activities, for instance, people may downgrade their social standards regarding what constitutes a sufficient level of social engagement. Moreover, people may start to selectively invest their resources into social contact that is most easily maintained, such as activities with close family members. From this perspective, an age-related prioritization of engagement with emotionally close ties, as found in previous studies (e.g., Lang & Carstensen, 1994), could represent reactive loss management rather than proactive network development.

Relationship goals may also change in response to changing relationship norms across the life span. To define and select relationship goals, people most likely orient towards prevailing models and characteristics of social relationships within their social comparison group (see, De Jong Gierveld, Van Tilburg, & Dykstra, 2006; Luhmann & Hawkley, 2016). With the beginning of middle-adulthood, for instance, most people live in a romantic relationship (Eckhard, 2015) which may increase the salience of partnership goals. Across the second half of life, however, stable partnerships start to be less and less frequent due to separation/divorce and widowhood (Engstler & Klaus, 2017). As a result, partnership goals may be less and less important with increasing age (see also Chapter 4). All in all, the nature of what constitutes a social deficit and a social resource may change with age as a function of changing comparison contexts (see also, Baltes, 1997).

Taken together, the findings of this dissertation indicate that research on adult social development may profit from giving up its focus on proactive selectivity processes as emphasized in the SST (Carstensen et al., 1999; Carstensen et al., 2000). There is a strong need for research on regulatory strategies that people use to manage social losses across adulthood. Specifically, there

needs to be a better understanding of the benefits and costs of different strategies for social loss management (Huxhold et al., 2013). To repeatedly downgrade relationship goals, for instance, may help to prevent increases in loneliness but may also contribute to a decreased size and functionality of one's social network. From this perspective, stability in subjective feelings of loneliness may not necessarily indicate an adaptive development of people's overall social embeddedness (for a discussion of suitable indicators of successful development see also, Heckhausen et al., 2010). Hence, to comprehensively describe the quality of people's social integration over time, researchers should rely on a multi-method approach - combining subjective and objective measures of social relationship quantity, quality and functionality.

6.3 Implications for Research on Loneliness

In section 6.2, I discussed how the findings from this dissertation contribute to the understanding of adult social development. In this section, I aim to address implications of the findings for the understanding of loneliness as a psychological phenomenon. Specifically, based on the results from Chapter 2 to 5, I aim to highlight important open question regarding the characteristics and emergence of loneliness as well as promising inquiries for future loneliness research.

A great number of previous studies on loneliness focused on identifying characteristics of social relationships that serve as robust risk factors for heightened loneliness. Results of this research are useful to identify basic relationship needs held by most human beings. For example, several studies identified the absence of a romantic partner as relevant risk factor of heightened loneliness in adulthood (e.g., Aartsen & Jylhä, 2011; Sundström, Fransson, Malmberg, & Davey, 2009), suggesting that adults endorse a basic need for engaging into close relationships providing not only support but also physical intimacy. Even the relevance of such well-known loneliness antecedents as partnership status, however, appears to show variation over ontogeny and historical cohorts (see Chapter 4). This indicates that antecedents of loneliness can show variation from person to person and over time. A central task for future loneliness research is to better understand the contextual and individual factors introducing variation in links between social relationship characteristics and loneliness

As discussed in Section 6.2 there is still a very limited understanding of how social antecedents of loneliness are influenced by cultural relationship norms and social comparison groups. As discussed above, individual relationship goals are most likely be shaped by innate social needs. To strive for a romantic partnership is essential for a person's reproductive fitness, for example, and may be evolutionary ingrained. However, relationship goals may also be influenced by the culture a person lives in (De Jong Gierveld & Tesch-Römer, 2012; De Jong Gierveld et al., 2006). Societies differ in their general valuing of family solidarity, for instance, which may affect

individual goals related to friendships and family relationships (see, De Jong Gierveld & Tesch-Römer, 2012). Moreover, relationship goals may be influenced by the prevalence of social relationship characteristics within a person's social micro-context. The individual relevance of partnership and family, for example, may change with the prevalence of partnerships and parenthood within one's friendship network (see also Chapter 4). In a similar vein, a person's preference for marriage (as opposed to other partnership models) may be influenced by the spread of traditionalistic values within his or her immediate social context.

Apart from social comparison groups, links between social relationships and loneliness may also vary with individual dispositions. As discussed in Section 6.2, results from Chapter 3 suggest that the average level of loneliness remains relatively stable across the second half of life. In addition, the autoregressive model revealed a relatively high rank-order stability in loneliness from midlife to old age (see Table 3-2). In other words, lonely people tended to stay lonely over time while non-lonely people were likely to maintain their sense of connectedness. These results indicate that individual traits play a crucial role in the development of loneliness. Previous research on loneliness identified a variety of personal traits, such as self-esteem, shyness, extraversion or interpersonal mistrust, that relate to a person's level of loneliness (for summaries of corresponding research see, Ernst & Cacioppo, 1999; Marangoni & Ickes, 1989). In addition, recent studies provided evidence suggesting that loneliness relates to genetic dispositions (e.g., Boomsma, Willemsen, Dolan, Hawkley, & Cacioppo, 2005). Genes and individual traits may influence loneliness by shaping interactional behaviors and thus the quantity and quality of social relationships. Dispositions like social anxiety or fear of negative evaluation (FNE), for instance, may lead to heightened loneliness by fostering defensive interactional styles or the avoidance of social contact (see, Cacioppo & Hawkley, 2005). Individual dispositions may also shape how objective characteristics of social relationships are perceived by a person. As discussed in Chapter 3, research on adult social development suggests that the social and emotional well-being of older adults profits from a positively biased view on social relationships, that is, a view focusing on favorable characteristics of social partners (Carstensen et al., 1999; Reed, Chan, & Mikels, 2014). In a similar vein, loneliness researchers have discussed a negatively biased view on social relationships as relevant risk factor for the emergence and maintenance of loneliness (Cacioppo & Hawkley, 2005).

In addition, personal characteristics, such as FNE or social anxiety, may influence how people react to rejection and loneliness (Maner et al., 2007). The extent to which behavioral and social consequences of loneliness depend on individual traits, however, is still insufficiently understood at this point. As discussed before, most studies on loneliness focus on how feelings of loneliness are predicted by characteristics of social relationships and characteristics of the person.

However, as proposed in the evolutionary model of loneliness, loneliness is most likely not only an outcome but also an antecedent of social behavior and social relationships. In support of this assumption, results from Chapter 5 suggest that daily variations in loneliness lead to changes in the social goals that people hold in upcoming social interactions. Moreover, results from Chapter 3 indicate that increased trait loneliness may lead to a decrease in the emotional quality of social relationship over time. An important endeavor for future research is to better understand how the short-term consequences of heightened loneliness (e.g. enhanced avoidance goals) relate to long-term consequences of increased trait loneliness (e.g. a decrease in social relationship quality). Specifically, it is crucial to identify the personal and contextual preconditions under which increased loneliness promotes a dysfunctional development of social relationships.

In summary, both social antecedents and social consequences of loneliness may vary with characteristics of the social context and with individual dispositions. Future studies on loneliness need to gain a better understanding of the factors (e.g. relationship goals, social comparison group, social traits) introducing variation in links between social relationship characteristics and loneliness

6.4. Limitations and Directions for Future Research

The individual discussion sections of Chapter 2 to 5 already addressed specific limitations of every single study, including problems related to longitudinal attrition and sample selectivity. Here I aim to discuss additional, general limitations of this dissertation to derive further directions for future research on loneliness and adult social development.

