



AARHUS UNIVERSITY



Coversheet

This is the accepted manuscript (post-print version) of the article.

Contentwise, the post-print version is identical to the final authoritative published version in the APA journal but there may be differences in typography and layout.

How to cite this publication

Please cite the final published version:

Zaragoza Scherman, A., Salgado, S., Shao, Z., & Berntsen, D. (2015). Life span distribution and content of positive and negative autobiographical memories across cultures. *Psychology of Consciousness: Theory, Research, and Practice*, 2(4), 475-489

Publication metadata

Title:	Life span distribution and content of positive and negative autobiographical memories across cultures
Author(s):	Zaragoza Scherman, A., Salgado, S., Shao, Z., & Berntsen, D.
Journal:	<i>Psychology of Consciousness: Theory, Research, and Practice</i>
DOI/Link:	http://psycnet.apa.org/doi/10.1037/cns0000070
Document version:	Accepted manuscript (post-print)

General Rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognize and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Notice: This is the author's version of a work that was accepted for publication in *Psychology of Consciousness: Theory, Research, and Practice*. A definitive version was subsequently published in *Psychology of Consciousness: Theory, Research, and Practice*, 2(4), 475-489. DOI: 10.1037/cns0000070

Lifespan Distribution and Content of Positive and Negative Autobiographical Memories Across Cultures

Alejandra Zaragoza Scherman*¹, Sinué Salgado*, Zhifang Shao**, and Dorthe Berntsen*

*Center On Autobiographical Memory Research (CON AMORE), Aarhus University

** School of Psychology and Cognitive Science, East China Normal University

Author's Note

The authors thank the Danish National Research Foundation (DNRF93) for funding and Annette Bohn and Jonathan Koppel for their comments on an earlier version of the manuscript.

Corresponding Author:

Alejandra Zaragoza Scherman
Center On Autobiographical Memory Research (CON AMORE)
Department of Psychology and Behavioural Sciences
School of Business and Social Sciences, Aarhus University
Bartholins Allé 9
Aarhus C, 8000
Denmark
E-mail: alejandra@psy.au.dk

¹ This name uses Spanish naming customs; paternal last name is *Zaragoza* and maternal last name is *Scherman*. Please, use *Zaragoza Scherman* as the last name for citations.

Abstract

Emotional valence of memories for autobiographical events is related to their distribution across the lifespan. Memories retrieved in response to requests for positive events cluster in young adulthood, when examined in middle-aged and older individuals in Western cultures. However, cultural differences have not been examined. Here a total of 565 participants from Mexico, China, Greenland, and Denmark were asked to recall autobiographical memories of the most positive and the most stressful or traumatic events in their lives, and to indicate how old they were when the events happened. Consistent with prior studies, memories of the positive life events primarily came from adolescence and early adulthood, forming a reminiscence bump in all four samples, whereas the memories of the negative events came from the entire lifespan, with an increase later in life. Content analyses revealed that, across cultures, the majority of the positive memories were about events included in the cultural life script (i.e., culturally shared expectations about the content and timing of important life events), whereas the majority of the negative memories were not. Overall, positive memories were about events that the participant had experienced personally, whereas the negative memories, more often than the positive memories, were about events experienced by others. However, participants from China formed an exception by reporting a significantly higher number of memories of positive events experienced by others (typically by their children) and by having fewer positive memories dated in young adulthood as compared to the other three groups.

Lifespan Distribution and Content of Positive and Negative Autobiographical Memories Across Cultures

In Western samples the lifespan distribution of autobiographical memories shows a distinct pattern with an increase of memories from adolescence and early adulthood compared to the surrounding periods, when participants are cued by random words (Crovitz & Schiffman, 1974). This *reminiscence bump* was first identified by Rubin, Wetzler, and Nebes (1986) and has been replicated numerous times (see Rubin, Rahhal, & Poon, 1998, for a review). The reminiscence bump is more pronounced in response to requests for important and/or emotionally positive events (e.g., Berntsen & Rubin, 2002; Fitzgerald, 1988; Rubin & Schulkind, 1997) but tends to be absent in response to a request for memories of negative events (e.g., Berntsen & Rubin, 2002; Rubin & Berntsen, 2003). However, this differential distribution of positive and negative events is not found when word cues are used (see Koppel & Berntsen, 2015, for a review).

The reminiscence bump has been investigated in a number of individual cultural samples (e.g., Conway & Haque, 1999) and two Western cultural samples (e.g., Janssen, Chessa, & Murre, 2005). However, to date only one study has involved a cross-cultural analysis of Western and Non-Western samples (Conway, Wang, Hanyu, & Haque, 2005). This study had relatively small sample sizes and great age variability across the samples, rendering the cross-cultural comparisons difficult. Furthermore, Conway et al., (2005) sampled memories in response to cue words and not in response to requests for important or emotional events, and they did not analyze their participants' memories according to emotional valence. Here we report findings from an extensive cross-cultural study with samples of adults over 40 years of age from Mexico, Greenland, China, and Denmark. In addition to examining the lifespan distribution of the memories of highly emotional positive and negative life events, we examined whether the content of the reported memories varied across cultures. The present study adds important new data to the existing literature in four ways: First, it examines the life distribution of autobiographical memories across samples from four countries that represent an array of Western and Eastern cultures. Such extensive cross-cultural examination of the distribution of autobiographical memories is unprecedented in the literature. Second, it surveys a large sample of adults over 40 years of age in these different countries. Third, it elicits the memories in response to requests for the most positive

and the most stressful and traumatic life events, instead of memories retrieved in response to cue words in previous work. Fourth, it provides an analysis of both the lifespan distributions and the content of the memories.

The Lifespan Distribution of Autobiographical Memory and the Cultural Life script

When individuals in Western countries are asked to retrieve autobiographical memories of highly positive and highly negative events and to date them according to when in life they took place, their distributions across the lifespan has been shown to differ markedly. A preference to recall highly positive life events from adolescence and early adulthood, when cued by requests for positive events, is a robust finding in the autobiographical memory literature, whereas memories for negative events typically do not show a ‘bump’ in young adulthood (e.g., Berntsen & Rubin, 2002; Berntsen, Rubin, & Siegler, 2011; Bohn, 2010; Collins, Pillemer, Ivcevic, & Gooze, 2007; Leist, Ferring, & Filipp, 2010; Rubin & Berntsen, 2003). This pattern is not simply a function of when in life events actually occur, because a similar pattern is not seen when the memories are elicited by word cues and afterwards examined for their emotional content (e.g., Rubin & Schulkind, 1997).

