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## **Examining Relations Between Aging, Life Story Chapters, and Well-Being**

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## Abstract

Socio-emotional selectivity theory holds that older age is associated with a sense of limited remaining time. We suggest that life story chapters may be involved in this experience. In this first study on the connection between socio-emotional selectivity theory and chapters, we examined whether older age is associated with fewer, temporally less distant, and less positive future chapters. We also examined relations between chapters and subjective well-being. Two samples (18-84 years) described past and future chapters and completed well-being measures. Older age was associated with fewer, less temporally extended, and less positive future chapters. Less positive past chapters was most consistently related to lower subjective well-being, but less positive future chapters also predicted lower subjective well-being in some analyses.

*Keywords:* Aging; life story chapters; subjective well-being; socio-emotional selectivity theory; future thinking

## **Examining Relations Between Aging, Life Story Chapters, and Well-Being**

As people age they experience a sense of limited remaining time (Carstensen, Isaacowitz, & Charles, 1999). This sense of a time-limited future self may be represented in life stories, since life stories are personal accounts of the remembered past and the anticipated future (McAdams, 2001). Thus, life stories represent individuals as continuous entities in time with perceived beginnings (i.e., birth) and anticipated endings (i.e., death). Older age is also associated with negative age-related events, such as general physical decline, illness, and death of close others. Thus, future life stories may also be more negative in older adults. The present study is a first step in connecting socio-emotional selectivity theory with life stories; it addresses the basic question of whether older age is associated with foreshortened and more negative future life stories.

Maintaining or achieving well-being is important to most individuals. Subjective well-being includes high positive affect, low negative affect, and high life satisfaction (Diener, Oishi, & Lucas, 2003). Several studies show that the way individuals think about their past, either in terms of life stories (see Adler, Lodi-Smith, Philippe, & Houle, 2016 for a review) or in term of memories (e.g., Watson, Berntsen, Kuyken, & Watkins, 2012) is related to well-being. In the present study, we examined whether the qualities of chapters individuals construct in their past and future life stories are related to subjective well-being. Life story chapters are generally much less researched than memories of circumscribed events, such as self-defining memories (Singer & Salovey, 1993) or high- and low points (McAdams, 2001), and the present study begins to

illuminate the role of chapters in psychological aging and well-being. Below, we elaborate on the literature relevant to our two aims.

### **Socio-emotional selectivity theory and future life story chapters**

Socio-emotional selectivity theory holds that when individuals experience a sense of limited remaining time, they focus on facilitating emotional meaning in the present rather than gaining information that may pay off in the future. Such behavior includes choosing to spend time with close others rather than make new acquaintances and using emotion regulation to increase positive feelings (Carstensen, 2006; Fung & Carstensen, 2004; Löckenhoff & Carstensen, 2004). A sense of limited remaining time arises at transitions that end a period in life, such as finishing college. However, as individuals grow older or become seriously ill, they face the ultimate end, the end of life. Thus, older age and serious illness are associated with an overarching sense of limited remaining time (Löckenhoff & Carstensen, 2004).

Although limited future time is the central concept in socio-emotional selectivity theory, little theoretical and empirical attention has been devoted to understanding the mental representations involved in this experience. In theoretical papers, the concept is described as a subjective experience (e.g., “perception of time as constrained”, p. 165) or an objective fact (e.g., “when time is limited”, p. 175), but with no elaboration of the mental representations of objective time (Carstensen et al., 1999). Empirically, studies have focused on examining the effects of a limited future time horizon, such as selection of close social partners (Carstensen et al., 1999; Löckenhoff & Carstensen, 2004). While these studies have contributed greatly to understanding the effects of limited future time, they are silent on the mental representations of time that give rise to an experience of future time as constrained.