A core strength of this dissertation is that all empirical studies were based on relatively large and age-heterogenous samples. This constitutes a valuable contribution to previous research on loneliness that most often relied on samples with one single age group (e.g. students or old adults). Still, the studies of this dissertation did not consider all parts of the adult life span sufficiently. Specifically, Chapter 2 to 4 examined age-related changes in the level and social antecedents of loneliness from midlife to old age but neglected developmental processes in young adulthood. Additional studies are needed to gain insight, for instance, into age-related changes in the average level of loneliness from young into middle adulthood. Previous cross-sectional investigations suggest that younger adults report a higher level of loneliness than middle-aged adults. Longitudinal studies are needed, however, to examine to what extent these cross-sectional age group differences reflect age-related changes and historical differences. Analyses from Chapter 2 suggested that – among current middle-aged and older adults - the prevalence of loneliness decreases rather than increases across historical time. Some challenging societal trends in social relationships, such as a decreasing stability of partnerships, however, may be most strongly pronounced in birth-cohorts that have not yet reached the phase of middle adulthood. In young

adulthood, loneliness may thus actually be more common among later born cohorts than among earlier born ones. All in all, additional studies with adults from young to old adulthood are needed to gain a more comprehensive picture of both age-related changes and historical difference in loneliness across adulthood.

The consideration of young adults is also crucial to gain a more differentiated picture of age-related changes in the social antecedents of loneliness. Based on propositions of the SST, Chapter 3 examined, for instance, whether the relationships between different aspects of emotional relationship quality and loneliness strengthen from midlife to old age. Age-related shifts in the relevance of informational and emotional goals, however, may already start before midlife. As people move from young to middle adulthood, they will get increasingly settled regarding their career, partnership and family situation which may lead to a decrease in the relevance of informational relationship goals. Moreover, with the beginning of middle adulthood, the own children start to grow more and more independent which may introduce a substantial shift in people's future time perspective and hence in the relevance of emotional relationship goals. All in all, from young to middle adulthood, shifts in the prioritization of relationship goals may be as strongly pronounced or even more strongly pronounced than from middle adulthood to old age. Additional studies with young, middle-aged and old adults may help to gain a clearer picture of the timing of age-related changes in relationship goals.

This dissertation addressed a relatively new line of inquiry in loneliness research, namely the topic of age-related changes in the social antecedents and social consequences of loneliness. To date, this issue has been hardly addressed in empirical studies. Hence, this dissertation can do nothing but provide first insights. Additional studies are needed to develop a comprehensive picture of both age-related stability and change in the social antecedents and social consequences of loneliness. As regards the social antecedents of loneliness, for instance, it would be an interesting endeavor for future research to examine whether a low number of peripheral social partners and/or a low diversity of social relationships lose relevance as predictors of loneliness with increasing age. As regards the social consequences of loneliness, it appears crucial to gain a better understanding of how immediate reactions to loneliness, such as avoidant motivations and withdrawal from others, may differentially affect the social relationships of younger and older adults.

In a similar vein, further research is needed to investigate the mechanism responsible for the age-related variations observed in this dissertation. The extent to which age-related change in the association of partnership status and loneliness are attributable to changing relationship norms, for instance, remains an open question at this point. An important endeavor for future research is to examine how both contextual relationship norms and individual relationship goals change across

the adult life span. Moreover, there needs to be a better understanding of the strategies that people use to manage involuntary losses in their social network. Specifically, studies need to investigate the costs and benefits of the adaption of relationship goals. In fact, for some people excessive relationship goals may be a relevant antecedent of loneliness. Unrealistic expectations regarding the appropriate frequency of reassuring behavior through others, for instance, may serve as a mediator of the relationship between certain social traits (e.g. social anxiety, FNE) and increased loneliness. In these cases, the reflection and adaption of relationship goals would be crucial to effectively reduce a person's level of loneliness. In other cases, however, the adaption of relationship goals may also be a risk. To gradually downgrade standards for an appropriate quality of social interactions, for instance, may lead to the maintenance of damaging or dysfunctional relationship context (e.g. relationships marked by aggression). All in all, the exploration of a person's relationship goals and expectations may be important to reduce loneliness in interventions.

6.5 Implications for Praxis

Supporting findings from cross-sectional studies with different age groups, the longitudinal analyses of this dissertation suggest that the experience of loneliness is not exclusive to late adulthood. Hence, both public discussions and scientific research on loneliness should be less strongly focused on the population of older adults but address all age groups - from young to old adulthood. At the same time, the results of this dissertation also suggest that age-related stability in the average level of loneliness does not necessarily indicate that people maintain good social network quantity and quality with increasing age. As discussed in Section 6.2, ageing adults may use a variety of strategies to prevent increased loneliness in the face of social losses, and some of these strategies, such as the adaption of relationship goals, may come at a price. People who repeatedly downgrade their standards regarding the quantity and quality of social contact, for instance, may experience a substantial deterioration of their social resources over time. Specifically, these people may have restricted access to information as well as less social partners providing instrumental help or emotional comfort in times of need. All in all, measures assessing subjective evaluations of social relationships, such as loneliness, most likely provide a biased or incomplete picture of a person's overall social embeddedness. To comprehensively describe the social situation of a population of interest (e.g. older adults), scientist and policy makers should rely on multimethod approaches that integrate information from subjective and objective relationship measures.

Several studies showed that increased loneliness is a serious risk for psychological as well as physical health impairments up to and including premature mortality (Hawkley & Cacioppo, 2010; Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015). Therefore, the development of efficient interventions constitutes a central task for loneliness research. In a recent meta-analysis,

Masi and colleagues (2010) examined the effectiveness of different loneliness interventions to increase opportunities for social engagement, for instance, or to change maladaptive social cognitions. The results of this study indicate that for most people the simple promotion of social contact is insufficient to reduce the level of loneliness. Instead the study found that people profit most strongly from interventions that consider psychological variables, such as (maladaptive) social cognitions. Results from this dissertation support the notion that efficient loneliness interventions need to do more than just extend a person's opportunities for social engagement. Specifically, to render satisfying effects, loneliness interventions should incorporate a careful exploration of the individual causes for loneliness. As discussed in Section 6.3., reasons for loneliness may be quite variable both over persons and over time. Some people may feel lonely because they have unrealistic relationship goals and/or a negatively biased view on their social relationships. Other people may experience heightened loneliness because their work-related duties keep them from engaging into pleasant social activities with their family and friends. Finally, for some people - and for older adults in particular - increased loneliness can also be the direct consequence of an involuntary relationship loss (see also, Böger & Huxhold, 2017). In sum, from person to person loneliness may represent very different relationship problems. Hence, to be effective loneliness interventions most likely need to be individualized. To do so, a careful exploration of different antecedents of loneliness (e.g. relationship goals, social cognitions, social behaviors, social network quality and structure) should be a core feature of loneliness interventions.

