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# Life script events and autobiographical memories of important life story events in Mexico, Greenland, China, and Denmark

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<sup>1</sup>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**

The aim of this study was to test the cultural life script theory across four different cultures.

We collected life scripts from 606 middle-aged and older adult participants in Mexico, Greenland, China, and Denmark, and examined whether key characteristics of life scripts generalize across these cultures. We also collected autobiographical memories of important personal events from the same participants, and coded them for their correspondence with the life scripts to establish whether the life script serves as a guide for autobiographical memory recall. Finally, we compared the life span distribution of life script events with that of the autobiographical memories. Consistent with predictions, a life script was found in all samples and the life span distribution of life script events tracked the life span distributions of personal autobiographical memories retrieved within the same cultures. These findings indicate a central interplay between cultural life scripts and autobiographical memory across disparate cultures.

## **Life Script Events and Autobiographical Memories of Important Life Story Events in Mexico, Greenland, China, and Denmark**

An increase of autobiographical memories from adolescence and early adulthood, in response to cue words and when important or positive memories are elicited, is a well established memory phenomenon, known as *the reminiscence bump* (Rubin, Wetzler, & Nebes, 1986). Cultural life script theory (Berntsen & Rubin, 2004) claims that the reminiscence bump for memories of important events can be accounted for by the common cultural expectations that individuals hold regarding the order and timing of important transitional life events within their culture. Such expectations are reflected in the *cultural life script*, which in turn serves as a mnemonic template that helps guide recall of autobiographical memories, especially those of important transitional and emotionally positive life events (Berntsen & Rubin, 2004).

According to Berntsen and Rubin (2004, p. 428), the conception of cultural life scripts reflects an integration of Schank and Abelson's (1977) concept of script and sociological theories of the normative segmentation of the life span (Neugarten, Moore, & Lowe, 1965). The cultural life script has several testable properties, which for the aim of the present study can be divided into two groups: Those that refer to characteristics of the life script (e.g., life scripts are semantic, not personal episodic, knowledge that focuses on the timing and ordering of positive transitional events and events expected in young adulthood) and those that refer to the mnemonic function of life scripts in relation to personal autobiographical memories (e.g., that retrieval of important autobiographical memories is guided by life script and thus biased toward positive events from young adulthood).

Properties of the cultural life script have been tested separately in several individual cultures, but not collectively in a systematic cross-cultural comparison using the same cues and procedures across different cultures in middle-aged and older adults. The aim of the

present work is to fill this gap in the literature, by testing all properties of the life script in four different individualistic and collectivistic cultures. A cross-cultural study allows investigating whether the properties of the cultural life script are found in these cultures even though the specific events in the life script events might differ from one culture to another.

### **Characteristics of the cultural life script**

In the standard life script task (Berntsen & Rubin, 2004) adults are asked to imagine a newborn baby with a prototypical life ahead and to generate important life events in this baby's future life from birth to death. When analyzed across participants, this task is a way of obtaining a representation of the life script of the culture of the participant. Such studies have obtained life scripts in Denmark (Berntsen & Rubin, 2004; Bohn, 2010; Rubin, Berntsen, & Hutson, 2009), the United States (Coleman, 2014; Rubin et al., 2009), Germany (Habermas, 2007; Hatiboğlu & Habermas, 2015), the Netherlands (Janssen & Rubin, 2011), Turkey (Erdoğan, Baran, Avlar, Taş, & Tekcan, 2008; Hatiboğlu & Habermas, 2015; Tekcan, Kaya-Kızılöz, & Odaman, 2012), Japan (Janssen, Uemiya, & Naka, 2014), and Qatar (Ottosen & Berntsen, 2014). Generally, these studies have found that the life events in the life script are predominantly positive, and that disproportionately many of the events are expected to occur during adolescence and early adulthood. However, methodological differences between the studies render more detailed cross-cultural comparison difficult.

### **Mnemonic function of the cultural life script in relation to autobiographical memories**

The objective of the studies that test the mnemonic function of life scripts is not to test the notion of the life script per se, but to directly test the claim that the life script helps guide recall of autobiographical memories, especially of important and positive personal life events, and thus the reminiscence bump for important memories can be accounted for by the cultural life script.

One common way to examine the mnemonic function of the cultural life script is to code the autobiographical memories according to whether or not they correspond to an event category in the life script (e.g., “getting married” or “having children”). In other words, once the life script of a particular culture has been established, it can be used as a “norm” for analyzing the autobiographical memories of the same or of other participants within the same culture. However, it should be noted that many of the studies that established these “norms” were mainly conducted with university students. As a result, they are approximations more than norms. After coding the memories for their correspondence with the life script, the percentage of overlap between the life script events and the autobiographical memories can be calculated. Studies using this strategy generally find that when participants are cued by a request for important (or emotionally positive) autobiographical memories, a high overlap is seen between these event memories and event categories represented in the cultural life script, typically in the range of 40 % to 70% (e.g., Berntsen & Bohn, 2010; Berntsen, Rubin, & Siegler, 2011; Hatiboğlu & Habermas, 2015; Koppel & Berntsen, 2016; Rasmussen & Berntsen, 2013; Rubin et al., 2009; Thomsen & Berntsen, 2008; Zaragoza Scherman, Salgado, Shao, & Berntsen, 2015b), whereas such high overlap is absent when more random sampling of autobiographical memories is used, such as in word cued recall (e.g., Berntsen & Bohn, 2010; Koppel & Berntsen, 2016). Thus, the mnemonic functions of the life script appear highly cue-dependent.