There are several possible explanations for the differential effects of positive and negative emotion cues on the lifespan distribution of the memories (see Berntsen & Rubin, 2002; 2004 for a review; Glück & Bluck, 2007). One explanation of the differential effects of emotion is the cultural life script theory (Berntsen & Rubin, 2004). This theory claims that the reminiscence bump for emotional and important events results from culturally shared representations of the timing and sequencing of major transitional life events within a culture. These expectations are represented in the cultural life script, which reflects an idealized life course. The cultural life script is biased towards important and emotionally positive life events and life events expected to take place in adolescence and early adulthood (Berntsen & Rubin, 2004). According to this view, when individuals are requested to report personal memories of important and highly positive life events, the life script serves as a guide. Because most studies about cultural life scripts collected to date (see Zaragoza Scherman, 2013, for a review) reported that adolescence and early adulthood are highly populated by positive life events, the theory holds that the temporal distribution of personal memories of highly positive events shows an increase in young adulthood, which corresponds to the one found in the life script. This hypothesis is consistent with Berntsen et al. (2011) who found that 68% of the self-nominated most positive events, reported by their participants as having

occurred in their personal lives, were events that corresponded to event categories included in the cultural life script of their culture.

The life script explanation is consistent with findings from several studies investigating the reminiscence bump. For instance, in cultural life scripts collected in the United States, Denmark, Turkey, the Netherlands, Qatar, and Japan, between 33% and 55% of all life events were expected to occur within the reminiscence bump period, that is, during adolescence and early adulthood (15 - 30 years of age). Furthermore, in these studies, between 56% and 92% of all life events in the life scripts were positive events (e.g., Berntsen & Rubin, 2004; Coleman, 2014; Janssen, Uemiya, & Naka, 2014; Ottsen & Berntsen, 2014; Tekcan, Kaya-Kızılöz, & Odaman, 2012; also see Zaragoza Scherman, 2013, for a review).

Autobiographical Memory and Cultural Differences

Previous research on the distribution of emotional memories across the lifespan has focused largely on Western populations (e.g., Berntsen & Rubin, 2002; Berntsen et al., 2011; Rubin & Berntsen, 2003). However, it is not clear that these findings generalize to other cultures considering that there is some evidence that cultural factors have an effect on the self and autobiographical memory (Heine, 2001; Libby & Eibach, 2007). Furthermore, emotionally negative life experiences seem to be especially related to distinct phenomenologies of the self (Cohen, Hoshino-Browne, & Leung, 2007; Grossmann & Kross, 2010), which can be seen to render the question regarding cultural differences especially relevant in relation to memories with an emotional content.

According to Markus and Kitayama (1991), distinct phenomenologies of the self result from distinct modes of self-construal, which differ across cultures. *Self-construal* refers to the degree of separateness and individuation at which individuals experience themselves in relation to other individuals. It is believed that Western cultures favor *independent self-construal*, while East Asian cultures favor *interdependent self-construal* (Markus & Kitayama, 1991). An individual with an independent self-construal would experience him- or herself as a unique and separate entity. An individual with an interdependent self-construal would experience being more closely related to other individuals (e.g., family members).

Indeed, culture and self-construal seem to play a role for cognition and autobiographical memory in several ways. For example, Wang, Leichtman, and Davies (2000) found that American mothers, typically shown to have an independent self-construal, engage in more elaborate conversations with their infants when discussing past events, compared with

Chinese mothers, typically shown to have an interdependent self-construal. The content of these conversations also differed across cultures. The conversations of American mothers were more centered on the activities that their children enjoyed and what their opinions were, whereas the conversations of Chinese mothers were about the children's compliance with behavioral norms. Different modes of self-construal not only affect the content of autobiographical memories and the style of communicating them, but might also play a role in the offset of childhood amnesia (e.g., age of earliest memories). According to Wang (2001), American individuals reported having earlier first memories than their Chinese counterparts.

In summary, one's cultural background seems to be associated with what and how individuals communicate about their autobiographical memories to others and from how early in life their first memories come. One pertinent question left unresolved by previous studies is whether culture also plays a role in the lifespan distribution of highly emotional autobiographical memories. Furthermore, it remains to be studied whether cultural differences may be related to the content of memories of highly emotional positive and negative life events. Regarding the content of the memories, one important question is whether the extent to which such memories align with culturally normative events (i.e., their degree of correspondence with the cultural life script) differs across cultures. It also remains to be studied whether participants' cultural background and modes of self-construal affect whom their memories are about: Would Western participants with an independent self-construal report more memories about themselves compared to participants with an interdependent self-construal, and vice versa? Conway et al. (2005) found that this was the case for memories of general life events. Chinese participants reported significantly more memories about others than themselves, compared to American participants. It remains to be investigated whether this pattern also applies to memories of highly emotional life events, and equally so to positive and negative events.

The Present Study

In the present study we investigated the lifespan distribution and content of autobiographical memories of highly emotional positive and negative life events in Western and East Asian samples of adults age 40+ from Mexico, Greenland, China, and Denmark. For the purposes of this study, Mexico, Greenland, and Denmark represent Western while China represents an Eastern society. Mexico and Greenland are not typically characterized as Western countries; however, their current cultures have resulted from Western colonization processes originating from Spain and Denmark, respectively. As a result, it could be argued that Mexico and Greenland share Western values with Denmark. Mexico, Greenland, and China are often regarded as collectivistic countries, while Denmark is regarded as an individualistic country (Hofstede, Hofstede, & Minkov, 2010; Markus & Kitayama, 1991; Nielsen, 2001). These countries also differ markedly in relation to other variables, such as religion, geography, climate, historical conditions, ethnicity, happiness levels, and political systems (e.g., Helliwell & Wang, 2013).

We asked participants to think back upon the most positive and most stressful or traumatic events in their lives and to indicate how old they were when these events took place (see Berntsen et al., 2011, for a similar procedure). In addition, they completed measures of event centrality, post-traumatic stress disorder (PTSD), depression, and life satisfaction across cultures (see Zaragoza Scherman, Salgado, Shao, & Berntsen, 2014b, for details). The present study was part of a larger survey that also examined the cultural life script and personal life story events (Zaragoza Scherman, Salgado, Shao, & Berntsen, 2014a).