6.6 Conclusion

Based on an integration of the literature on loneliness and adult development, the present dissertation asked how the experience (i.e. the level, social antecedents and social consequences) of loneliness changes across the adult life span. Analyses of longitudinal data with an accelerated design suggest that the average level of loneliness remains relatively stable from midlife to old age. Moreover, results on the social antecedents of loneliness indicate that age-related changes in social network quality constitute an insufficient explanation for age-related stability in loneliness. Specifically, the analyses found that some aspects of social network quality deteriorate rather than improve with age. The results also suggest, however, that certain social relationship deficits, such as being single, may exert lower impact on a person's level of loneliness with age. Taken together, findings on the social antecedents of loneliness indicate that age-related stability in loneliness may reflect changed relationship goals and norms rather than good relationship quality. Results on the social consequences of loneliness showed that the immediate socio-motivational effects of loneliness may be quite similar for adults from different age groups. Further studies are needed to find out whether or not the same motivational effect of loneliness, such as a heightened motivation

to avoid negative social outcomes, leads to differential changes in social relationship across the adult life span. In addition to that, future research needs to broaden the knowledge on strategies that people of different age groups use to manage deteriorations of their social network. Finally, it appears crucial to better understand how both stable inter-individual differences and intra-individual changes in relationship goals contribute to feelings of loneliness across the adult life span.

In conclusion, social antecedents and social consequences of loneliness may vary over persons and time. Further research is needed to gain a better understanding of both the contextual and individual factors contributing to variations in the relationships between characteristics of social relationships and loneliness. To efficiently tackle loneliness in interventions it should be considered, however, that processes in the emergence and maintenance of loneliness may be quite individual.

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Appendices

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Appendix A

Appendix to Chapter 2

**Einsamkeit und soziale Exklusion in der zweiten
Lebeshälfte**

Content

Tabelle A1	<i>Anteile von Personen mit Einsamkeitsempfinden (in Prozent)</i>
Tabelle A2	<i>Anteile von Personen mit sozialem Exklusionsempfinden (in Prozent)</i>

Appendix A (Chapter 2)

Tabelle A1

Anteile von Personen mit Einsamkeitsempfinden (in Prozent)

		Westdeutschland			Ostdeutschland			Bundesgebiet		
		Männer	Frauen	Gesamt	Männer	Frauen	Gesamt	Männer	Frauen	Gesamt
1996	40-54 Jahre	12,3	9,0	10,7	9,0	8,0	8,5	11,6	8,8	10,2
	55-69 Jahre	10,3	11,0	10,7	8,4	9,3	8,9	9,9	10,7	10,3
	70-85 Jahre	12,5	12,3	12,4	11,2	13,4	12,7	12,3	12,5	12,4
	Gesamt	11,5	10,6	11,0	9,0	9,8	9,4	11,0	10,5	10,7
2002	40-54 Jahre	7,9	8,0	8,0	8,7	4,5	6,7	8,1	7,3	7,7
	55-69 Jahre	4,8	8,9	6,9	3,2	6,0	4,7	4,5	8,3	6,5
	70-85 Jahre	7,4	11,0	9,6	7,9	13,7	11,6	7,5	11,6	10,0
	Gesamt	6,6	9,1	7,9	6,5	7,3	6,9	6,6	8,7	7,7
2008	40-54 Jahre	11,3	9,1	10,2	10,3	7,1	8,7	11,1	8,8	10,0
	55-69 Jahre	8,7	7,7	8,2	8,9	5,6	7,2	8,7	7,3	8,0
	70-85 Jahre	9,6	6,5	7,9	4,7	6,4	5,7	8,7	6,5	7,4
	Gesamt	10,1	8,0	9,0	8,7	6,4	7,5	9,8	7,7	8,7
2014	40-54 Jahre	10,1	9,1	9,6	11,7	7,3	9,5	10,4	8,8	9,6
	55-69 Jahre	10,7	9,5	10,1	9,4	4,3	6,8	10,5	8,5	9,5
	70-85 Jahre	6,5	8,3	7,5	4,2	6,7	5,6	6,1	8,0	7,1
	Gesamt	9,5	9,0	9,2	9,0	6,1	7,5	9,4	8,5	8,9

Quelle: DEAS 1996 (n = 3.979), 2002 (n = 2.766), 2008 (n = 4.392), 2014 (n = 4.216), gewichtet, gerundete Angaben. Jede Zahl beruht auf Personenzahl n > 30, geringere Fallzahlen von 10 < n ≤ 30 werden mit () und von n ≤ 10 mit // gekennzeichnet.

Appendix A (Chapter 2)

Tabelle A2

Anteile von Personen mit sozialem Exklusionsempfinden (in Prozent)

		Westdeutschland			Ostdeutschland			Bundesgebiet		
		Männer	Frauen	Gesamt	Männer	Frauen	Gesamt	Männer	Frauen	Gesamt
2014	40-54 Jahre	10,1	9,1	9,6	11,7	7,3	9,5	10,4	8,8	9,6
	55-69 Jahre	10,7	9,5	10,1	9,4	4,3	6,8	10,5	8,5	9,5
	70-85 Jahre	6,5	8,3	7,5	4,2	6,7	5,6	6,1	8,0	7,1
	Gesamt	9,5	9,0	9,2	9,0	6,1	7,5	9,4	8,5	8,9

Quelle: DEAS 1996 (n = 3.979), 2002 (n = 2.766), 2008 (n = 4.392), 2014 (n = 4.216), gewichtet, gerundete Angaben. Jede Zahl beruht auf Personenzahl $n > 30$, geringere Fallzahlen von $10 < n \leq 30$ werden mit () und von $n \leq 10$ mit // gekennzeichnet.

Appendix B

Appendix to Chapter 3

Emotional qualities of the Social Network, Loneliness and Age

Content

Table B1	<i>Items for the assessment of loneliness</i>
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Table B1

Items for the assessment of loneliness (adapted from De Jong Gierveld et al., 2006)

1. I miss having people who I feel comfortable with
 2. There are plenty of people that I can depend on if I'm in trouble
 3. Often, I feel rejected
 4. There are many people that I can count on completely
 5. I miss having a sense of security and warmth
 6. There are enough people that I feel close to
-

Appendix B (Chapter 3)

Table B2

Means (*M*), standard deviations (*SD*) and number of observations (*Obs*) for all variables of interest in each 3-year age group