Using a different approach to examine the mnemonic function of life script, Koppel and Berntsen (2014) found that when participants read fictional stories and were tested for later recall or recognition, they were better at remembering those events that corresponded to highly mentioned events in the life script. They concluded that the life script is important to process life stories, including fictional ones, consistent with the life script serving a mnemonic function of autobiographical memory.

Using a future event paradigm, Bohn and Berntsen (2011) found that 79% of future life events reported by school children corresponded to events contained in the life script. This demonstrated that even children know the life script of their culture and thus adds to the evidence that this knowledge is independent of having lived through the events oneself (Berntsen & Rubin, 2004).

A few studies have examined the life span distribution of life script events and that of autobiographical memories. For example, Bohn (2010) showed that the life span distributions of life script events and autobiographical memories reported by a group of older Danes both peaked from adolescence and early adulthood, as predicted by the cultural life script theory. With the direct comparison of the temporal distributions of life script and life story events across the life span from the same population it is possible to visually locate and estimate where in the life span such overlap occurs. This is especially important considering that predictions made by the cultural life script theory refer to an overlap of positive life script events and positive autobiographical memories located mainly during adolescence and early adulthood (Berntsen & Rubin, 2004).

Results of studies comparing the life span distribution of life script events with that of important autobiographical memories show that the two distributions resemble each other, especially in two ways: 1) there is a disproportionate number of positive life events between 15 and 30 years of age, resulting in a bump during adolescence and early adulthood, and 2) a relatively flat distribution of negative and neutral life events (see Zaragoza Scherman, 2013; for a review).

In summary, key properties of the cultural life script have been tested in several individual cultures, but not in systematic cross-cultural comparisons using the same cues and procedures across different cultures testing both life scripts and life story memories in middle-aged and older individuals. Besides it has not been established whether life scripts from yet

other uninvestigated cultures also contain major transitional events to be expected to occur during adolescence and early adulthood, to subsequently determine whether the life script, in turn, guides recall of autobiographical memories of personal life story events. According to the life script theory (Berntsen & Rubin, 2004), it is expected that cross-cultural differences will be found regarding the selection of normative events included in the life script, while at the same time key structural characteristics deriving from the conception of the cultural life script will show little or no variation across cultures. For example, it is expected that all cultures will show an emphasis on cultural transitional events occurring in adolescence or early adulthood and that these are judged as emotionally positive. However, whether such invariant cross-cultural characteristics exist remains to be examined systematically.

### **The Present Study**

The main purpose of this study was to test key properties of the cultural life script theory in four different cultures. First, we collected life scripts with adult participants in Mexico, Greenland, China, and Denmark, and examined whether key characteristics of life scripts, as specified in Berntsen and Rubin (2004), generalize across cultures. Second, we collected autobiographical memories of important life story events from the same participants, and coded them for their correspondence with the life scripts to establish whether the life script serves as a guide for recall. Finally, we compared the life span distribution of life script events with that of the autobiographical memories. A central goal of the present work is to examine whether these life script properties generalize across cultures, and whether cultural life scripts can account for the life span distributions of personal autobiographical memories retrieved within the same cultures.

According to a vast body of research, culture is an important factor that contributes to differences in the age of the earliest autobiographical memory, the sense of self, emotional expression, and normativity of life scripts, to name a few important findings (Hatiboğlu &



Habermas, 2015; Heine, 2001; Hofstede, 1991; Leichtman, Wang, & Pillemer, 2003; Markus & Kitayama, 1991; Mesquita & Walker, 2003; Ruby, Falk, Heine, Villa, & Silberstein, 2012; Wang, 2001; see Wang & Ross, 2007, for a review). Furthermore, cultural life scripts are also important when discussing autobiographical memories because they contain semantic information on what is worth pursuing (and remembering) in life, and when it is best to do it. By surveying adult community samples that represent distinct individualistic (Denmark) and collectivistic (Mexico, Greenland, and China) cultures, we hope to introduce potential variability of the content of the life script events and autobiographical memories of life story events. However, we expect that the properties of the cultural life script will appear in all samples, despite the potential variability in these cultures that results from differences in geographical location, language, climate, religion, population, and ethnicity.

## **Hypotheses**

We generated a total of eight hypotheses, based on the properties of the cultural life script theory (Berntsen & Rubin, 2004, p. 428). Hypotheses 1 - 6 deal with the characteristics of the cultural life script across cultural groups, largely consistent with earlier work on the cultural life script theory by Berntsen and Rubin (2004). Hypotheses 7 and 8 deal with the mnemonic function of the life script, operationalized as an overlap of the life span distributions and content between the life script and the autobiographical memories of personal life story events, within each cultural sample.

**Hypothesis 1.** We expected a high degree of agreement on the expected important life events generated by the participants, within all included cultural samples, so that a life script could be obtained within each sample.