Individuals represent time in a variety of ways, such as weeks and years (Larsen, Thompson, & Hansen, 1996). But not all representations of time may be relevant for understanding when and why individuals experience a sense of limited remaining time and socio-emotional selectivity theory would benefit from a clearer conceptualization of the representations involved. We suggest that personalized representations of time in the form of life story chapters may contribute to the sense of limited remaining time. One of the primary functions of life stories is to represent individuals as temporally extended entities (Habermas & Bluck, 2000). Individuals begin constructing life stories in pre-adolescence, but life stories mature throughout adulthood and are continually reconstructed as individuals reflect on the meaning of experiences (Bohn & Berntsen, 2008; Köber, Schmiedek, & Habermas, 2015; McLean, Pasupathi, & Pals, 2007). When constructing life stories, individuals use sequences of chapters to create a temporally coherent account (Thomsen, 2009), although other strategies also play a role in fostering temporal coherence (Habermas, Ehlert-Lerche, & de Silveira, 2009).

Chapters refer to important periods with perceived beginnings and endings, including information about the people, places, activities, and objects associated with the period (Brown, Hansen, Lee, Vanderveen, & Conrad, 2012; Thomsen, 2015). For example, a 35-year old woman may represent her life as consisting of a childhood chapter, a school chapter, a college chapter, a work chapter, and a married life chapter, with each chapter nesting thematically related memories (Conway, 2005; Neisser, 1986). Chapters are constructed for both the past and the future and function as temporal categories that create boundaries in subjective time. Thus, chapters structure individuals' perception of time, influencing their perspective on past, present, and future.

Chapters may be involved in the perception of limited future time as it occurs at different points in the life span. During their lives, individuals continually construct chapters that reflect a variety of extended activities and these chapters then influence the perception of future time as restricted. Thus, when younger individuals identify many future chapters extending several decades into the future, future time may be perceived as relatively unlimited. On occasions when young and middle-aged individuals identify an ongoing chapter as ending, such as at the time of college graduation, future time may be temporarily experienced as shortened. Because older and terminally ill individuals identify fewer future chapters that do not extend very far from the present, future time may generally be perceived as very limited.

If chapters are one of the representations involved in the sense of limited remaining time experienced by older adults, we should expect increasing age to be associated with fewer future chapters and future chapters less distant from the present. This idea is supported by studies showing that when older individuals imagine future events, these events are closer to the present than events imagined by younger individuals (Spreng & Levine, 2006), by studies showing that older age is related to imagining fewer possible selves (Chessell, Rathbone, Souchay, Charlesworth, & Moulin, 2014; Cross & Markus, 1991; Hooker, 1992), and by studies showing that higher age is related to experiencing the future as more limited (Demiray & Bluck, 2014). In addition, because future chapters are constructed by reference to culturally shared knowledge (Thomsen, 2015), and such knowledge holds that old age is associated with negative events like the loss of close others and health problems (Berntsen & Rubin, 2004; Bohn, 2010), older age may be associated with less positive future chapters. This idea is supported by a study showing

that older adults rated their future subjective well-being lower than younger adults (Staundinger, Bluck, & Herzberg, 2003).

### **Life story chapters and subjective well-being**

The second aim of the study was to examine relations between characteristics of past and future chapters and subjective well-being. The emotional valence of past chapters has been found to be related to personality traits, such that individuals who score higher on neuroticism describe more negative chapters, whereas individuals who score higher on extraversion and conscientiousness describe more positive chapters (Thomsen, Olesen, Schnieber, & Tønnesvang, 2014; Thomsen & Pillemer, 2016). More positive past chapters also are related to higher self-esteem and a clearer self-concept (Steiner, Thomsen, & Pillemer, under review). Recently, we found that patients with schizophrenia describe more negative past chapters compared to a matched healthy control group (Holm, Thomsen, & Bliksted, 2016) and another study found that depressed patients had more negative past chapters than healthy controls (Dalglish, Hill, Golden, Morant, & Dunn, 2011). In general, these studies suggest that more positive past chapters should be related to better subjective well-being, but no previous studies have directly examined this.

Reduced positivity of future chapters may also lead to lower subjective well-being; studies of possible selves point to connections between representations of future lives and subjective well-being (e.g., King & Raspin, 2004), and generalized expectations for the future, such as optimism, are also related to subjective well-being (Alarcon, Bowling, & Khazon, 2013). At the same time, the study on chapters in depressed patients found no differences between



patients and controls for future chapters (Dalglish et al., 2011). This indicates that the positivity of future chapters may not be related to subjective well-being.