Age	Loneliness			Distressing relationships			Pleasant relationships			Satisfaction family			Satisfaction friends		
	<i>M</i>	<i>SD</i>	<i>Obs</i>	<i>M</i>	<i>SD</i>	<i>Obs</i>	<i>M</i>	<i>SD</i>	<i>Obs</i>	<i>M</i>	<i>SD</i>	<i>Obs</i>	<i>M</i>	<i>SD</i>	<i>Obs</i>
40-42 (41) ¹	1.77	.57	407	.65	0.99	535	1.54	1.42	542	4.03	.81	546	4.18	.62	539
43-45 (44)	1.79	.58	564	.68	0.99	730	1.53	1.43	739	4.00	.81	742	4.15	.64	732
46-48 (47)	1.77	.56	784	.70	1.03	999	1.47	1.44	995	4.02	.79	1000	4.17	.65	994
49-51 (50)	1.74	.53	967	.57	0.93	1196	1.37	1.45	1206	3.97	.81	1206	4.13	.66	1189
52-54 (53)	1.76	.56	1041	.59	0.89	1281	1.30	1.38	1289	4.03	.78	1302	4.13	.61	1278
55-57 (56)	1.76	.55	998	.55	0.90	1231	1.33	1.47	1238	4.03	.81	1249	4.12	.64	1231
58-60 (59)	1.73	.53	1119	.45	0.76	1348	1.36	1.47	1348	4.05	.78	1356	4.13	.63	1336
61-63 (62)	1.73	.55	1152	.47	0.81	1344	1.33	1.48	1340	4.01	.76	1340	4.15	.63	1311
64-66 (65)	1.73	.53	1090	.43	0.77	1280	1.35	1.50	1284	4.03	.76	1289	4.13	.60	1268
67-69 (68)	1.71	.53	1179	.42	0.73	1392	1.44	1.61	1403	4.06	.77	1405	4.13	.63	1384
70-72 (71)	1.70	.53	1327	.36	0.68	1614	1.43	1.64	1617	4.08	.75	1610	4.10	.62	1595
73-75 (74)	1.69	.54	1182	.38	0.69	1425	1.41	1.63	1418	4.07	.81	1412	4.07	.64	1391
76-78 (77)	1.73	.56	872	.36	0.68	1062	1.18	1.54	1055	4.09	.76	1044	4.08	.64	1020
79-81 (80)	1.74	.58	706	.36	0.66	900	1.20	1.53	896	4.09	.76	881	4.00	.69	844
82-84 (83)	1.70	.57	440	.37	0.65	583	1.36	1.63	569	4.15	.81	578	4.02	.72	545
<i>Average</i>	<i>1.74</i>	<i>.55</i>		<i>.49</i>	<i>0.81</i>		<i>1.37</i>	<i>1.51</i>		<i>4.05</i>	<i>.78</i>		<i>4.11</i>	<i>.64</i>	

Note. ¹Numbers in parentheses refer to the mean of a given age group. Numbers in the last line of the table display the average of the age group specific means and standard deviations respectively.

Appendix B (Chapter 3)

Table B3

Parameter estimates for the effects of covariates in the dual change score models

	Loneliness	Distressing relationships	Pleasant relationships	Satisfaction family	Satisfaction friendships
Gender (-.5=m, .5=f) on intercept	-2.112 (.55)	1.944 (.51)	1.847 (.73)	1.516 (.35)	2.063 (.36)
Gender (-.5=m, .5=f) on slope	.000 (.09)	.066 (.09)	.529 (.17)	-.328 (.20)	-.519 (.23)
Education (-1=l, 0=m, 1=h) on intercept	-.911 (.53)	1.392 (.52)	3.568 (.69)	.678 (.38)	.610 (.30)
Education (-1=l, 0=m, 1=h) on slope	-.119 (.07)	.079 (.08)	.596 (.21)	-.142 (.08)	-.135 (.12)
Residence (-.3=W, .7=E) on intercept	.186 (.57)	-2.440 (.53)	-.869 (.75)	.682 (.41)	-.238 (.43)
Residence (-.3=W, .7=E) on slope	-.249 (.09)	-.031 (.09)	-.292 (.12)	-.156 (.08)	.043 (.11)
DEAS cohort (-1=96, 0=02, 1=08) on intercept	1.793 (.50)	.593 (.35)	1.163 (.67)	-.267 (.25)	-.378 (.21)
DEAS cohort (-1=96, 0=02, 1=08) on slope	-.087 (.04)	-.001 (.04)	-.051 (.06)	.062 (.06)	.095 (.06)

Note. Regression weights are unstandardized. Numbers in parentheses display the standard errors. Variable for gender is centered around its mean (m=male, f=female). Variable for education is centered around the middle category (l= low education, m=medium education, h=high education). Variable for region of residence is centered around its mean (W=Western Germany, E=Eastern Germany). Variable for DEAS cohort is centered around its middle category.

Appendix B (Chapter 3)

Table B4

Parameter estimates for the effects of covariates in the autoregressive model

	<i>b</i> ₄₄ (SE)	95% BS CI
<i>Prediction of Loneliness₍₄₄₎</i>		
Gender (-.5=m, .5=f)	.02 (.07)	[-.11;.16]
Education (-1=l, 0=m, 1=h)	-.16 (.06)	[-.27;-.03]
Residence (-.3=W, .7=E)	-.35 (.07)	[-.47;-.21]
DEAS cohort (-1=96, 0=02, 1=08)	.02 (.04)	[-.06;.09]
<i>Prediction of Pleasant R₍₄₄₎</i>		
Gender (-.5=m, .5=f)	.70 (.13)	[.45;.94]
Education (-1=l, 0=m, 1=h)	.86 (.12)	[.63;1.10]
Residence (-.3=W, .7=E)	-.65 (.13)	[-.91;-.38]
DEAS cohort (-1=96, 0=02, 1=08)	.02 (.08)	[-.14;.17]
<i>Prediction of Distressing R₍₄₄₎</i>		
Gender (-.5=m, .5=f)	1.12 (.13)	[.83;1.37]
Education (-1=l, 0=m, 1=h)	.98 (.12)	[.77;1.22]
Residence (-.3=W, .7=E)	-.92 (.13)	[-1.20;-.68]
DEAS cohort (-1=96, 0=02, 1=08)	.12 (.07)	[-.02;.26]
<i>Prediction of S. Family₍₄₄₎</i>		
Gender (-.5=m, .5=f)	.77 (.12)	[.54;1.01]
Education (-1=l, 0=m, 1=h)	.20 (.11)	[-.01;.42]
Residence (-.3=W, .7=E)	-.03 (.12)	[-.27;.23]
DEAS cohort (-1=96, 0=02, 1=08)	.02 (.07)	[-.11;.17]
<i>Prediction of S. Friendships₍₄₄₎</i>		
Gender (-.5=m, .5=f)	.87 (.12)	[.66;1.11]
Education (-1=l, 0=m, 1=h)	.42 (.11)	[.23;.66]
Residence (-.3=W, .7=E)	-.80 (.12)	[-1.05;-.56]
DEAS cohort (-1=96, 0=02, 1=08)	-.05 (.07)	[-.20;.09]

Note. Displayed are unstandardized regression weights in age group 44 and their 95 % bootstrap confidence intervals [lower bound, upper bound]. All regression weights are constrained to be equal from age group 44 to age group 83. Numbers in parentheses display standard errors. Pleasant R = number of pleasant relationships. Distressing R = number of distressing relationships. S. Family = Satisfaction with family relations. S. Friendships = Satisfaction friendships. Variable for gender is centered around its mean (m=male, f=female). Variable for education is centered around the middle category (l= low education, m=medium education, h=high education). Variable for region of residence is centered around its mean (W=Western Germany, E=Eastern Germany). Variable for DEAS cohort is centered around its middle category.