**Hypothesis 2.** Because a life script has a temporal structure, we expected a positive correlation between the order in which life script events were generated and their estimated ages, within all cultural samples.

**Hypothesis 3.** Because a life script is biased towards positive events, we predicted that life scripts would contain more positive than negative life events, according to the emotional valence ratings, in all samples.

**Hypothesis 4.** Similarly, because a life script is distorted to favor positive life events, we expected a higher level of agreement across participants within each sample for the estimated ages for positive events relative to negative events.

**Hypothesis 5.** We expected a disproportionate number of positive life events to be estimated to occur between 15 and 30 years of age, showing a similar life span distribution to that of the reminiscence bump of important autobiographical memories, whereas the life span distribution of negative events should be relatively flat or show a slow increase, in all samples.

**Hypothesis 6.** Similarly, because a life script refers to an idealized life, we expect a dominance of culturally sanctioned transitional social events (such as marriage), rather than pure biological events (such as menarche) in all samples.

**Hypothesis 7.** We expected great overlap between the contents of life script events and autobiographical memories for important events within each cultural sample, so that the content of a large number of the autobiographical memories recalled by the participants within each cultural sample would correspond to events included in the corresponding life script for this cultural sample.

**Hypothesis 8.** We expected an overlapping pattern between the life span distribution of the positive life script events and that of positive autobiographical events within each sample. However, due to childhood amnesia, such overlap would not be expected to occur in infancy and early childhood. Even though the life script might contain important cultural transitional events dated early in life, such as baptism, learning to walk and talk, or attending day care,

such events are unlikely to be retrieved in an autobiographical memory task due to childhood amnesia (Kingo, Berntsen, & Krojgaard, 2013; Rubin, 2000).

## Method

### Participants

A total of 606 adults over 40 years of age from Mexico, Greenland, China, and Denmark participated in the study; however, only 565 participants were considered for data analysis for reasons provided below. In Mexico, 156 participants were recruited, by volunteer local students enrolled at the University of Guadalajara, in Guadalajara, Jalisco, through word of mouth. Of these, 24 participants were excluded from the final analysis because they failed to follow instructions, reported to be younger than 40 years of age, or failed to complete at least 95% of the survey. Data for the remaining 132 participants (93 females; mean age = 51.15 years,  $SD = 8.87$ , age range: 40 - 91) were analyzed. In Greenland, 143 participants were recruited, by Greenlandic university students enrolled in Aarhus University, in the students' hometowns: Nuuk, Aasiaat, Ilulissat, Qaqortoq, and Sisimiut. Participants were recruited in community centers, via public radio announcements, posters, and by word of mouth. The final Greenlandic sample consisted of 137 participants (86 females; mean age = 50.56,  $SD = 6.82$ , age range = 40 - 74). The six participants excluded from the final analysis had failed to complete at least 95% of the survey. In China, 154 participants (90 females; mean age = 50.88,  $SD = 7.16$ , age range = 40 - 79) completed 100% of the survey. No participants were excluded from the final analysis. Volunteer local university students, enrolled at the East China Normal University, recruited Chinese participants in Shanghai. Recruitment was done in community centers and by word of mouth. In Denmark, 153 participants completed the survey. They were recruited via human resource offices, posters, word of mouth, and Facebook. Only 142 participants (96 females; mean age = 50.88,  $SD =$

7.16, age range = 40 - 80) were considered for the final data analysis, as eleven participants did not complete more than 95% of the survey or failed to indicate gender.

## **Materials**

In counterbalanced order, participants completed tasks designed to generate cultural life scripts and to elicit autobiographical memories of life story events. Subsequently, participants also completed measures of centrality of event for highly emotional memories, depression and post-traumatic stress disorder (PTSD), and life satisfaction for parallel studies (See Zaragoza Scherman, Salgado, Shao, & Berntsen, 2015a; Zaragoza Scherman et al., 2015b).

Demographic information was also collected.

**The cultural life script events questionnaire.** Introduced by Berntsen and Rubin (2004) this questionnaire required participants to imagine an ordinary newborn boy or girl (according to the participant's own gender) within their own culture and to list the seven most important life events that this imaginary child would likely experience from birth to death. Once the events had been generated, participants were asked to rate each event in terms of (1) prevalence (how many people out of one hundred will experience the event), (2) importance (how important the event is in a 7-item Likert scale), (3) age (at what age the event is expected to take place), and (4) emotional valence (whether the event is emotionally neutral, negative, or positive in a 7-item Likert scale).

**The personal life story events questionnaire.** Introduced by Rubin et al. (2009), this questionnaire required participants to imagine themselves telling their life story to a new friend whom they trust completely. Subsequently, participants were prompted to list the seven most important events in their life story. Participants also rated the events in terms of (1) prevalence, (2) importance, (3) age at the event, and (4) emotional valence.

## Procedure

**Data collection procedure.** In Mexico, China, and Greenland, trained research assistants administered the survey individually or in small groups (no more than five people), at the participant's home or workplace. In Denmark, participants received and returned the survey via regular mail, along with detailed instructions on how to complete the questionnaires and contact details of the research assistant in case they had any comments or questions. Participants were instructed to complete the questionnaires within a maximum of two hours. In all samples, survey materials were back-translated from English to the participants' own native language, following the procedures outlined by Brislin (1970).