Chapters do not just vary on emotional valence, individuals also differ in the number of chapters they identify in their life stories and the temporal extension of their chapters. Here we examined whether these characteristics of chapters were also related to subjective well-being. Studies show that thinking about the future as open-ended is related to better psychological well-being (e.g., Demiray & Bluck, 2014). Hence, we expected that more future chapters and future chapters extending longer into the future would be related to higher well-being.

It is well-established that older age is associated with better well-being, even in the face of age-related challenges and a limited future time horizon (e.g., Demiray & Bluck, 2014; Gross et al., 1997; Thomsen et al., 2005). Older adults may have higher well-being because they have gained more experience in coping with events in ways that lead to more positive and less negative emotions (Mehlsen et al., 2012). According to socio-emotional selectivity theory, older adults also maximize their well-being in the present through the selection of goals that do not depend on an extended future (Carstensen, 2006). Hence, we expected that older age would be associated with higher subjective well-being and we controlled for age when examining relations between past and future chapters and well-being.

### **The present study**

The present study constitutes a first empirical step in examining whether chapters may be involved in the sense of limited time experienced by older adults. We examined relations between age, life story chapters, and well-being in two samples. Participants of varying ages identified past and future chapters, gave their age for the beginning and end of each chapter, and

rated chapters on emotional tone (from very negative to very positive). We expected that higher age would be associated with fewer and less temporally distant future chapters and with less positive future chapters. In addition, we expected that more positive past chapters would be related to higher subjective well-being. We also examined the relations between subjective well-being and the number, temporal distance, and emotional valence of future chapters. Because the first study was in some respects exploratory, we attempted to replicate the results in a second independent sample.

We coded the chapters for content to provide descriptive data on how individuals think about their lives as chapters. Although several studies on chapters have been conducted (see Thomsen, 2015 for a review), no previous studies have coded the content of chapters. Knowledge about the content of chapters is important in this context because it provides descriptive data on the “endings” that individuals naturally represent in their lives, thus providing future studies with a wide array of endings to examine.

## **Method**

### **Participants**

The participants in sample 1 were 106 individuals with a mean age of 42.26 years ( $SD = 19.56$ ; range 18-84; 18-39 years (45%); 40-59 years (31%); and 60-84 years (24%)). There were 73 women and 29 men (4 participants did not specify their gender). The participants were recruited from open lectures on psychology and a folk high school.

The participants in sample 2 were 124 individuals (94 women) with a mean age of 39.91 years ( $SD = 20.45$ ; range 18-74; 18-39 years (53%); 40-59 years (19%); and 60-84 years (29%)). The young participants were recruited from a high school and the middle-aged and older

participants were recruited from open lectures in psychology and word of mouth (contact first author for more information on demographics).

All participants volunteered to complete the questionnaire in their own time; they received no compensation for their participation. There were no significant differences on the two samples with respect to gender distribution ( $\chi^2(1) = .52, p > .10$ ) or age ( $t(223) = .88, p > .10$ ).

## Materials

**Chapters.** The chapter questionnaire (Thomsen & Berntsen, 2008) was divided into two sections, past and future, with the future section always following the past section. The participants were instructed that they would be asked to list chapters in their past and future life stories. They were informed that chapters referred to a period in their lives [a period that they could imagine would be a part of their future lives]; that it was important that chapters covered their entire life span; that chapters need not have clear beginnings or endings; that chapters could be parallel; and that chapters could be ongoing (only for past chapters). They were then given examples of chapters (only for past chapters) and instructed that the number and types of chapters may be very different across individuals (contact first author for verbatim instructions). For both past and future chapters they were then provided with 15 spaces for recording chapters, where they were asked to provide the title of the chapter, its start and end ages (or they could mark “ongoing” if the chapter had not ended yet), and answer the following question: “How would you describe the chapter emotionally?” rated on a 5-point scale with 1 = *very negative*; 2 = *negative*; 3 = *neutral/mixed*; 4 = *positive*; and 5 = *very positive*. We then calculated the mean emotion rating for past and future chapters separately by summing the ratings for past/future

chapters and dividing by the number of chapters rated on the question. Higher mean scores indicate more positive emotional tone. We calculated temporal distance from the present by looking through all past and future chapters, locating the earliest age given for past chapters and the oldest age given for future chapters, and calculating the difference between these two values and the participants' present ages. Higher numbers refer to chapters more temporally distant from the present.