Hypotheses and Predictions

We generated the following predictions on the basis of earlier studies on the lifespan distribution and content of memories of highly emotional life events in Western cultures (e.g., Berntsen & Rubin, 2002; Berntsen et al., 2011; Rubin & Berntsen, 2003); on autobiographical remembering in the participants from Western and East Asian cultures (Conway et al., 2005); and on different manifestations of collectivism in Mexican and Chinese cultures (Ruby, Falk, Heine, Villa, & Silberstein, 2012). First, memories of the most positive life events would be distributed mainly during young adulthood, while negative events would be more evenly distributed across the entire lifespan, with an increase later in life. Second, a large percentage of the memories of the most positive life events will be events contained in the cultural life script (*scripted events* in the following), while only a small percentage of the negative life

events will be scripted events; and, third, the content of the autobiographical memories of participants drawn from Western cultures will be events mainly about themselves (personal events), whereas the memories of participants drawn from an East Asian culture, based on Confucian values, will be about themselves (personal events), as well as about other people (non-personal events).

Method

Participants

We collected data from 598 participants. The questionnaires of 33 participants were excluded from the sample as they failed to complete at least 95% of the total survey. A final sample of 565 adults (365 females, 200 males), mean age = 52.31, SD = 8.44, age range: 40-91, was analyzed. See Table 1 for detailed demographic information per country. Participants received either no compensation, or a monetary compensation of between 100 and 200 DKK (equivalent to approximately 18 to 32 USD), either in cash, in vouchers to local supermarkets or public transportation cards. Volunteer university students recruited participants at local public psychological services, community services, human resource offices, or their social network. Recruitment was done through advertisements, radio public announcements, posters, and direct invitation in person, through e-mail, or Facebook.

Procedure

Data collection procedure. In all countries, participants received a booklet in which they were asked to report memories of their most stressful or traumatic and most positive life events. Participants provided these memory reports in response to the instructions of the Centrality of Event Scale (CES; Berntsen & Rubin, 2006), a scale that has been used to investigate the centrality of autobiographical memories to identity and personal life stories. First, participants were asked to think back to their most stressful or traumatic event and complete the following statement: *“The most stressful or traumatic event of my life was...”* and indicate how old they were when they experienced the event. The same instructions were used in relation to identifying and dating the most positive event. They also answered the CES in relation to these events, in addition to a number of other measures that are reported elsewhere (see Zaragoza Scherman et al., 2014b). The CES was found to be highly reliable in all samples for both the negative (7 items; $\alpha = .86 - .91$) and the positive event (7 items; $\alpha = .82 - .87$). Materials were presented in the participants’ native language and were self-

administered either at the participants' homes or workplaces, at a psychological services provider's office, or at the community center, individually or in small groups of no more than five people. We used methods of back-translation (Brislin, 1970) to ensure the quality of the translation process of the materials. This procedure was reviewed by the local ethics committee, which approved its consistency with APA guidelines.

In Mexico, Greenland, and China, a research assistant was present during data collection to give instructions, answer questions, collect questionnaires, and provide payment for participation, when applicable. In Denmark, the survey was mailed to the participants, along with information about the research project and detailed instructions on how to answer the questions, plus contact information of the main investigator in case further instructions or clarifications were needed. After the questions were completed, participants sent the questionnaire back to the main investigator in a pre-paid envelope, along with their mailing information (in a separate envelope), so they could receive payment for their participation. The response rate for this survey was 77%.

Coding procedure for scripted versus unscripted events

Two independent coders, research assistants from the same country and whose native language was the same as that of the participants, coded the memories of both positive and negative life events as "scripted" or "unscripted", according to whether or not the event was part of the cultural life script in each country. This coding was done in accordance with an index of cultural life script events that was generated for each sample on the basis of aggregate data from the specific sample in question. When generating the index of life script events for each of the four samples, we followed the procedure developed by Berntsen and Rubin (2004). Details on these procedures and the contents of the four cultural life scripts are available elsewhere (Zaragoza Scherman, 2014; Zaragoza Scherman et al., 2014a)².

Examples of positive scripted life events were "getting married" and "having children." Examples of negative scripted life events were "the death of a beloved one" and "serious illness". Events that did not correspond with the life script were coded as "unscripted". Examples of positive unscripted life events are "opening a business" and "getting a promotion at work". Examples of negative unscripted life events are "sexual abuse" and "miscarriage". It should be noted that life events might be classified as scripted in one sample but unscripted in other samples, due to the fact that events collected in one country were coded with their

² Life scripts can be requested from the first author.

corresponding index of cultural life script events and that the events classified as belonging to the life script naturally show some variation across cultures.

The general inter-rater agreement (“scripted” vs. “unscripted”) for the most positive events was 90% ($\kappa = .87, p < .001$); per country it was 86% for Mexico ($\kappa = .81, p < .001$), 96% ($\kappa = .94, p < .001$) for Greenland, 81% ($\kappa = .77, p < .001$) for China, and 96% ($\kappa = .94, p < .001$) for Denmark. The general inter-rater agreement for the most negative events was 91% ($\kappa = .84, p < .001$); per country it was 99% ($\kappa = .97, p < .001$) for Mexico, 85% ($\kappa = .65, p < .001$) for Greenland, 94% ($\kappa = .90, p < .001$) for China, and 85% ($\kappa = .81, p < .001$) for Denmark. Disagreements were handled through discussion.

Coding procedure for personal versus non-personal events

Memories of both positive and negative life events were also coded as “personal” events or “non-personal” events, by our two independent coders. Memories for personal events referred to memories about the participants themselves, that is, memories in which the participant personally experienced the recalled event and was the main character of the event (e.g., “when I got married” or “my trip to Russia”). Memories for non-personal events referred to memories about events that someone else experienced and for which this other person was the main character (e.g., “my daughter’s university graduation” or “when my husband lost his job”). The general inter-rater agreement (“personal” vs. “non-personal”) for the most positive life events was 99% ($\kappa = .91, p < .001$); per country it was 99% ($\kappa = .66, p < .001$) for Mexico, 100% ($\kappa = 1, p < .001$) for Greenland, 97% ($\kappa = .90, p < .001$) for China, and 100% ($\kappa = 1, p < .001$) for Denmark. The general inter-rater agreement (“personal” vs. “non personal”) for the most negative life events was 93% ($\kappa = .86, p < .001$); per country it was 95% ($\kappa = .89, p < .001$) for Mexico, 88% ($\kappa = .75, p < .001$) for Greenland, 94% ($\kappa = .85, p < .001$) for China, and 96% ($\kappa = .92, p < .001$) for Denmark. Disagreements were handled through discussion.