**Data coding procedure.** Cultural life scripts were coded to create meaningful categories, by two independent coders who were trained research assistants from the same country as the participants. The coding procedures were applied to each cultural sample, separately. The coders coded 100% of life script events and autobiographical memories of life story events as described below.

*Cultural life script events* were initially coded according to the 36 categories of the Danish original life script (Berntsen & Rubin, 2004, p. 436). Events that did not fit any of these Danish event categories were initially coded as "new events". Subsequently, the "new events" were now used to generate new categories in each sample. The creation of new categories followed a two-step process: In the first step, two independent coders generated new potential categories separately. In the second step, the coders met and discussed their categories and together created new potential categories. A tentative category was generated only if it had been mentioned by at least 4% of participants in the sample, following procedures introduced by Berntsen and Rubin (2004). Next, all events were coded again with the Danish and the tentative categories to create final categories for the new life script. As before, a final category was generated only if it had been mentioned by at least 4% of participants in the sample. Events that did not fulfill the 4% cut-off requirement were grouped

in the category “Other”. Finally, the “other” events were analyzed one last time to make sure that “other” only included events that did not fit in any of the other event categories or that did not fulfill the 4% cut-off requirement. The final categories were labeled as close to the participants' own verbal labels as possible. Inter-rater agreements for the life script events categories were 83% (Mexico), 89% (Greenland), 80% (China), and 77% (Denmark). Disagreements were solved through discussion until coders agreed in 100% of the cases, sometimes with the assistance of the first author.

A research assistant classified all the life script events as “social” when the event clearly conformed to social norms and cultural traditions (e.g., “marriage”) or “biological” when the event followed natural biological development (e.g., “begin walking”, “puberty”). In order to verify the validity of these codings, all categories were then coded by another coder following the criteria above (e.g., marriage was social and puberty was biological). Subsequently, all events that corresponded to each category were coded as “social” or “biological”. Inter-rater agreements were 87% (Mexico), 91% (Greenland), 96% (China), and 96% (Denmark).

*Autobiographical memories of life story events* were also coded using the procedure above, but this time, the corresponding life script of the sample was used as a starting point. Inter-rater agreements for the life story events were 87% (Mexico), 83% (Greenland), 81% (China), and 81% (Denmark). Disagreements were solved through discussion until coders agreed in 100% of the cases, sometimes with the assistance of the first author.

Autobiographical memories were classified as “scripted” if they corresponded to a life script event category, using the corresponding life script categories for each sample, and “unscripted” if they had been coded as “other”.

Based on participants' ratings of emotional valence, the life script events and the autobiographical memories were classified as follows: emotionally negative (-1 to -3), neutral (0), or positive (1 to 3).

## Results

We will present the results following the eight hypotheses outlined earlier. First, we will describe the shared characteristics of the cultural life scripts that were obtained in the study with Mexican, Greenlandic, Chinese, and Danish samples. Subsequently, we will focus on the comparison between the life span distributions of the life script events and the autobiographical memories of personal life story events, within each sample.

### **General Characteristics of Cultural Life Scripts in Mexico, Greenland, China, and Denmark**

**Hypothesis 1. Agreement about important life events included in the life script.** As predicted, we obtained a high degree of agreement on what constitutes normative life events, as well as on the order and timing of the normative events within each culture, resulting in the life scripts of Mexico, Greenland, China, and Denmark. Following the procedure described in the methods section, we obtained 40 categories from 924 events in the Mexican sample, 34 categories from 959 events in the Greenlandic sample, 36 categories from 1078 events in the Chinese sample, and 35 categories from 994 events in the Danish sample, which also include the category “other”, thus 73 distinct categories when grouped together (See Table 1). Of these categories, 11 are common across all four samples: “having children”, “marriage”, “college”, “begin school”, “go to school”, “kindergarten/begin day care”, “own birth”, “retirement”, “old age/life after retirement and in old age”, “having peers” and “(happy) childhood”. Other categories are common across two or three samples. It should be noted that event categories in Table 1 were generated in each country separately, based on participants’ own verbal labels (For more detailed representations of the life scripts as well as the importance and prevalence ratings for the life script events, see Appendix A in the Supplemental Material).

However, for comparison purposes, when possible, similar categories referring to the same event were equated across countries. For example, derived from the participants' own verbal labels the category "kindergarten" was only obtained in Mexico, while the category "begin daycare" was obtained in Denmark and Greenland; the category "preschool education" was obtained in China. While these category labels come from different samples, they all refer to early education and show similarities and overlap across cultures, therefore, we treated them as the same category in the table, even though "being daycare" happens before "kindergarten". The same applies to other life events that might be considered to be similar, such as "buying/building/owning a house", and "old age" and "life after retirement and in old age". It should be noted that some of these differences in the labeling might stem from word choice or the grammatical structures inherent to the Spanish, Greenlandic, Chinese, and Danish languages. Other events were kept separate even though they might be related, e.g., "long trip", "travelling", and "taking a vacation". Cultural differences in the content of the life script categories can also be seen as every sample emphasizes different spheres of life; for example, categories unique to the Mexican sample emphasize family, religion, and becoming 15 years old; unique Greenlandic categories refer to the rearing of small children, outdoor experiences, and hunting milestones; unique Chinese categories emphasize events related to the attainment of lifelong education, family and social responsibility, work life, and health; unique Danish categories refer to divorce, partner's death, socialization early in life, and leaving home.