The thematic content of past and future chapters was coded using a scheme developed for previous studies (e.g. Thomsen & Berntsen, 2008, but note that chapter content was not reported in the paper; contact the first author for more details on the coding scheme). A student assistant coded all past and future chapters and the first author independently coded chapters for 20 randomly selected participants (10 from sample 1 and 10 from sample 2). Inter-rater agreement was high (kappas ranging from .83-.96) and percentages of overall agreement were 91% and 92% (for sample 1 and 2 respectively).

**Subjective well-being.** The participants completed the Positive And Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) and the Satisfaction With Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985). Both scales possess good psychometric properties, also in the Danish versions (Mehlsen, Thomsen, Viidik, Olesen, & Zachariae, 2005; Olesen, Thomsen, & O'Toole, 2015). The PANAS consists of 20 labels for positive and negative affects rated on how often they have been experienced within the last week from 1 = *not at all/very little* to 5 = *an extremely high degree*. The SWLS consists of five statements on satisfaction with one's current life situation, rated from 1 = *strongly disagree* and 7 = *strongly*

*agree*. Both scales showed good internal reliability (Cronbach's alphas = .78/.85 (positive affect); .86/.79 (negative affect); and .86/.82 (SWLS) in sample 1/sample 2 respectively).

## **Results**

### **Preliminary analyses**

The means are shown in Table 1. There were no consistent gender differences for the variables and gender was not included as a covariate in our analyses (contact first author for detailed analyses).

Most past chapters concerned childhood, school, further education, marriage/family, children, and work life. Most future chapters concerned further education, marriage/family, children, work life, 3<sup>rd</sup> generation relations, and retirement (see Appendix for an overview of the content).

### **Main analyses**

To examine whether higher age would be associated with fewer, foreshortened, and less positive future chapters, we correlated age with the chapter variables (see Table 1). Because we conducted 27 correlations in each of the two samples, we corrected the significance level to  $p < .0019$ . The expected findings were consistent across the two samples. Higher age was associated with fewer future chapters, future chapters extending less into the future, and less positive future chapters. There was no relation between age and the emotional tone of past chapters, but older age was related to identifying more past chapters (only in sample 2).

In accordance with prior research, higher age was related to better well-being. Thus, age was positively related to life satisfaction, although this was not significant when using the corrected significance level in sample 1 ( $r(97) = .24, p > .01$ ) and was non-significant in sample

2 ( $r(110) = .18, p > .05$ ). However, higher age was related to less negative affect when using the corrected significance level ( $r_s(96 \text{ and } 110) = -.41 \text{ and } -.45, p_s < .001$ , for sample 1 and 2 respectively). Correlations for positive affect were non-significant ( $r_s(93 \text{ and } 108) = .01 \text{ and } .03$ , for sample 1 and 2 respectively).

Emotional valence of chapters was related to well-being (see Table 1). More positive past chapters was related to higher well-being, as measured by higher life satisfaction (both samples), lower negative affect (sample 1), higher positive affect (sample 2). For sample 1, there were no significant correlations between emotional tone of future chapters and well-being. However, for sample 2 more positive future chapters was related to higher well-being, when measured as higher life satisfaction. In order to examine whether past chapters were more strongly associated with well-being than future chapters, we examined whether the correlations between emotional tone of past chapters and well-being were significantly different from the correlations between the emotional tone of future chapters and well-being. Only for life satisfaction and negative affect in sample 1 did the difference reach significance (Steiger's  $z_s = 3.92 \text{ and } 3.48, p_s < .001$ , respectively).

Since older individuals described fewer and temporally less extended future chapters, it is possible that older individuals simply considered the future as less important and hence that future chapters are not related to well-being in old age. To examine this possibility, we tested whether correlations between emotional tone of past and future chapters and well-being differed across age groups. We collapsed the two samples (to gain enough participants in the middle-aged and old group) and divided the 230 participants into three age groups: 111 younger (18-39 years), 55 middle-aged (40-59 years), and 59 older (60-84 years). The results are shown in Table

2 (using a corrected  $p$  level of .0028 because 18 correlations were conducted; note that similar age divided correlations were performed using number and temporal distance of past and future chapters, but that none of these correlations were significant using the corrected  $p$  level). The correlations between the emotional tone of past and future chapters and well-being did not differ significantly when comparing young to middle-aged, middle-aged to old, or young to old, suggesting that there were no significant age differences in how the emotional tone of past and future chapters related to well-being.