Coding procedure for emotionality and personal significance

To assess that participants provided highly emotional and highly personally important memories, our two independent coders coded the memories for emotionality and importance. Memories were coded for emotionality along a -3 to + 3 rating scale, where -3 and -2 were

collapsed to indicate high intensity, negative emotion; + 3 and +2 were collapsed to indicate high intensity, positive emotion; and -1, 0 +1 were collapsed to indicate low intensity with positive or negative or mixed emotion. Memories were coded for importance with the following categories: “not important at all”, “somewhat important”, and “highly important”. For both variables, we also developed an “uncodable” category for those memories that were difficult to code because the description was not detailed enough. Inter-rater agreement for emotionality was = 92.8%, ($\kappa = .80, p < .0005$). Inter-rater agreement for importance was = 82.9%, ($\kappa = .21, p < .0005$).

Results

The independent coding of emotionality and significance indicated that the participants indeed provided highly emotional and highly important memories. Overall, 96.7% of the events were coded highly emotionally intense. Similarly, 96.9% of all events were coded as highly important.

Lifespan Distribution of the Memories of the Most Positive and Most Negative Events

Statistical tests showed no gender differences in the lifespan distribution of autobiographical memories; therefore, we collapsed the data for men and women into one group. Figure 1 shows the lifespan distribution of autobiographical memories of the most positive and most negative life events that were dated to have occurred when the participants were between 0 and 50 years of age. Mean age of occurrence per event category appears in Tables 2 and 3. Memories of events dated later were omitted from the figure as a decrease of memories in later decades could have resulted from the fact that fewer participants had lived through their 50’s, 60’s, 70’s and 80’s (see Table 1 for age ranges per country).

To create Figure 1 we followed the same procedure as the one reported in Rubin and Berntsen (2003) to account for the fact that participants were not the same age and that some of them had not yet reached 50 years of age, using the following formula: $r_{mem} * 10 / (M_{age} + 0.5 - 40) + r2_{mem}$, where (r_{mem}) is the number of memories recalled in the decade by participants who were between 40 and 50 years of age, (M_{age}) refers to the mean age of these participants, and ($r2_{mem}$) refers to the number of memories recalled in the decade by participants who were 50+ years old. That is, for all countries, we adjusted the percentage of memories of both positive and negative events for the decade of the 40’s. In our general and by country samples, this

correction was done separately for positive and negative life events.³ In Figure 1, the top graph represents the entire sample (general), while the graphs below represent the lifespan distribution of each country, as shown. Visual inspection of the general graph strongly suggests that the life span distribution of the positive and negative memories differed. This was confirmed by a chi square test comparing the frequencies of positive and negative memories in the first five decades (the same strategy was used below for assessing the distributions of the two types of memories in the individual samples). This test showed a significant difference $\chi^2(4) = 127.73, p < .001$, consistent with our first prediction that memories of the most positive life events were reported to have occurred mainly during adolescence and early adulthood, showing a reminiscence bump, whereas memories of the most negative life events were of events reported to have occurred throughout the lifespan, with an increase in later in life. In this study, we replicated the results on the lifespan distribution of memories of highly emotional life events reported in Berntsen et al. (2011) when examining all samples together. However, when examining the four individual samples, some cultural differences were found.

The lifespan distributions of memories of positive and negative events in the Mexican $\chi^2(4) = 45.78, p < .001$, Greenlandic $\chi^2(4) = 32.51, p < .001$, and Danish $\chi^2(4) = 72.34, p < .001$, samples mirrored the general distribution, showing that in three out of four countries, positive memories were distributed differently from negative memories.

The Chinese sample formed an exception. Even though the lifespan distribution of the Chinese memories also resembled the general lifespan distribution, the distributions of memories of positive and negative life events recalled by Chinese participants was not significantly different throughout the lifespan $\chi^2(4) = 7.80, p = .099$. Furthermore, Chinese memories dated in the decade of the 40's contained more positive events ($n = 47$) compared with the other samples: Mexico ($n = 17$), Greenland ($n = 19$), and Denmark ($n = 16$), $\chi^2(3) = 26.86, p < .001$. In addition, the number of positive life events in the decade of the 20's,

³ For example, participants in their forties who had also dated a positive life event during this decade were on average 45.21 years old. We added 0.50 to take into account that, on average, participants would have already lived half a year after their last birthday ($45.21 + 0.50 = 45.71$). Then, we subtracted 40 from 45.71 years to obtain the average years that those participants had lived into their 40's. Then, we took the 29 positive memories participants reported in this decade and multiplied it by 10. The result (290) was then divided by 5.71. This division ($290 / 5.71 = 50.82$) produced an estimated number of memories that we would have obtained had all participants in the 40 - 50 decade been 50 years old. As a result, during the 40's decade of the general sample graph, we included 50.82 (instead of 29), positive memories plus 26 positive memories reported by people older than 50 years of age who dated their most positive event to have occurred during their 40's; that is, we plotted a total of 76.82 positive memories for that decade in the general sample.

compared with the decade of the 40's was not significantly different from the sample from China $\chi^2(1) = 0.01, p = .918$, but it was significantly different in the other samples: Mexico $\chi^2(1) = 34.84, p < .001$; Greenland $\chi^2(1) = 16.06, p < .001$; and Denmark $\chi^2(1) = 39.13, p < .001$. Finally, we also observed that the total number of memories dated in the first decade of life were significantly lower in China ($n = 4$), compared to Greenland ($n = 21$), Mexico ($n = 23$) and Greenland ($n = 23$), $\chi^2(3) = 14.35, p = .002$, possibly as a result of later offset of childhood amnesia in Chinese samples as previously shown by Wang (2001).

In general, across samples, the lifespan distributions showed more memories of positive life events in adolescence and early adulthood, while the number of memories of negative life events increased with increasing age. However, cultural differences in the distribution of autobiographical memories of positive and negative life events produced varied, yet comparable, patterns throughout the lifespan.

Content Analysis

This section describes the content analyses of all memories (including the ones that were dated to have occurred after 50 years of age) to determine whether participants' autobiographical memories were about scripted or unscripted events and about personal or non-personal events.

Memories of scripted and unscripted life events

Tables 2 and 3 show the percentages of the most positive and most negative memories, respectively, that were coded into scripted events categories and unscripted events (across countries), as well as the mean age for the time of their occurrence. *Scripted events* refer to the memories corresponding to the cultural life script from each country. For example, if a participant thought about his or her marriage as the most positive life event in their lives, this event was coded as "scripted" since "getting married" is a life script event. In Tables 2 and 3, the percentages refer to the number of events mentioned within each sample; for example, 42% of the most positive life events in Mexico were "having children". Across countries, the five most common scripted positive life events were "having children", "marriage", "college", "romantic relationships", and "major achievements". The five most common scripted negative life events were "other's death", "parents' deaths", "divorce", "partner's death" and "serious disease".