The first column of Table 1 contains the numbered life script event categories of all the samples that were obtained during the coding procedure described above. The category "other", listed at the end of the table, corresponds to life script events that were mentioned by less than 4% of participants in the sample concerned. For each sample, we then designated a set of four columns. Each set is labeled according to the sample, and the total of participants,



per sample, is provided below the country label. In each set per sample, the first column is the percentage of participants whose reported events were coded under each category. Categories with 0 indicate that no events were coded with that category in that sample, because it was mentioned by too few participants or not at all. The second and third columns are the mean estimated age at the event and its standard deviation, respectively; and the fourth and fifth column represent the mean emotional valence and its standard deviation, respectively, for each event category.

In order to estimate the level of agreement between participants regarding the life events that are expected to happen in a typical life course in their culture, within each sample, we calculated the percentage of events that were included in the top ten life script event categories: 52.5% in Mexico, 55.7% in Greenland, 57.5% in China, and 64.4% in Denmark. In other words, 52.5%, out of the 924 life events that were generated by the Mexican sample, were categorized in the top 10 Mexican categories. Considering that the Mexican life script contains 40 categories, it means that 25% of the categories captured more than half of the events. We interpret this to mean a high level of agreement considering all the possible life events that participants could have nominated from the entire life span, when responding to our question. Furthermore, when the pattern of the frequencies with which events were mentioned is compared across countries, we observed a similar rate of decline in the number of mentions in each category, as the rank order of frequencies increased (See Figure 1). As outlined by Rubin et al. (2009), in a similar analysis, this suggests that a similar underlying structure appears regardless of the number of events generated and their recording frequencies.

**Hypothesis 2. Temporal structure.** In order to test the predictions regarding the temporal structure of the life scripts, we correlated, per participant, the order in which the life script events were mentioned with the estimated ages of the events (Berntsen & Rubin, 2004).

We found that the mean correlation coefficient for Spearman correlations were  $r_s = .72$  (Mexico),  $r_s = .68$  (Greenland),  $r_s = .82$  (China), and,  $r_s = .80$  (Denmark). These results demonstrated that across all four cultural samples, participants tended to generate the events in chronological order, beginning with earlier and ending with the events dated later in life.

**Hypothesis 3. Positivity bias.** As mentioned earlier, one of the main features of cultural life scripts is the overrepresentation of positive life script events, compared to negative and neutral life script events. In order to examine this prediction, we conducted a Chi-square test, comparing the number of positive events versus the number of negative and neutral events, reported by participants within each sample. A significant number of events in the life scripts were rated as positive events, in comparison to negative and neutral events, in all our four samples: Mexico (90%), Greenland (89%), China (86%), and Denmark (80%), all  $\chi^2_s(2) > 990.28$ , all  $ps < .001$

**Hypothesis 4. Agreement in age estimates for positive and negative life script event categories.** We expected that participants would provide closer average age estimates for positive event categories, compared with negative event categories, reflecting higher agreement on the timing of positive life events. In order to examine this prediction, we calculated the mean emotional valence of event category, mean age estimates per category and their associated standard deviation. Subsequently, we ran a Pearson correlation between the mean emotional valence ratings per event category in each sample (Mexico,  $n = 40$ ; Greenland,  $n = 34$ ; China,  $n = 36$ ; Denmark,  $n = 35$ ) and the standard deviation of age estimates of life script events in each sample, under the assumption that each event category could be treated as an independent observation (see Berntsen & Rubin, 2004, for a similar procedure).

As predicted, the standard deviation of the mean age estimates decreased with increasing ratings of emotional valence,  $r = -.58$ ,  $p < 0.001$  (Mexico),  $r = -.30$ ,  $p = 0.082$

(Greenland),  $r = -.61$ ,  $p < 0.0001$  (China), and  $r = -.27$ ,  $p = 0.121$  (Denmark). These negative correlations indicated that higher ratings in the emotional valence corresponded to lower standard deviations in age estimates; however, it did not reach statistical significance in the Greenlandic and Danish samples.

**Hypothesis 5. Life span distribution of life script events in adolescence and early adulthood.** As in previous studies, a high percentage of positive life script events were dated during the typical period for a reminiscence bump of important autobiographical memories (15 to 30 years of age) in all four samples: Mexico (44%), Greenland (38%), China (56%) and Denmark (55%), all  $\chi^2(1) > 7.02$ , all  $ps < .01$ . These high percentages are particularly striking when we consider that this time period covers only 20% of someone's entire life course, assuming that this person lived to 76.25 years of age, which is the mean life expectancy at birth of these four countries, when averaged (*World Development Indicators: Mortality*, 2016). Furthermore, the predominance of positive events during this time period produces a similar life span distribution of events to that of the reminiscence bump, whereas negative events were not located in any specific life time period, as shown later, when we discuss the life span distribution of life script events in greater detail. These results are especially relevant as they demonstrate that the period of adolescence and early adulthood is highly favored in the culturally shared expectations regarding the timing of important transitional life events during the life span. As Berntsen and Rubin (2004) have argued, this may result in an increase of autobiographical memories of life events from this period, resulting in the reminiscence bump for important memories.