To examine the relative contributions of age, past chapters, and future chapters to well-being, we conducted three separate multiple regressions for each sample. Life satisfaction, positive affect, or negative affect were entered as the outcome variables and age, emotional tone and number of past chapters, and emotional tone, number, and temporal distance of future chapters as the predictor variables (note that we did not enter temporal distance of past chapters because this variable correlated almost perfectly with age, see Table 1). The results are shown in Table 3. The emotional tone of past chapters explained variance in well-being beyond age in four of the six analyses. The emotional tone of future chapters explained variance in well-being beyond age in two of six analyses. The number and temporal distance of future chapters in general did not explain significant variance in well-being, when controlling for age and the other chapter variables, although more future chapters was related to higher positive affect in sample 1. Higher age remained a significant predictor of lower negative affect (both samples) and life satisfaction (only sample 1) even when controlling for the emotional tone of past and future chapters. In general, more positive past chapters and age were the strongest predictors of subjective well-being.

## Discussion

In this first study addressing whether chapters may play a role in the sense of limited time experienced by older adults, we found that higher age was associated with fewer and temporally less distant future chapters. It may be argued that it is hardly surprising that older adults have fewer and less temporally extended future chapters, as this simply reflects the objective fact that they have shorter time left to live. However, if the number and temporal extension of chapters simply reflected objective time, the correlations between number and temporal distance of future chapters and age should have been close to 1 as it was for past chapters. Rather, the correlations ranged from  $-.37$  to  $-.75$ , indicating that the number and temporal distance of future chapters also reflect individually constructed mental representations.

Higher age was also associated with less positive future chapters, whereas age was not related to the emotional tone of past chapters. Overall, the emotional tone of past chapters was more consistently associated with well-being than the emotional tone, number, and temporal distance of future chapters. Like previous studies, older participants reported lower negative affect (Gross et al., 1997). Thus, although older participants had less positive and foreshortened future chapters, and positivity of future chapters was related to well-being for this group, they still had higher well-being than younger participants.

### **Socio-emotional selectivity theory and future life story chapters**

This study addressed the initial research question of whether older adults would describe fewer and foreshortened future chapters. Our results are consistent with the idea that chapters may be one type of mental representation contributing to the sense of limited remaining time experienced under a variety of circumstances. Chapters structure individuals' sense of time so



that the number and temporal extension of ongoing and future chapters may influence whether the individual's perspective on the future is restricted. Thus, chapters may provide the representational structure that underlies the sense of limited remaining time found in older adults, in adults with severe illnesses, and also temporarily in individuals who face the end of a life period, such as college (Löckenhoff & Carstensen, 2004). Rather than representing endings as abstracted knowledge based on statistics, like "expected age of death is 85 years" or "most students are 22 years when they finish college", chapter endings represent time in a personalized way. Chapter endings are tied to the periods in life that the individual has lived through in the past, is engaged in at present, and anticipates living through in the future. Other ways of representing time, like seasons, weeks, or linear calendar time (years; 2016, 2017, 2018 etc.) do not imply endings as strongly – rather they imply recurrence (weeks and seasons) or infinite time (years) (Larsen et al., 1996). We suggest that such representations of time are more likely to contribute to a sense of limited future time when they capture personalized time (e.g., the ending of *a year* being tied to ending *a year of my life*). However, note that knowledge of one's age (e.g., "I am 79) in combination with statistical knowledge of the expected age of death (e.g. "expected age of death is 85 years") may also contribute to a sense of limited future time. Incorporating the concept of chapters into socio-emotional selectivity theory emphasizes that perceived future time varies according to how individuals *represent* endings in chapters, rather than according to objective endings only. This distinction is important because it allows analyses of how factors affecting the representation of chapters may influence the sense of limited remaining time. For example, a chapter ending may lose its immediacy if it is mentally represented as being very far off, as when intervening time contains many important prior events.