Table B5

Parameter estimates for correlations between the different indicators of emotional qualities of the SNW in the autoregressive model

	r_{44} (SE)	95 % BS CI
Pleasant $R_{(44)} \leftrightarrow$ Distressing $R_{(44)}$.07 (.01)	[.05;.09]
Pleasant $R_{(44)} \leftrightarrow$ S. Family ₍₄₄₎	.06 (.01)	[.04;.08]
Pleasant $R_{(44)} \leftrightarrow$ S. Friendships ₍₄₄₎	.04 (.01)	[.02;.05]
Distressing $R_{(44)} \leftrightarrow$ S. Family ₍₄₄₎	-.05 (.01)	[-.07;-.04]
Distressing $R_{(44)} \leftrightarrow$ S. Friendships ₍₄₄₎	-.00 (.01)	[-.02;.01]
S. Family _{(44)} \leftrightarrow S. Friendships₍₄₄₎}	.17 (.01)	[.14;.19]

Note. Displayed are correlations in age group 44 and their 95 % bootstrap confidence intervals [lower bound, upper bound]. All correlations are constrained to be equal from age group 44 to age group 83. Numbers in parantheses display standard errors. Pleasant R = number of pleasant relationships. Distressing R = number of distressing relationships. S. Family = Satisfaction with family relations. S. Friendships = Satisfaction friendships. CFI = comparative fit index. RMSEA = root mean square error of approximation.

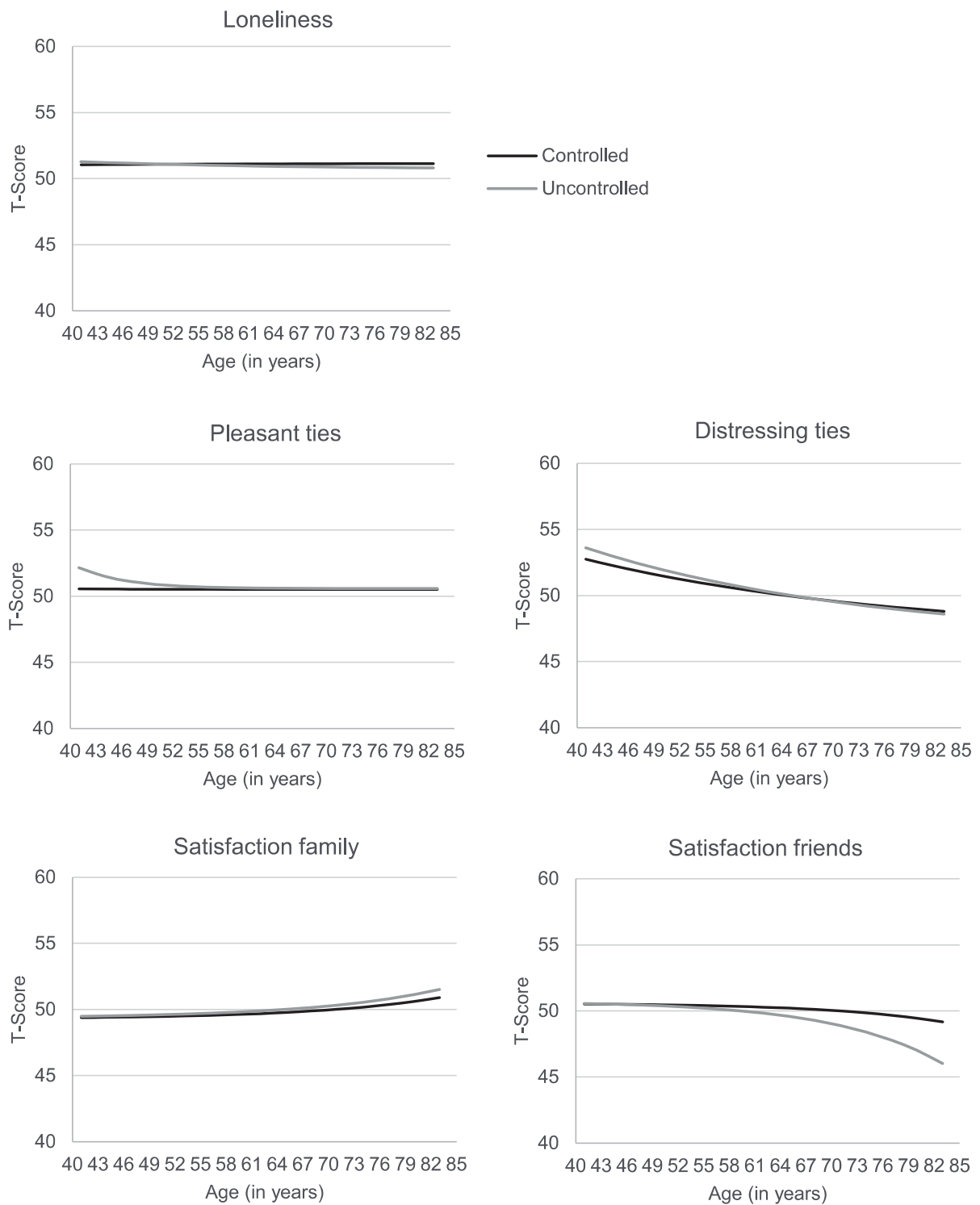


Figure B1. Comparison of controlled (black line) and uncontrolled (grey line) change trajectories for loneliness and emotional qualities of the SNW as they are estimated by the corresponding DCSCMs. Controlled change trajectories are adjusted for gender, education, region of residence and DEAS cohort affiliation.

Appendix C

Appendix to Chapter 4

Partnerships Status and Loneliness Across Age and Historical Time

Content

Table C1	<i>Items for the assessment of loneliness</i>
Table C2	<i>Percent of partnered people, number of observations (Obs) as well as means (M) and standard deviations (SD) for loneliness in each 6 year age group by time point</i>
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Table C5	<i>Summary of gender effects in all models</i>
Supplementary Syntax 1	<i>Modeling of aging-related & historical changes in the relationship of partnership status and loneliness</i>
Supplementary Syntax 2	<i>Modeling of aging-related & historical changes in mean levels of partnership satisfaction</i>

Table C1

Items for the assessment of loneliness (adapted from De Jong Gierveld et al., 2006)

1. I miss having people who I feel comfortable with
 2. There are plenty of people that I can depend on if I'm in trouble
 3. Often, I feel rejected
 4. There are many people that I can count on completely
 5. I miss having a sense of security and warmth
 6. There are enough people that I feel close to
-

Appendix C (Chapter 4)

Table C2

Percent of partnered people and number of observations (Obs) as well as means (M) and standard deviations (SD) for loneliness in each 6 year age group by time point

Age group	Partnership status (Frequency of partnered people)				Loneliness					
	t0		t1		t0		t1			
	%	Obs	%	Obs	M	SD	Obs	M	SD	Obs
40-45	81.20	711	85.90	297	50.39	9.95	466	50.93	9.66	231
46-51	83.10	909	83.30	431	50.17	9.17	637	50.11	9.18	357
52-57	82.90	861	86.50	401	49.76	9.34	584	49.52	9.22	337
58-63	82.10	795	78.70	389	49.27	9.23	593	49.19	8.29	351
65-69	82.70	918	81.60	403	49.16	9.45	698	49.28	8.96	346
70-75	76.40	1128	75.10	421	48.51	8.91	821	49.82	8.80	356
76-81	63.00	614	58.10	160	48.84	9.36	422	49.71	9.27	127

Appendix C (Chapter 4)

Table C3

Means (M), standard deviations (SD) and number of observations (Obs) for partnership satisfaction and satisfaction of single people in each 6 year age group by time point

Age group	Partnership satisfaction						Satisfaction of singles					
	t0			t1			t0			t1		
	<i>M</i>	<i>SD</i>	Obs	<i>M</i>	<i>SD</i>	Obs	<i>M</i>	<i>SD</i>	Obs	<i>M</i>	<i>SD</i>	Obs
40-45	51.19	10.32	575	49.30	9.68	255	52.53	9.53	134	54.63	9.93	43
46-51	50.23	10.35	752	50.25	9.73	359	50.96	10.76	153	53.92	8.45	72
52-57	50.04	10.32	709	50.43	10.79	348	50.47	9.57	147	54.01	8.94	55
58-63	49.37	10.11	650	50.03	10.63	307	51.07	9.83	140	51.90	9.73	84
65-69	49.30	10.38	754	50.37	10.02	327	51.44	10.29	158	54.28	7.82	75
70-75	50.00	9.59	854	50.73	10.03	313	48.67	9.87	263	53.10	9.03	104
76-81	50.48	8.82	385	50.52	11.51	93	47.96	9.64	226	53.61	8.60	67

Table C4

Variables used as auxiliary predictors of missing data.