We ran a more detailed analysis to further confirm the positivity bias of the life script events that were dated during adolescence and young adulthood. In order to do so, we selected only the life script events that were dated between 15 and 30 of years. Then, with a Chi-square test, we compared the number of positive versus negative and neutral life script

events within this period, in each sample. Also, consistent with the positivity bias in life scripts, our predictions and earlier research (Rubin & Berntsen, 2003), a high percentage of life script events dated during the reminiscence bump period was assigned positive emotional valence: Mexico (94%), Greenland (90%), China (93%), and Denmark (94%), all  $\chi^2(1) > 515.05$ , all  $ps < .001$ .

**Hypothesis 6. Social versus biological life events.** Also of relevance is the dominance of culturally sanctioned transitional events in the life script. With the exception of biological events marked by age such as “childhood”, “puberty”, “enter adulthood”, and “old age” (see Table 1), almost all of the life events in the life script result from socially sanctioned transitions, which are governed and regulated by complex cultural rules and institutions. According to our coding, 99% (Mexico), 90% (Greenland), 91% (China), and 88% (Denmark) of all life script events corresponded to a social event.

**Hypothesis 7. Overlap between autobiographical memories and life script events.** As expected, participants in this study reported a higher percentage of memories corresponding to scripted events, compared to unscripted events in Mexico (64%), Greenland (66%), and Denmark (68%), all  $X^2(1) > 72.68$ , all  $ps < 0.001$ , but not in China (53%),  $X^2(1) = 3.80$ ,  $p = 0.051$ . The latter may reflect that some participants in this generation experienced the Chinese Cultural Revolution (1966 - 1976), which meant that they were prevented from experiencing some life script events, such as attending college, because they were forcibly relocated from the cities to the countryside to work in agriculture.

Interestingly, many of these autobiographical memories of cultural life script events were dated as having occurred when participants were between 15 and 30 years of age: Mexico (48%), Greenland (39%), China (51%), and Denmark (45%). Furthermore, we also observed that the vast majority of reported memories were rated as emotionally positive events: Mexico (82%), Greenland (72%), China (78%) and Denmark (73%).

We conducted a series of chi-square tests to determine whether the order of the presentation of the life script and autobiographical memories questionnaires had resulted in differences in the number of autobiographical memories that were coded as scripted and unscripted according to the cultural life script. We found that there was not a statistically significant association between order of questionnaire presentation and whether a memory was coded as scripted or unscripted in Mexico  $\chi^2(1) = .280, p = .597$ , Greenland  $\chi^2(1) = 2.911, p = .088$ , and Denmark  $\chi^2(1) = .720, p = .396$  whereas there was a statistically significant association in China  $\chi^2(1) = 13.497, p < .001$ , as the group who completed the questionnaire about life scripts first reported 297 scripted memories and 207 unscripted memories, while the group who completed the questionnaire about autobiographical memories first reported 274 scripted memories and 300 unscripted memories, meaning that the group that completed the questionnaire about autobiographical memories first reported significantly more unscripted than scripted memories.

**Hypothesis 8. Life span distributions of life script events and autobiographical memories.** The distributions of life script events (left panels) and autobiographical memories (right panels) are shown in Figure 2 (In this paper we report only the life span distribution of the autobiographical memories of life story events according to valence and age at events. Results of ratings for the autobiographical memories according are reported elsewhere). Figure 2 shows that the life span distribution of positive life script events resembles that of positive autobiographical memories, as the distributions show significant overlap, consistent with our predictions. From top to bottom, Figure 2 shows, side by side, the life span distribution of life script events and autobiographical memories of important life story events collected in Mexico, Greenland, China, and Denmark. The events are grouped according to their emotional valence ratings: positive, negative, and neutral. Each panel in Figure 2 represents the percentage of life events from the cultural life script (left panels) or important

autobiographical memories of life story events (right panels) that were dated in each decade across the life span. Because left panels correspond to life scripts, the distribution of the events covers the entire life span, while the distribution of autobiographical memories of life story events in the right panels cover only from 0 to 49 years of age, as 40% of our sample is younger than 50. In the left panels, we have traced a vertical line over the data point of decade of the 40's to indicate up to what point the life span distribution of life script events is comparable with that of the autobiographical memories of life story events, shown in the right panels. Furthermore, in all right panels, the percentage of autobiographical memories in the decade of the 40's has been adjusted to include additional memories that could have been potentially reported during this decade assuming that all participants had been at least 50 years of age. We used the same procedure previously reported by Rubin and Berntsen (2003) and Zaragoza Scherman et al. (2015b). This procedure was applied to positive, negative and neutral memories separately<sup>2</sup>. First and most noticeable of all, in all samples, the life span distribution of life script events and that of autobiographical memories show that the percentage of positive life script events and autobiographical memories of positive life events increases in adolescence, peaks in early adulthood, and decreases in the decade of the 30's. Thus, the distributions show a peak during the reminiscence bump period, with a high proportion of both life script events and personal memories dated during this period (i.e., 15 - 30 years of age).