Examining chapters allows naturalistic assessment of individualized temporal structure. Our coding of chapter content revealed that individuals perceive a wide variety of endings across their life span, such as elementary school, illness, traveling, and residential location (see Appendix). The method reveals how temporal boundaries are created at all stages of adult life and thus emphasizes the relevance of socio-emotional selectivity theory across the life span. Because chapter endings signal that a chunk of activities, people, and places may disappear from one's life, perhaps forever, individuals facing chapter endings should display the range of behaviors found to be associated with a sense of limited remaining time in previous studies on social-emotional selectivity theory, such as preference for close social partners (Carstensen, 2006). The content of the chapters given by individuals may help design new studies examining whether the sense of limited future time influences behavior across this wider variety of approaching endings (e.g. endings of vacations). Extending this idea, one important question is whether endings of distinctly negative chapters (e.g., illness) have similar effects as endings of more positive chapters (e.g., college).

Although chapters may be somewhat stable temporal categories in autobiographical memory, used to represent the individual as a coherent entity across time, they are also dynamic and influenced by extraneous factors, like social interaction or experimental manipulation (Thomsen, 2015). The latter point is important because experimental studies are necessary to establish the causal role of chapters in the sense of limited remaining time. Future studies could examine whether making endings of ongoing chapters salient to participants will increase their preference for close social partners as well as decrease motivation to gather new information,

outcomes that within the socio-emotional selectivity theory framework have been found to be related to perceived endings.

### **Life story chapters and subjective well-being**

Consistent with expectations, having more positive past chapters was related to higher subjective well-being. The findings add to the literature showing that describing positive chapters in one's life story is related to better mental health (e.g. Dalgleish et al., 2011; Steiner et al., under review). The findings are correlational and we do not know whether experiencing positive emotions color the descriptions of chapters, which would be consistent with previous studies showing that emotions affect interpretations (e.g., Bower, 1981) or whether thinking about one's life in terms of positive chapters increases subjective well-being. However, a recent study has shown that prompting people to think about chapters increases their state self-esteem, suggesting that chapters can influence well-being (Steiner, Pillemer, & Thomsen, under review).

Foreshortened future chapters were not related to subjective well-being. However, the emotional tone of future chapters was related to subjective well-being, although less consistently than the emotional tone of past chapters. The less consistent findings for future chapters may reflect that although life stories are defined as including anticipated future events, they are often told with a strong focus on the past, including only a brief outlook into the future (Habermas et al., 2009). Thus, the future may be less emphasized and thus more weakly related to well-being. Another possible explanation is that future event representations are more scripted than past event representations (Berntsen & Bohn, 2010) and if this is the case for future chapters, they may be less influenced by individuals' dispositions and states such as subjective well-being. The relation between future chapters and well-being may also depend on how much the individual

thinks about her/his future chapters. Thus, the emotional tone of future chapters may only affect current well-being if they loom large in the individual's thoughts, and such looming may depend on the temporal proximity of the chapters as well as mental strategies focusing on or avoiding thoughts about the future.

Although the associations between subjective well-being and the emotional tone of future chapters were less consistent, both older and younger adults showed associations between less positive future chapters and lower well-being. At the same time, older adults reported higher levels of well-being. It may seem counterintuitive that older adults had both higher well-being and less positive future chapters, when positivity of future chapters and well-being were related. One possible explanation is that the less positive future chapters in older adults represent the age-related negative events often described as challenging well-being in old age (e.g., illness). How positively or negatively these events are represented is related to well-being, but at the same time older adults have strategies, such as emotion regulation, to reduce negative affect below that experienced by younger adults (Carstensen, 2006). Relatedly, a recent study suggested that chronological age and future time perspective may work as opposing forces in shaping well-being, and that older adults who manage to construct their future in both positive and more open-ended terms may gain the benefits of both their higher age and an open-ended and positive future (Demiray & Bluck, 2014). Thus, although older adults in general experience the future as more limited than younger adults and this may shift their focus towards maximizing emotional meaning in the present, those older adults who also think about their future in an open-ended and positive way may cope best with age-related challenges.