Education

A person's educational biography was assessed via different questions in the DEAS interview. Based on the answers given to these questions, a short version of the International Standard Classification of Education (UNESCO, 2006) was used to classify a person's level of educational attainment. The resulting variable differentiated three levels of educational attainment:

1. low education (ISCED 0-2): no formal vocational training
2. medium education (ISCED 3-4): completed vocational training or higher general school certificate
3. high education (ISCED 5-6): completed professional development training or completed university studies

Health

A person's health status was operationalized via his or her self-rated health. Self-rated health was assessed by a single item of the DEAS interview asking "How do you assess your current state of health?" Responses were given on a 5-point scale ranging from 1 (*very good*) to 5 (*very bad*).

Social integration

We used two variables to represent a person's level of social integration:

1. Living alone: In the DEAS interview people answered different questions about the composition of their household. Based on the reports received we created an indicator differentiating people in single households from people who lived with at least one other person.
2. Size of the support network: In the DEAS Interview, participants named up to 5 people who they can turn to in order to receive advice (informational support) and up to 5 people who they can turn to in order to be comforted or cheered up (emotional support). The total sum of people named in these questions served as indicator for a person's potential for social support.

UNESCO. (2006). *International standard classification of education ISCED 1997*. Paris: UNESCO.

Table C5

Summary of gender effects in all models

Model for the relationship between partnership status and loneliness	At both time points, gender effects on partnership status differed significantly between age groups, $\Delta\chi^2(12) = 172.21$, $p < .001$. Among adults in the youngest age group, the distribution of partnered and single people did not differ significantly between men and women, $t_0: b (SE) = -0.02 (0.03)$, $t_1: b (SE) = -0.06 (0.04)$; $\Delta\chi^2(2) = 2.07$, $p = .355$. In the oldest age group, women were less likely to be partnered than men, $t_0: b (SE) = -0.38 (0.04)$, $t_1: b (SE) = -0.40 (0.06)$; $\Delta\chi^2(2) = 105.23$, $p < .001$. Gender differences in loneliness were similar over age groups and time points, $\Delta\chi^2(13) = 15.54$, $p = .275$. At both time points and in all age groups women reported a significantly lower level of loneliness than men, $t_0: b (SE) = -1.97 (0.26)$; $t_1: b (SE) = -1.97 (0.26)$; $\Delta\chi^2(1) = 55.34$, $p < .001$.
Model for the mean level of partnership satisfaction	Gender effects on both the intercept of and the change in partnership satisfaction did not differ between age groups, $\Delta\chi^2(12) = 12.08$, $p = .439$. In all age groups women were less satisfied with their partnerships than men at baseline, $b (SE) = -1.28 (0.46)$; $\Delta\chi^2(1) = 7.58$, $p = .006$. The rate of change in partnership satisfaction did not differ significantly between men and women, $b (SE) = -0.82 (0.48)$; $\Delta\chi^2(1) = 2.90$, $p = .089$.
Model for the mean level of satisfaction with a life as a single person	Gender effects on the intercept of and the change in satisfaction with a life as a single person did not differ between age groups, $\Delta\chi^2(12) = 9.02$, $p = .701$. In all age groups there were no significant differences between men and women in both the intercept of and the change in satisfaction with single life, intercept: $b (SE) = 0.53 (1.11)$, $\Delta\chi^2(1) = 0.23$, $p = .635$; change: $b (SE) = 1.15 (1.19)$, $\Delta\chi^2(1) = 0.93$, $p = .335$.