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<sup>2</sup> The procedure consists of first determining the mean age of, for example, the participants in the Mexican sample aged 40-49 who had also provided positive memories dated during this decade, which resulted in a mean age of 46.92. Second, we added 0.50 (six months) to the obtained mean age as an average of months that might have passed since their last birthday, following the example,  $46.92 + 0.50 = 47.42$ . The third step is to subtract 40 to 47.42 to obtain only the mean number of years that these participants had lived in the decade of their 40's, therefore,  $47.42 - 40 = 7.42$ . Next, we calculated the number of positive memories that had been dated during the decade of the 40's by all participants in their 40's, which resulted in 24. Then, we multiplied that number by 10 (number of years in a decade), which resulted in  $24 \times 10 = 240$ . Then, we divided this 240 by 7.42 to obtain the number of memories that we would have potentially obtained had participants in their 40's been 50 years of age, resulting in 32.36. Lastly, we added the number of memories provided by the rest of the participants, that were dated in the decade of the 40's, in the case of our example,  $32.36 + 28 = 60.36$ . In conclusion, with the adjustment, the data point of positive memories dated during the decade of the 40's, in the Mexican sample, went from 52 memories (24 memories reported by participants in their 40's and 28 memories reported by the rest of the participants) to 60.36 memories (including now 8.36 additional potential memories if all participants in their 40's had been 50 of age). 8.36 is the difference between 24 actual memories and 32.36 adjusted memories which resulted from the procedure described above.

In order to test the cultural life script theory and establish the overlap between the life span distributions of positive life script events and positive autobiographical memories of life story events dated from 5 to 49 years of age, we divided this period into five-year intervals, and ranked each of them according to the number of life events that were dated during each period. Subsequently, we computed Spearman rank correlations between the rankings for the positive life script events and positive autobiographical memories. We found strong and statistically significant correlations between these rankings in our Mexican sample:  $r_s = .83, p = .005$ ; Greenlandic sample:  $r_s = .76, p = .017$ ; Chinese sample:  $r_s = .75, p = .020$ ; and Danish sample:  $r_s = .83, p = .005$ . This provides evidence that the life span distribution of life script events closely resembles that of autobiographical memories within each culture.

Furthermore, in all samples, the life span distribution of autobiographical memories of life events can be seen to portray a more realistic life course, as the percentage of negative memories of life events in the right panels is higher in all four samples, compared to the percentage of negative life script events; however, as predicted by the cultural life script theory, they do not appear to be consistently located in a particular lifetime period; in fact, it can be appreciate that every culture has a different distribution of negative memories.

As expected, the percentage of autobiographical memories of life story events early in life is substantially lower than that of life script events, which could possibly be explained by the fact that adults rarely remember events from early infancy, a phenomenon known as *childhood amnesia*. Childhood amnesia is a highly robust phenomenon, when people are asked to produce personal memories for past event (see Kingo et al., 2013 for a review). It has also been found for important early events that would naturally belong in a life story, such as birth of siblings (Sheingold & Tenney, 1982), or the invasion and liberation of one's country (Berntsen & Rubin, 2006; see also Winograd, & Killinger, 1983). In order to show this more clearly, we simulated childhood amnesia by adding another data point on the 0 - 9 years for

the positive events in the left panels of Figure 2, to illustrate what the percentage of life script events would look like if these events were also affected by childhood amnesia. We base our simulation on the distribution of more than 11000 autobiographical memories from age 10 and younger reported by Rubin (2000). According to Rubin (2000, Figure 1), the proportion of memories dated at age 5 is 0.1130, while the proportion of memories at age 10 is 0.1845. Thus, following Rubin's data, memories dated at age five corresponded to 61% of the memories reported at age 10, suggesting a reduction of 39% due to childhood amnesia. In order to estimate the effects of childhood amnesia for the present life script data, we calculated an extra data point in the decade of 0 - 9 years in Figure 2, by multiplying the percentage of memories that our participants dated in the decade 10 - 19 by .61. The resulting dotted line, labeled (Positive CA, where CA stands for Childhood Amnesia), is now very similar to that of the autobiographical memories of actual life story events.

## Discussion

We examined the properties of cultural life scripts and their correspondence with autobiographical memories across different cultures. We found support for all eight hypotheses across four different cultures, showing remarkable cross cultural similarities in the representation of the life script. In the following we elaborate and discuss the implications of these findings. Our discussion is structured in accordance with the previously stated eight hypotheses.

First, as predicted by the cultural life script theory (Berntsen & Rubin, 2004), and consistent with previous studies (Berntsen & Rubin, 2004; Bohn & Berntsen, 2011; Coleman, 2014; Erdoğan et al., 2008; see Janssen, Chessa, & Murre, 2005, for a review; Janssen & Haque, 2015; Janssen et al., 2014; Ottsen & Berntsen, 2014; Rubin et al., 2009; Tekcan et al., 2012; see also Zaragoza Scherman, 2013 for a review), it was possible to generate cultural life scripts of Mexico, Greenland, China, and Denmark within adult samples over 40 years of age,



reflecting an agreement on commonly expected important transitional life events and their order and timing, within each culture. Second, these life events tended to be generated by the participants in a chronological order, from birth to death; consistent with the notion that chronological order is a key organizational structure. Third, all generated life scripts were predominantly positive, reflecting an idealized version of life. Fourth, compared with negative life events, age estimates for positive events showed smaller standard deviations in all samples, consistent with the idea that they have a time-locked position in the life script. Fifth, across all samples, we also found that positive events were estimated to occur most frequently in adolescence and early adulthood, which corresponds with the reminiscence bump of important autobiographical memories. Sixth, as predicted, almost all of the cultural life script events referred to socially sanctioned transitions, thus supporting the notion that the cultural life script results from cultural rather than biological processes. Seventh, within each sample we found substantial overlap between the content of the generated life script events and the autobiographical memories of personal life story events, with this overlap being largest for events dated during the period of the reminiscence bump.