As predicted, the majority of the most positive life events (80%) were scripted events

(i.e., events in the cultural life script). Most importantly, a significantly higher number of scripted positive life events (55%) were located during the decade of the 20's, compared to the other decades (0-9 years = 2%, 10-19 years = 5%, 30-39 years = 28%, 40-49 years = 10%) $\chi^2(4) = 389.97, p < .001$. Only a smaller portion of the most negative life events (39%) was coded as scripted, replicating the results obtained by Berntsen et al. (2011). However, some cultural differences in the frequencies of the scripted versus unscripted memories were found. The distribution of memories of the positive scripted life events (Table 2) across the four samples was as follows: Mexico (92.37%), Denmark (91.60%), Greenland (74.45%), and China (62.99%), $\chi^2(3) = 54.11, p < .001$. The distribution of memories of the negative scripted life events (Table 3) across the four samples was as follows: Denmark (50.38%), China (37.66%), Mexico (35.38%), and Greenland (32.12%), $\chi^2(3) = 10.70, p < .05$. Thus, although the positive events tended to be scripted and negative events unscripted, this pattern was not equally pronounced across the four samples. The percentage of unscripted life events per sample appears as the last category in Tables 2 and 3 for comparison purposes.

Memories of personal and non-personal life events

Figure 2 shows the percentage of autobiographical memories about personal (i.e., about the person him or herself) and non-personal (i.e., about someone else) events across cultures as a function of event emotional valence. As predicted, more memories of positive life events were coded as personal events than as non-personal events, whereas memories of negative life events were coded as personal and non-personal events in almost the same amount $\chi^2(1) = 202.08, p < .001$. In other words, the large majority of positive memories (94%) referred to life events about the participants themselves, while negative memories were about others (42%) almost as frequently as about themselves (58%). There were no cross-cultural differences with respect to the distribution of memories about personal vs. non-personal events for the negative events $\chi^2(3) = 7.21, p = .066$. However, for the positive life events, there were significant cross-cultural differences $\chi^2(3) = 57.46, p < .001$, as Chinese participants reported 18% of the most positive life events about other people, while Mexican, Greenlandic and Danish participants reported only 1% of the most positive life events about others. For example, during the decade of the 40's, 32% of the most positive events reported by Chinese participants were actually life events from their children's lives (e.g., "when my daughter went to university").

Discussion

The literature on cultural differences in the distribution of autobiographical memories across the life span is sparse. In order to begin to fill this gap, we here examined the lifespan distribution and content of autobiographical memories of highly emotional positive and stressful and traumatic life events across samples of older and middle-aged individuals from Mexico, China, Greenland, and Denmark.

Consistent with our predictions, overall the participants showed a preference to recall memories of the most positive life events that occurred when they were between 15 and 30 years old, creating a reminiscence bump, while they did not exhibit this preference for memories of the most stressful and traumatic life events. Also consistent with our predictions, when asked to remember their most positive life event, participants generally reported highly normative life events contained in the cultural life script, whereas when asked to remember their most stressful or traumatic life event, participants tended to report mainly unscripted events (i.e., events not included in the life script of their culture). Thus, for the four samples combined, we replicated prior findings on the lifespan distribution and content of memories of the most positive and most negative life events (Berntsen et al., 2011). In addition, the positive life events were generally events that were directly experienced by the participants, whereas negative events considerably more frequently were about events that were experienced by someone other than the participants (e.g., “my brother’s accident”). However, when analyzing the four samples in comparison with one another, important cultural differences were observed to which we now turn.

The lifespan distribution of positive and negative events differed significantly in all samples, except the Chinese sample. As expected, participants in the Chinese sample recalled a significantly higher number of memories of positive life events that were dated when they were in their 20’s, compared with the number of memories of negative life events. However, the amount of positive life events dated in the 20’s was not significantly different from that in the 40’s. Thus, Chinese participants did not show a standard ‘bump’ for positive events as they showed an equally clear preference to recall positive life events from their 40’s. An important key to explaining this deviation from the overall pattern comes from analyses of the content: One-third of the memories in the decade of the 40’s reported by the Chinese participants were of events that their children, not the participants, had experienced personally when the children were in their 20’s. This suggests that Chinese participants’ decade of the

40's became as memorable as their 20's, because their children then were experiencing scripted life events typically expected to occur in young adulthood, for example "entering to university" and "getting married".

The fact that Chinese participants reported a large number of memories of positive life events about their children explains why the number of positive life events was higher in the Chinese sample for the decade of the 40's compared to that of other countries. When the memories about non-personal positive life events are excluded from the analysis, the difference in the amount of positive life events in the decade of the 40's ($n = 23$), compared to the decade of the 20's ($n = 45$), becomes significant $\chi^2(1) = 7.12, p = .008$. Furthermore, the lifespan distribution of the positive and negative life events also becomes significantly different when non-personal events are excluded $\chi^2(3) = 11.58, p = .009$, making it similar to the lifespan distribution of the other samples (although for this analysis, the first decade of life (0-9 years) could not be included, as we did not have enough memories dated in this decade).

These cross-cultural differences in the lifespan distribution and content of highly emotional events may be accounted for by different modes of self-construal, in combination with Western and Confucian philosophies. We predicted that cultural background would affect the content of the autobiographical memories. Specifically, we anticipated that participants from an East Asian culture, based on Confucian values, would recall more events about other people ("non-personal" events) compared to participants from Western cultures. Indeed this was what we found in Chinese participants for memories of their positive life events. Compared with the other three samples, the Chinese sample was more likely to nominate memories of positive life events encountered by their children as their own most positive events.

In addition, the uniqueness of the lifespan distribution of the memories reported by the Chinese participants might result from the historical period that some of the participants experienced. A portion of the participants lived through the Cultural Revolution (1966-1976). During this period, an entire generation of urban youth was prevented from entering university and was sent to the countryside to experience communitarian life and agricultural manual labor. The Cultural Revolution might have had the potential to alter the lifespan distribution of memories of highly emotional memories.

All four samples reported more memories of positive events that were personally experienced by the participants themselves, whereas such dominance was not seen for the

negative memories. This is reminiscent of the optimism bias – i.e., the finding that people are more inclined to expect negative future events to happen to others relative to themselves, whereas positive future events are expected to be more likely to happen to themselves relative to others (e.g., Gouveia & Clarke, 2001; Weinstein & Klein, 1996). Here we found a similar effect for memories of past events. Importantly, this effect, which may serve positive self-enhancement, was less pronounced for the Chinese sample.