Note. Tests for significant variation over age groups/time points: a liberal model where a given gender effect was freely estimated was compared to a restrictive model where the same gender effect was constrained to be similar over age groups/time points. Tests for significant differences from zero: a liberal model where a given parameter was allowed to differ between men and women was compared to a restrictive model where gender differences in the same parameter were constrained to equal zero.

```
#####
!SUPPLEMENTARY SYNTAX 1
!Modeling of aging-related & historical changes in
!the relationship of partnership status and loneliness
#####
```

```
!Define data file to use
DATA: FILE = data.dat;
```

```
!Define variable names
VARIABLE:
NAMES =
group !age group
sex !gender
lot0 !loneliness level t0
lot1 !loneliness level t1
pst0 !partnership status t0
pst1 !partnership status t1
!Auxiliary variables
edu !education t0
srh !self-rated health t0
sup !support network t0
alone; !living alone t0
```

```
!Define code for missing values
MISSING = all (-999);
```

```
!Define groups
grouping is group (1=AG1 2=AG2 3=AG3 4=AG4 5=AG5 6=AG6 7=AG7);
```

```
!Define variables to consider in the model
USEVAR = sex pst0 pst1 lot0 lot1;
```

```
!Define auxiliary variables for modeling missing data
AUXILIARY = (m) edu srh sup alone;
```

```
#####  
!Define the basic regression model  
!Controlled for gender  
!Structure is similar for all age groups  
#####  
ANALYSIS:  
MODEL:  
  
!Model for t0  
#####  
!Estimate regression effect of partnership status on loneliness  
lot0 on pst0;  
!Estimate mean of partnership status  
[pst0];  
!Estimate mean of gender  
[sex];  
!Control for gender differences in loneliness  
lot0 on sex;  
!Control for gender differences in partnership status  
pst0 on sex;  
  
!Model for t1  
#####  
!Estimate regression effect of partnership status on loneliness  
lot1 on pst1;  
!Estimate mean of partnership status  
[pst1];  
!Control for gender differences in loneliness  
lot1 on sex;  
!Control for gender differences in partnership status  
pst1 on sex;  
  
!Allow for correlations between  
!loneliness scores at both time points  
lot0 with lot1;  
!partnership status at both time points  
pst0 with pst1;
```

```
#####
!Define age group specific parameter labels
#####

!b(i)t0=age group specific regression effect at t0
!b(i)t1=age group specific regression effect at t1
!i=number of age group

!+++++
model AG1: !Parameter for AG1 (40-45y)
!+++++
lot0 on pst0 (b1t0);
lot1 on pst1 (b1t1);

!+++++
model AG2: !Parameter for AG2 (46-51y)
!+++++
lot0 on pst0 (b2t0);
lot1 on pst1 (b2t1);

!+++++
model AG3: !Parameter for AG3 (52-57y)
!+++++
lot0 on pst0 (b3t0);
lot1 on pst1 (b3t1);

!+++++
model AG4: !Parameter for AG4 (58-63y)
!+++++
lot0 on pst0 (b4t0);
lot1 on pst1 (b4t1);

!+++++
model AG5: !Parameter for AG5 (64-69y)
!+++++
lot0 on pst0 (b5t0);
lot1 on pst1 (b5t1);

!+++++
model AG6: !Parameter for AG6 (70-75y)
!+++++
lot0 on pst0 (b6t0);
lot1 on pst1 (b6t1);

!+++++
model AG7: !Parameter for AG7 (76-81y)
!+++++
lot0 on pst0 (b7t0);
lot1 on pst1 (b7t1);
```

```
#####
!Define difference parameters
!adb=aging-related changes in b
!cdb=cross-sectional differences in b
!hdb=historical changes in b
#####

!Define new model variables
!+++++
model constraint:
new(
!Cross-sectional differences in b
cdb1 cdb2 cdb3 cdb4 cdb5 cdb6
!Historical differences in b
hdb1 hdb2 hdb3 hdb4 hdb5 hdb6
!Age group effects on cdb and adb
!To test for age group moderation in
aging-related changes and cross-sectional differences
cadb ccdb);

!Define cross-sectional differences at t0
!+++++
!Regression effect in age group i is a function of
!a) Regression effect in age group i-1
!b) Cross-sectional difference parameter cdb
b3t0 = b2t0 + cdb2;
b4t0 = b3t0 + cdb3;
b5t0 = b4t0 + cdb4;
b6t0 = b5t0 + cdb5;
b7t0 = b6t0 + cdb6;

!Define age group moderation of cross-sectional differences
!+++++
!cdb is allowed to show linear variations over age groups
cdb1 = b2t0 - b1t0;
cdb2 = cdb1 + 1*ccdb;
cdb3 = cdb1 + 2*ccdb;
cdb4 = cdb1 + 3*ccdb;
cdb5 = cdb1 + 4*ccdb;
cdb6 = cdb1 + 5*ccdb;

!Define aging-related (within-group) changes
!+++++
!Regression effect in age group i at t1 is a function of
!a) Regression effect in age group i at t0
!b) Aging-related change parameter adb
b2t1 = b2t0 + adb2;
b3t1 = b3t0 + adb3;
b4t1 = b4t0 + adb4;
b5t1 = b5t0 + adb5;
b6t1 = b6t0 + adb6;
!Define age group moderation of within-group changes
!+++++
!adb is allowed to show linear variations over age groups
adb1 = b1t1 - b1t0;
```

```
adb2 = adb1 + 1*cadb;
adb3 = adb1 + 2*cadb;
adb4 = adb1 + 3*cadb;
adb5 = adb1 + 4*cadb;
adb6 = adb1 + 5*cadb;
```

```
!Define historical changes
```

```
!+++++
```

```
!Historical change hdb is function of cdb and adb
```

```
hdb1 = cdb1 - adb1;
hdb2 = cdb2 - adb2;
hdb3 = cdb3 - adb3;
hdb4 = cdb4 - adb4;
hdb5 = cdb5 - adb5;
hdb6 = cdb6 - adb6;
```

```
#####
```

```
!Set constraints for comparative fit analysis
```

```
#####
```

```
!M1: No difference model
```

```
!all cdb and adb are set to 0
```

```
!Constraints to specify:
```

```
0=cdb1;
0=ccdb;
0=adb1;
0=cadb;
```

```
!M2: Linear aging-effect only model
```

```
!Effects are invariant over age groups (ccdb==0) & cadb==0)
```

```
!cdb equals adb (hdb==0)
```

```
!Constraints to specify:
```

```
0=cdb1-adb1;
0=ccdb;
0=cadb;
```

```
!M3: Linear aging- and historical effect model
```

```
!cdb and adb are allowed to differ (hdb!=0)
```

```
!Effects are invariant over age groups (ccdb==0) & cadb==0)
```

```
!Constraints to specify:
```

```
0=ccdb;
0=cadb;
```

```
!M4: Non-linear aging- and historical effect model
```

```
!cdb and adb are allowed to differ (hdb!=0)
```

```
!Effects are allowed to vary over age groups (ccdb!=0) & cadb!=0)
```

```
!No constraints to specify.
```



```
#####
! SUPPLEMENTARY SYNTAX 2
!Modeling of aging-related & historical changes in
!mean levels of partnership satisfaction
#####
```

```
!Define data file to use
DATA: FILE = data.dat;
```

```
!Define variable names
VARIABLE:
NAMES =
group !age group
sex !sex
pasat0 !partnership satisfaction t0
pasat1 !partnership satisfaction t1
pst0 !partnership status t0
pst1 !partnership status t1
!Auxiliary variables
edu !education t0
srh !self-rated health t0
sup !support network t0
alone; !living alone t0
```

```
!Define code for missing values
MISSING = all (-999);
```

```
!Consider only people who are partnered at t0 and t1
useobservations = pst0==1 AND pst1==1;
```

```
!Define groups
grouping is group (1=AG1 2=AG2 3=AG3 4=AG4 5=AG5 6=AG6 7=AG7);
```

```
!Define variables to consider in the model
USEVAR = sex pasat0 pasat1;
```

```
!Define auxiliary variables for modeling missing data
AUXILIARY = (m) edu srh sup alone;
```

```
#####
!Define the basic latent change score model:
!Controlled for gender
!Structure is similar for all age groups
#####
```

ANALYSIS:

MODEL:

!Define latent factor score for pasat0 (=intercept)

f1t0 BY pasat0@1;

!Define latent factor score for pasat1

f1t1 BY pasat1@1;

!Define autoregression of factor scores

!Autoregression equals 1

f1t1 ON f1t0@1;

!Define the latent change score

df1 BY f1t1@1;

!Latent change score and intercept are allowed to covary

df1 with f1t0*0;

!Control for gender differences in intercept

f1t0 ON sex;

!Control for gender differences in latent changes

df1 ON sex;

!Only intercept and latent change score have variances (all other @0)

!Set variance of observed score at t0 to 0

pasat0@0;

!Set variance of observed score at t1 to 0

pasat1@0;

!Set variance of latent factor score at t1 to 0

f1t1@0;

!Only intercept and latent change score have means (all other @0)

!Set mean of observed score at t0 to 0

[pasat0@0];

!Set mean of observed score at t1 to 0

[pasat1@0];