## **Limitations**

The study is preliminary and as such constitutes a first step in illuminating the potential for integrating socio-emotional selectivity theory with research on life story chapters. Many questions therefore remain unanswered and need to be addressed in future studies. Most important, the present study was correlational and future studies experimentally manipulating the salience of chapter endings and measuring the effects on outcomes studied within the socio-emotional selectivity literature, such as subjective experience of limited future time and selection of social partners, are needed (see Peetz & Wilson, 2013, for studies showing that increasing the salience of even minor transitions affects individuals' motivation). In addition, the present study did not include a scale measuring the sense of future time, and follow-up studies should more directly examine associations between future chapters and sense of restricted time.

There are other methodological limitations of the study. First, past chapters were always described before future chapters, and this may have affected differences between past and future chapters. Thus, the higher number of past chapters may be because participants tired after completing the part about past chapters. This is, however, difficult to reconcile with the finding that future chapters were rated more positively than past chapters. Since the differences between past and future chapters are also consistent with other studies comparing past and future event representations (Berntsen & Bohn, 2010; D'Argembeau & van der Linden, 2004), we would argue that the differences do not reflect an order effect. Also note that lack of counterbalancing is unlikely to explain relations between future chapters and age, because the order was similar for all participants. Second, we assessed the emotional tone of chapters on a one-dimensional scale, which may not appropriately capture mixed emotions. Participants experiencing such mixed emotions may have been more likely to mark the midpoint of the scale and this may have

obscured results (16-23% of responses for past and future chapters in both samples were at the midpoint of the scale). Future studies should assess emotional content in a more nuanced way. The samples overrepresented women, younger individuals and, due to the recruitment procedure, individuals with an interest in psychology and we do not know whether the present findings will generalize to other groups. Finally, although chronological age seems the most obvious explanation for the age effects, we cannot rule out the possibility of meaningful generational differences.

## **Conclusion**

In conclusion, having more positive past chapters was related to higher subjective well-being, suggesting that prompting people to think about the past in a way that emphasizes positive chapters may increase well-being. Older age was associated with fewer, less distant, and less positive future chapters, suggesting that chapters may play a role in the sense of limited remaining time experienced by the elderly. This initial study contributes to our understanding of the mental representations involved in the sense of limited time central to socio-emotional selectivity theory, and we suggest that future studies extend this theoretical synthesis and systematically examine the effect of life story chapters on time-perspective.

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Table 1

*Means and correlations for the chapter variables, age, and subjective well-being measures for sample 1/sample 2. Correlations that are significant in both samples in bold (using a Bonferoni corrected significance level of  $p < .0019$ ).*

	Mean	Age	Life satisfaction	Positive affect	Negative affect
Number of past chapters	9.73 <sup>a</sup> /9.17 <sup>a</sup>	.01/.46*	.01/.28	.16/.17	.00/-.17
Number of future chapters	4.89/6.38	<b>-.37*/-.44*</b>	-.06/.12	.22/.11	.12/.23
Temporal distance, past	40.08 <sup>a</sup> /38.00	<b>.99*/.99*</b>	.23/.20	.01/.04	<b>-.39*/-.44*</b>
Temporal distance, future	24.20/33.84	<b>-.40*/-.75*</b>	.04/-.10	.08/-.10	.09/.38*
Emotional tone, past	3.68 <sup>a</sup> /3.80 <sup>a</sup>	.14/-.04	<b>.58*/.47*</b>	.10/.35*	-.35*/-.21
Emotional tone, future	4.03/4.03	<b>-.34*/-.35*</b>	.10/.31*	.02/.22	.12/-.06

<sup>a</sup> implies significant differences between past and future chapters; \*  $p < .001$

Table 2

*Correlations between the emotional tone of past and future chapters and subjective well-being for young, middle-aged, and older participants.*

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	Younger (111)		Middle-aged (55)		Older (59)	
	Past	Future	Past	Future	Past	Future
Life satisfaction	.53*	.25	.46*	.18	.59*	.45*
Positive affect	.32*	.13	.01	.22	.27	.27
Negative affect	-.35*	-.10	-.23	-.03	-.10	-.30

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\*  $p < .0028$

Table 3

*Multiple regressions with age, past and future chapters predicting subjective well-being*