Conclusion

Prior research has shown that emotional valence of highly emotional memories plays an important role in their temporal distribution during the lifespan, when people are asked to retrieve memories of emotional events. Here we showed that this pattern replicated across different cultures, but with some important cross-cultural variations. We found that memories of the most positive life events frequently originated from events experienced during the adolescence and early adulthood years, whereas memories of the most negative life events came from events experienced during the entire lifespan and increased in frequency later in the lifespan. Cross-cultural differences were found in regards to the relative effects of emotional valence on the distribution of events across the lifespan and in regards to the amount of personal vs. non-personal events for memories of the most positive life events. Chinese participants showed less of a peak of positive events in young adulthood and reported more non-personal positive events about their children's lives, in comparison to Mexican, Greenlandic, and Danish participants.

References

- Berntsen, D., & Bohn, A. (2010). Remembering and forecasting: The relation between autobiographical memory and episodic future thinking. *Memory & Cognition*, 38, 265-278.
- Berntsen, D., & Rubin, D. C. (2002). Emotionally charged autobiographical memories across the life span: The recall of happy, sad, traumatic, and involuntary memories. *Psychology & Aging*, 17, 636-652.
- Berntsen, D., & Rubin, D. C. (2004). Cultural life scripts structure recall from autobiographical memory. *Memory & Cognition*, 32, 427-442.
- Berntsen, D., & Rubin, D. C. (2006). The centrality of event scale: A measure of integrating a trauma into one's identity and its relation to post-traumatic stress disorder symptoms. *Behaviour Research and Therapy*, 44, 219-231.
- Berntsen, D., Rubin, D. C., & Siegler, I. C. (2011). Two versions of life: Emotionally negative and positive life events have different roles in the organization of life story and identity. *Emotion*, 11, 1190-1201.
- Bohn, A. (2010). Generational differences in cultural life scripts and life story memories of younger and older adults. *Applied Cognitive Psychology*, 24, 1324-1345. doi: 10.1002/acp.1641
- Bohn, A., & Berntsen, D. (2011). The reminiscence bump reconsidered: children's prospective life stories show a bump in young adulthood. *Psychological Science*, 22, 197-202. doi: 10.1177/0956797610395394
- Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology*, 1, 185-216. doi: 10.1177/135910457000100301
- Cohen, D., Hoshino-Browne, E., & Leung, A. K. y. (2007). Culture and the structure of personal experience: Insider and outsider phenomenologies of the self and social world. In P. Z. Mark (Ed.), *Advances in Experimental Social Psychology* (pp: 1-67) San Diego, CA: Academic Press.
- Coleman, J. T. (2014). Examining the life script of African-Americans: A test of the cultural life script. *Applied Cognitive Psychology*, 28, 419-426. doi: 10.1002/acp.3000
- Collins, K. A., Pillemer, D. B., Ivcevic, Z., & Gooze, R. A. (2007). Cultural scripts guide recall of intensely positive life events. *Memory & Cognition*, 35, 651-659.
- Conway, M. A., & Haque, S. (1999). Overshadowing the reminiscence bump: Memories of a struggle for independence. *Journal of Adult Development*, 6, 35-44.

- Conway, M.A., Wang, Q., Hanyu, K. & Haque, S. (2005). A Cross-cultural investigation of autobiographical memory: On the universality and cultural variation of the reminiscence bump. *Journal of Cross-Cultural Psychology*, 36, 739-749.
- Crovitz, H. F., & Schiffman, H. (1974). Frequency of episodic memories as a function of their age. *Bulletin of the Psychonomic Society*, 4, 517-518.
- Erdoğan, A., Baran, B., Avlar, B., Taş, A. Ç., & Tekcan, A. I. (2008). On the persistence of positive events in life scripts. *Applied Cognitive Psychology*, 22, 95-111.
- Fitzgerald, J. M. (1988). Vivid memories and the reminiscence phenomenon: The role of a self narrative. *Human Development*, 31, 261-273.
- Glück, J., & Bluck, S. (2007). Looking back across the life span: A life story account of the reminiscence bump. *Memory & Cognition*, 35, 1928-1939.
- Gouveia, S. O. & Clarke, V. (2001). Optimistic bias for negative and positive events. *Health Education*, 101, 228-234.
- Grossmann, I., & Kross, E. (2010). The impact of culture on adaptive versus maladaptive self-reflection. *Psychological Science*, 21, 1150-1157. doi: 10.1177/0956797610376655
- Heine, S. J. (2001). Self as cultural product: An examination of East Asian and North American selves. *Journal of Personality*, 69, 881-906. doi: 10.1111/1467-6494.696168
- Helliwell, J. & Wang, S. (2013). World happiness: Trends, explanations and distribution. In J. Helliwell, R. Layard & J. Sachs (Eds.), *World Happiness Report 2013* (pp. 8-37).
- Hofstede, G., Hofstede, G.J. & Minkov, M. (2010). *Cultures and organizations: Software of the mind*, 3rd ed., McGraw-Hill, New York, NY.
- Janssen, S. M., Chessa, A. G., & Murre, J. M. J. (2005). The reminiscence bump in autobiographical memory: Effects of age, gender, education, and culture. *Memory*, 13, 658-668. doi: 10.1080/09658210444000322
- Janssen, S. M., & Rubin, D. C. (2011). Age effects in cultural life scripts. *Applied Cognitive Psychology*, 25, 291-298. doi: 10.1002/acp.1690
- Janssen, S. M., Uemiya, A., & Naka, M. (2014). Age and gender effects in the cultural life script of Japanese adults. *Journal of Cognitive Psychology* 26, 307-321. doi: 10.1080/20445911.2014.892493
- Koppel, J., & Berntsen, D. (2015). The peaks of life: The differential temporal locations of the reminiscence bump across disparate cueing methods. *Journal of Applied Research*