!Set mean of latent factor score at t1 to 0

[f1t1@0];

```
#####
!Define age group specific parameter labels
#####
```

```
!m(i)t0=age group specific intercept of partnership satisfaction at t0
!adm(i)= age group specific change in mean score from t0 to t1
!i=number of age group
```

```
!+++++
model AG1: !Parameter for AG1 (40-45y)
!+++++
[f1t0*50] (m1t0);
[df1*0] (adm1);
```

```
!+++++
model AG2: !Parameter for AG2 (46-51y)
!+++++
[f1t0*50] (m2t0);
[df1*0] (adm2);
```

```
!+++++
model AG3: !Parameter for AG3 (52-57y)
!+++++
[f1t0*50] (m3t0);
[df1*0] (adm3);
```

```
!+++++
model AG4: !Parameter for AG4 (58-63y)
!+++++
[f1t0*50] (m4t0);
[df1*0] (adm4);
```

```
!+++++
model AG5: !Parameter for AG5 (64-69y)
!+++++
[f1t0*50] (m5t0);
[df1*0] (adm5);
```

```
!+++++
model AG6: !Parameter for AG6 (70-75y)
!+++++
[f1t0*50] (m6t0);
[df1*0] (adm6);
```

```
!+++++
model AG7: !Parameter for AG7 (76-81y)
!+++++
[f1t0*50] (m7t0);
[df1*0] (adm7);
```

```
#####
!Define additional difference parameters
!cdm=cross-sectional differences in M
!hdm=historical changes in M
#####
```

```
!Define new model variables
!+++++
model constraint:
new(
!Cross-sectional differences in M
cdm1 cdm2 cdm3 cdm4 cdm5 cdm6
!Historical changes in M
hdm1 hdm2 hdm3 hdm4 hdm5 hdm6
!Copy of parameter for aging-related changes in M
padm1 padm2 padm3 padm4 padm5 padm6
!Age group effects on cdm and adm
!To test for age group moderation in
aging-related changes and cross-sectional differences
cadm ccdm
);
```

```
!Define cross-sectional differences at t0
!+++++
!Mean score in age group i is a function of
!a) Mean score in age group i-1
!b) Cross-sectional difference parameter cdm
m3t0 = m2t0 + cdm2;
m4t0 = m3t0 + cdm3;
m5t0 = m4t0 + cdm4;
m6t0 = m5t0 + cdm5;
m7t0 = m6t0 + cdm6;
```

```
!Define age group moderation of cross-sectional differences
!+++++
!cdm is allowed to show linear variations over age groups
cdm1 = m2t0 - m1t0;
cdm2 = cdm1 + 1*ccdm;
cdm3 = cdm1 + 2*ccdm;
cdm4 = cdm1 + 3*ccdm;
cdm5 = cdm1 + 4*ccdm;
cdm6 = cdm1 + 5*ccdm;
```

```
!Define age group moderation of within-group changes
!+++++
!adm is allowed to show linear variations over age groups
adm2 = adm1 + 1*cadm;
adm3 = adm1 + 2*cadm;
adm4 = adm1 + 3*cadm;
adm5 = adm1 + 4*cadm;
adm6 = adm1 + 5*cadm;
```

```

!Define historical changes
!+++++
!Historical change hdm is function of cdm and adm
hdm2 = cdm2 - adm2;
hdm3 = cdm3 - adm3;
hdm4 = cdm4 - adm4;
hdm5 = cdm5 - adm5;
hdm6 = cdm6 - adm6;

!Define duplicates of parameter estimates for aging-related changes
!+++++
!Duplicates are created to print parameter estimates for aging-related changes
!in one list at the end of the output along with all other difference parameters
padm1 = adm1;
padm2 = adm2;
padm3 = adm3;
padm4 = adm4;
padm5 = adm5;
padm6 = adm6;

#####
!Set constraints for comparative fit analysis
#####

!M1: No difference model
!all cdm and adm are set to 0
!Constraints to specify:
0=cdm1;
0=ccdm;
0=adm1;
0=cadm;

!M2: Linear aging-effect only model
!Effects are invariant over age groups (ccdm==0) & cadm==0)
!cdm equals adm (hdm==0)
!Constraints to specify:
0=cdm1-adm1;
0=ccdm;
0=cadm;

!M3: Linear aging- and historical effect model
!cdm and adm are allowed to differ (hdm!=0)
!Effects are invariant over age groups (ccdm==0) & cadm==0)
!Constraints to specify:
0=ccdm;
0=cadm;

!M4: Non-linear aging- and historical effect model
!cdm and adm are allowed to differ (hdm!=0)
!Effects are allowed to vary over age groups (ccdm!=0) & came!=0)
!No constraints to specify

```

Vorveröffentlichungen aus der Dissertation

1. Böger A., Wetzel M. & Huxhold O. (2017). Allein unter vielen oder zusammen ausgeschlossen: Einsamkeit und wahrgenommene soziale Exklusion in der zweiten Lebenshälfte. In: Mahne K., Wolff J., Simonson J., Tesch-Römer C. (eds) *Altern im Wandel*. Springer VS, Wiesbaden.
2. Böger, A., & Huxhold, O. (2018). Age-related changes in emotional qualities of the social network from middle adulthood into old age: How do they relate to the experience of loneliness? *Psychology and Aging*, 33(3), 482-496. doi:10.1037/pag0000222

Lebenslauf

Die biografischen Angaben des Lebenslaufs sind in der Online-Version der Dissertation aus Gründen des Datenschutzes nicht enthalten.

Publikationen

- ²Böger, A., & Huxhold, O. (2018). Age-Related Changes in Emotional Qualities of the Social Network From Middle Adulthood Into Old Age: How Do They Relate to the Experience of Loneliness? *Psychology and Aging, 33*(3), 482-496. doi:10.1037/pag0000222
- Böger, A., & Huxhold, O. (2018). Do the Antecedents and Consequences of Loneliness Change From Middle Adulthood Into Old Age? *Developmental Psychology, 54*(1), 181-197. doi: 10.1037/dev0000453.
- ³Böger A., Wetzel M.& Huxhold O. (2017). Allein unter vielen oder zusammen ausgeschlossen: Einsamkeit und wahrgenommene soziale Exklusion in der zweiten Lebenshälfte. In: Mahne K., Wolff J., Simonson J., Tesch-Römer C. (Hrsg.) *Altern im Wandel*. Springer VS, Wiesbaden.
- Böger A., Huxhold O., & Wolff J.K. (2017). Wahlverwandtschaften: Sind Freundschaften für die soziale Integration wichtiger geworden? In: Mahne K., Wolff J., Simonson J., Tesch-Römer C. (Hrsg.) *Altern im Wandel*. Springer VS, Wiesbaden.

Ausgewählte Präsentationen

- Böger, A., & Huxhold, O. (2016). *Schützt eine verbesserte Beziehungsqualität vor einer Zunahme von Einsamkeit im Alter?* Vortrag auf dem 50. Kongress der Deutschen Gesellschaft für Psychologie, 18.-22. September 2016 in Leipzig, Deutschland.
- Böger, A., & Huxhold, O. (2015). *Changes in the close tie network as antecedent of loneliness: moderating effects of poverty status and age?* Posterpräsentation auf dem 68. annual scientific meeting of the Gerontological Society of America, 18.-22. November 2015 in Orlando, Florida, Vereinigte Staaten von Amerika.
- Böger, A., & Huxhold, O. (2015). *Einsamkeitsrisiken in der zweiten Lebenshälfte: variieren sie mit der sozioökonomischen Ressourcenlage?* Posterpräsentation auf der 22. Tagung der Fachgruppe Entwicklungspsychologie in der DGPs, 31. August - 02. September 2015 in Frankfurt, Deutschland.
- Böger, A., & Huxhold, O. (2014). *Do antecedents and consequences of loneliness change across the second half of life?* Posterpräsentation auf dem 49. Kongress der Deutschen Gesellschaft für Psychologie, 21.-25. September 2014 in Bochum, Deutschland.

^{2,3} Vorveröffentlichung aus der Dissertation

Erklärung zur Dissertation

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

Berlin, Juli 2018

Anne Böger