	Sample 1			Sample 2		
	Life satisfaction	Positive affect	Negative affect	Life satisfaction	Positive affect	Negative affect
	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$
Age	.23*	.03	-.29*	.30	.02	-.53*
Number of past chapters	-.06	.06	-.03	.05	.02	.21
Number of future chapters	.12	.32*	-.08	.20	.19	-.07
Temporal distance, future	.06	-.05	.02	-.04	-.21	.16
Emotional tone, past	.55*	.13	-.34*	.35*	.31*	-.11
Emotional tone, future	.12	-.09	.07	.26*	.16	-.24*
<i>Adj. R<sup>2</sup></i>	.35	.04	.19	.26	.15	.23

Model  $F(6, 79) = 8.53^*$   $F(6, 77) = 1.57$   $F(6, 78) = 4.24^*$   $F(6, 97) = 6.92^*$   $F(6, 99) = 4.11^*$   $F(6, 101) = 6.21^*$

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\*  $p < .05$



Appendix

*Percentage of past and future chapter content (sample 1/sample 2) with mean ages and mean emotional valences*

	<u>Past chapters</u>			<u>Future chapters</u>		
	%	Age	Emotion	%	Age	Emotion
Childhood	7.3/9.3	1.67/1.59	3.73/4.13	-/-	-/-	-/-
Kindergarten	2.4/3.7	2.96/2.37	4.04/3.97	-/-	-/-	-/-
School	10.0/17.0	8.86/10.47	3.49/3.92	-/-	-/-	-/-
Spare time	3.3/4.0	11.58/21.30	4.47/4.47	3.6/3.8	42.47/46.32	4.33/4.36
Youth	4.1/5.2	15.10/14.57	3.57/3.73	-/-	-/-	-/-
Social relations	2.3/3.0	15.29/15.26	3.96/3.90	1.4/2.2	36.00/61.50	4.57/4.40
Military service	.5/.6	20.80/21.17	3.40/4.50	-.1	-/19.00	-/5.00
Sabbatical	1.3/.6	18.92/18.83	3.38/3.67	1.2/3.9	27.83/19.37	4.50/4.41
Further education	16.4/12.1	19.71/19.00	3.89/3.77	9.6/9.9	24.50/21.62	4.08/4.01
In love	3.1/1.6	19.75/19.20	3.61/3.87	2.4/2.0	28.10/30.62	4.17/4.92
Travel	1.4/1.2	22.08/20.70	4.15/4.55	4.0/3.8	33.25/32.04	4.79/4.64

Location	7.7/3.8	22.53/21.75	3.77/3.81	4.6/5.8	29.50/31.36	3.91/4.33
Negative events	5.9/4.2	24.61/30.68	1.90/1.87	3.0/1.9	56.38/65.00	1.93/1.92
Divorce/break up	2.4/2.0	24.68/31.47	2.04/2.47	.6/-	36.00/-	2.33/-
Marriage/family	5.7/5.7	29.07/27.96	3.79/4.09	8.6/10.9	35.94/32.03	4.58/4.54
Children	5.2/5.2	31.66/29.40	4.21/4.31	9.6/10.8	37.00/34.77	4.43/4.52
Work life	9.6/10.3	32.45/30.18	3.99/3.78	15.4/11.4	36.80/32.60	4.05/3.97
Middle age/adult life	.9/.4	32.89/27.25	4.22/3.50	.6/1	42.00/24.00	3.67/4.00
3. generation relations	.8/1.6	53.63/44.14	4.86/4.67	6.4/5.8	59.95/57.39	4.70/4.85
Retirement	1.1/2.3	63.30/61.52	4.00/3.50	10.0/9.3	67.33/65.60	3.92/3.92
Widowhood	-/-	-/-	-/-	.4/.3	75.00/-	1.50/1.5
Aging	.3/.1	70.67/65.00	4.00/3.00	4.8/4.9	72.48/72.03	3.54/3.15
Death	-/-	-/-	-/-	.4/3.1	95.00/89.31	3.00/3.06
Other	7.8/6.2	24.61/23.76	3.71/3.88	13.6/9.9	50.34/55.58	4.06/3.75

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