- in *Memory and Cognition*, 4, 66-80. doi: 10.1016/j.jarmac.2014.11.004
- Leist, A. K., Ferring, D., & Filipp, S.-H. (2010). Remembering positive and negative life events. *The Journal of Gerontopsychology and Geriatric Psychiatry*, 23, 137-147. doi: 10.1024/1662-9647/a000017
- Libby, L. K., & Eibach, R. P. (2007). How the self affects and reflects the content and subjective experience of autobiographical memory. In Constantine Sedikides & S. J. Spencer (Eds.), *The self* (pp. 75-91). New York, NY: Psychology Press.
- Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, 98, 224-253. doi: 10.1037/0033-2909.102.2.272
- Nielsen, J. K. (2001). Government, culture and sustainability in Greenland: A Microstate with a hinterland. *Public Organization Review*, 1, 229-243.
- Ottsen, C. L., & Berntsen, D. (2014). The cultural life script of Qatar and across cultures: Effects of gender and religion. *Memory*, 22, 390-407. doi: 10.1080/09658211.2013.795598
- Rubin, D. C., & Berntsen, D. (2003). Life scripts help to maintain autobiographical memories of highly positive, but not highly negative, events. *Memory & Cognition*, 31, 1-14.
- Rubin, D. C., Berntsen, D., & Hutson, M. (2009). The normative and the personal life: Individual differences in life scripts and life story events among USA and Danish undergraduates. *Memory*, 17, 54-68.
- Rubin, D. C., Rahhal, T. A., & Poon, L. W. (1998). Things learned in early adulthood are remembered best. *Memory & Cognition*, 26, 3-19.
- Rubin, D. C., & Schulkind, M. D. (1997). The distribution of autobiographical memories across the lifespan. *Memory & Cognition*, 25, 859-866. doi: 10.3758/bf03211330
- Rubin, D. C., Wetzler, S. E., & Nebes, R. D. (1986). Autobiographical memory across the lifespan. In D. C. Rubin (Ed.), *Autobiographical memory* (pp. 202-221). New York, NY, US: Cambridge University Press.
- Ruby, M. B., Falk, C. F., Heine, S. J., Villa, C., & Silberstein, O. (2012). Not all collectivism are equal: Opposing preferences for ideal affect between East Asians and Mexicans. *Emotion*, 12, 1206-1209. doi: 10.1037/a0029118
- Tekcan, A. I., Kaya-Kızıllöz, B., & Odaman, H. (2012). Life scripts across age groups: A comparison of adolescents, young adults, and older adults. *Memory*, 20, 836-847. doi: 10.1080/09658211.2012.710431

- Thomsen, D. K., & Berntsen, D. (2008). The cultural life script and life story chapters contribute to the reminiscence bump. *Memory*, 16, 420-435. doi: 10.1080/09658210802010497
- Wang, Q. (2001). Culture effects on adults' earliest childhood recollection and self-description: Implications for the relation between memory and the self. *Journal of Personality and Social Psychology*, 81, 220-233. doi: 10.1037/0022-3514.81.2.220
- Wang, Q., Leichtman, M. D., & Davies, K. I. (2000). Sharing memories and telling stories: American and Chinese mothers and their 3-year-olds. *Memory*, 8, 159-177. doi: 10.1080/096582100387588
- Weinstein, N. D. & Klein, W. M. (1996). Unrealistic optimism: Present and future. *Journal of Social and Clinical Psychology*, 15, 1-8.
- Zaragoza Scherman, A. (2013). Cultural life script theory and the reminiscence bump: A reanalysis of seven studies across cultures. *Nordic Psychology*, 65, 103-119. doi: 10.1080/19012276.2013.807667
- Zaragoza Scherman, A. (2014). *A Cross-Cultural Examination of Autobiographical Memories of Highly Emotional Life Events* (Doctoral thesis, Aarhus University, Aarhus, Denmark).
- Zaragoza Scherman, A., Salgado, S., Shao, Z., & Berntsen, D. (2014a). Cultural life scripts and personal life story events in Mexico, Greenland, China, and Denmark. *Manuscript in preparation*.
- Zaragoza Scherman, A., Salgado, S., Shao, Z., & Berntsen, D. (2014b). Event centrality of positive and negative autobiographical memories across cultures. *Memory*. Advance online publication. doi: 10.1080/09658211.2014.962997

Table 1. Demographics of participants in the final sample for each country

	Sample		Age				Years of Education	
	size	Females %	Mean	SD	Min	Max	Mean	SD
All Countries	565	64.60	52.31	8.44	40	91	14.39	3.25
Mexico	132	70.45	51.15	8.87	40	91	14.30	3.45
Greenland	137	62.77	50.56	6.82	40	74	14.54	2.95
China	154	58.44	50.88	7.16	40	79	12.91	3.21
Denmark	142	67.61	56.57	9.26	40	80	15.94	2.58

Table 2. Percentage and mean age of scripted events categories and unscripted events for the most positive life events in each of the four countries

Scripted Positive Events Categories	Mexico		Greenland		China		Denmark	
	<i>Total N = 131</i>		<i>Total N = 137</i>		<i>Total N = 154</i>		<i>Total N = 131</i>	
	%	<i>M Age</i>						
1 Having children	41.98	26.29	37.23	27.00	6.49	30.00	57.25	27.81
2 Marriage	13.74	24.35	10.95	33.14	12.99	28.75	8.40	29.32
3 Begin school	0.76	4.00	-	-	-	-	-	-
4 College	8.40	29.64	5.11	34.29	4.55	24.43	2.29	41.00
5 Retirement	0.76	50.00	-	-	1.95	51.67	0.76	62.00
6 Parents' death	-	-	-	-	0.65	50.00	-	-
7 First job	-	-	-	-	-	-	0.76	25.00
8 Grandchildren	2.29	49.33	5.84	49.00	-	-	-	-
9 Serious disease	-	-	-	-	-	-	0.76	63.00
10 Major achievement	-	-	-	-	13.64	35.76	-	-
11 Confirmation	-	-	0.73	14.00	-	-	-	-
12 Having peers	-	-	0.73	28.50	-	-	-	-
13 The "right" job	-	-	-	-	1.30	28.50	-	-
14 Being part of a family	3.82	21.00	2.19	18.50	-	-	-	-
15 Being part of society	-	-	0.73	0.00	-	-	-	-
16 To raise a child	-	-	-	-	3.90	41.67	-	-
17 Childhood	-	-	0.73	0.00	-	-	0.76	9.00
18 Outdoor experiences	-	-	1.46	25.75	-	-	-	-
19 Leisure time and sports	-	-	0.73	49.00	-	-	-	-
20 Living as an adult	-	-	5.11	32.00	-	-	-	-
21 Being financially independent	1.53	23.00	0.73	22.00	-	-	-	-
22 Having a job	3.82	39.33	2.19	42.67	5.84	26.89	-	-
23 Travelling	0.76	30.00	-	-	0.65	23.00-	2.29	33.00
24 Romantic relationships	-	-	-	-	-	-	18.32	31.67
25 Owning a house or a car	-	-	-	-	5.84	40.33	-	-
26 Education and Studying	-	-	-	-	1.95	20.33	-	-
27 Life after retirement and in old age	-	-	-	-	0.65	50.00	-	-

28	University entrance exam	-	-	-	1.30	17.00	-	-
29	Undertaking social or family responsibility	-	-	-	0.65	34.00	-	-
30	Choosing schools or major	-	-	-	0.65	18.00	-	-
31	Finding a life partner	-	-	-	0.65	24.00	-	-
32	Having a harmonious family				0.65	28.00		
33	Birthday 15th	0.76	15.00					
34	Academic and professional success	6.11	27.50	-	-	-	-	-
35	Buying a house	1.53	38.00	-	-	-	-	-
36	Taking a vacation	0.76	22.00	-	-	-	-	-
37	Goal achievements	2.29	30.00	-	-	-	-	-
38	Religion and spirituality	3.05	28.50	-	-	-	-	-
	Unscripted Positive Events	7.63	17.80	25.55	36.74	35.71	37.78	8.40 39.45

Table 3. Percentage and mean age of scripted events categories and unscripted events for the most negative life events in each of the four countries

Scripted Negative Events Categories	Mexico		Greenland		China		Denmark	
	<i>Total N=130</i>		<i>Total N=137</i>		<i>Total N=154</i>		<i>Total N=131</i>	
	%	<i>M Age</i>						
1 Having children	1.54	28.50	0.73	33.00	2.60	26.25	0.76	34.00
2 Marriage	-	-	-	-	5.19	34.56	-	-
3 Others' death	32.31	34.32	30.66	28.19	5.19	36.63	10.69	33.11
4 Leave home	-	-	-	-	-	-	0.76	16.00
5 Parents' death	-	-	-	-	15.58	38.35	14.50	31.84
6 Divorce	-	-	-	-	-	-	10.69	39.36
7 Serious disease	-	-	-	-	2.60	43.50	6.11	32.56
8 Partner's death	-	-	-	-	-	-	6.11	47.38
9 Being part of a family	1.54	13.00	-	-	-	-	-	-
10 Childhood	-	-	-	-	-	-	0.76	8.00
11 Outdoor experiences	-	-	0.73	22.00	-	-	-	-
12 Having a job	-	-	-	-	1.30	26.00	-	-
13 University entrance exam	-	-	-	-	0.65	18.00	-	-
14 Being sick	-	-	-	-	4.55	36.00	-	-
Unscripted Negative Events	64.62	29.23	67.88	31.96	62.34	36.70	49.62	26.64

Figure 1. Lifespan distribution for the autobiographical memories of the most positive and most negative life events dated to have occurred between 0 and 50 years of age

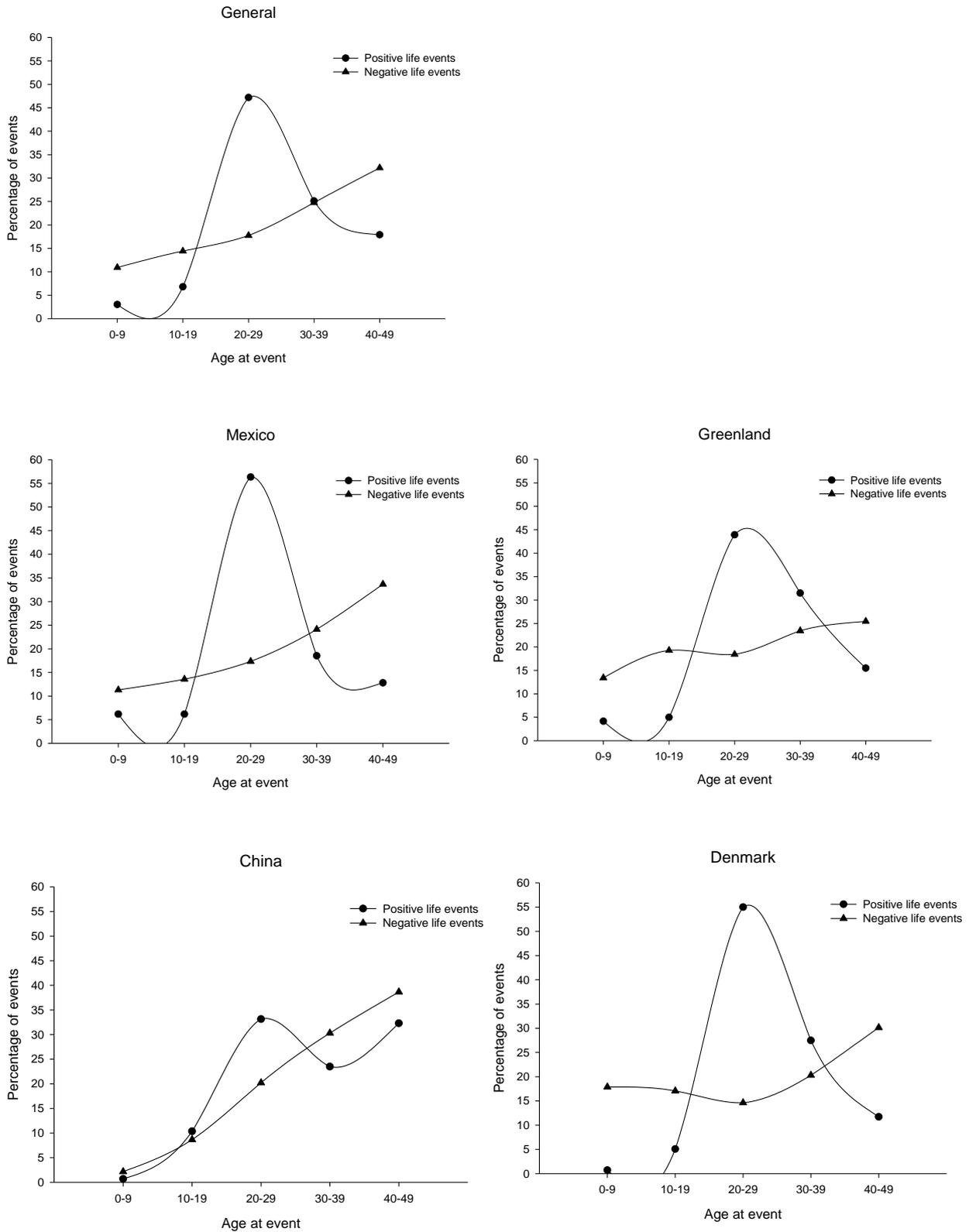


Figure 2. Percentage of autobiographical memories of positive and negative life events for personal and non-personal events in each of the four countries