Eighth, the life span distribution of autobiographical memories followed that of the life script events within each culture. Most importantly, across cultures, we found that both distributions favored the occurrence of positive life events during adolescence and early adulthood, resulting in a distribution similar to that of the typical reminiscence bump of important autobiographical memories, whereas the occurrence of negative life events was not bound to a particular time in the life span. As shown in Figure 2, the only life time period where the life span distribution of life script events differed from that of autobiographical memories was early childhood as the number of reported memories was lower than that of life script events; however, this is to be expected, due to childhood amnesia. Despite the fact that there are numerous important transitional life events expected to take place during this period,

individuals are unable to recall their personal experiences of these events later in life (e.g., Sheingold & Tenney, 1982).

In spite of these shared structural patterns between the four cultural samples, we also found cultural differences. As a result of surveying different individualistic and collectivistic cultures in the same study, some cross-cultural variability was introduced that resulted in similarities and differences in the content and types of life events that were expected to occur in each culture. Similar life events across samples reflected events that appear in other cultural samples, such as “marriage”, “having children”, “college”, and “going to school”. Education, family life, and work themes appeared in all samples. On the other hand, the cross-cultural differences in the content of the life script events show that most of the unique event categories in the Mexican, Greenlandic, and Chinese samples seem to favor events related to other members of the extended family, and the social group, whereas the unique event categories in Danish sample emphasize events with close family members, such as a spouse, and a child. More research is needed in order to examine these differences and their underlying mechanisms more systematically. Also, although the results suggest a central role for the cultural life script to account for the reminiscence bump cross cultures, this account is limited to memories for important life events; it does not explain the bump for word-cued memories (Koppel & Berntsen, 2015).

## **Conclusion**

We found that key properties of cultural life script were replicated across four samples with different nationalities and cultural backgrounds. Importantly, in all samples, the life span distribution of autobiographical memories followed the one of life script events. Both distributions showed a dominance of life events that were dated during the reminiscence bump period, i.e., between 15 and 30 years of age, and events dated during this period were mainly positive.

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Figure 1. Percentage of participants who mentioned a life script event ordered from most to least, plotted according to ranking of order, in the four samples

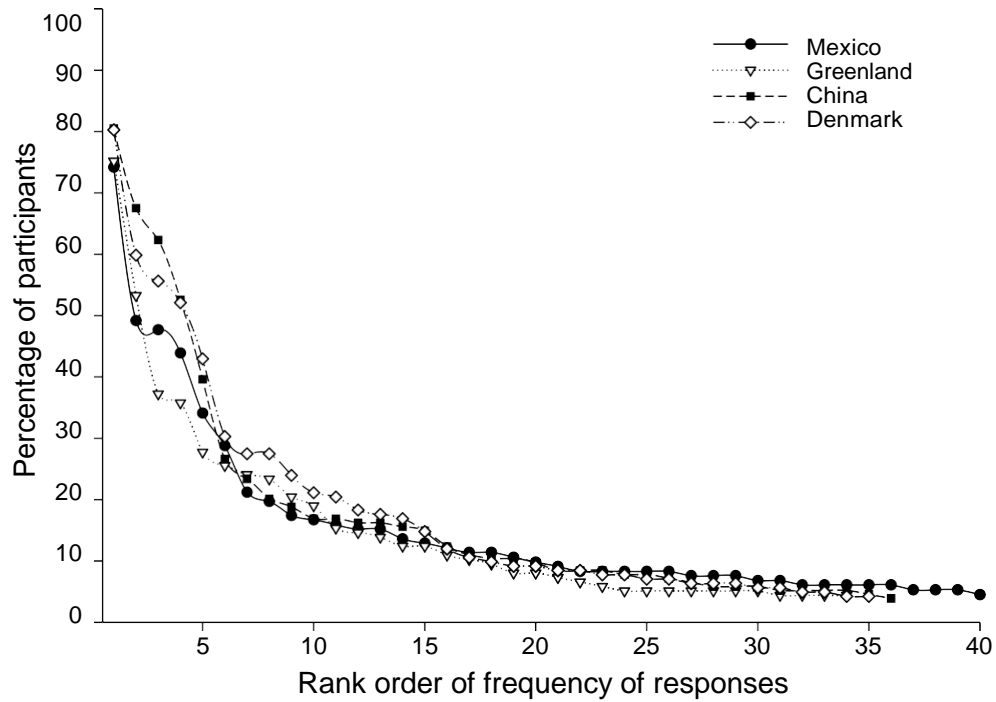
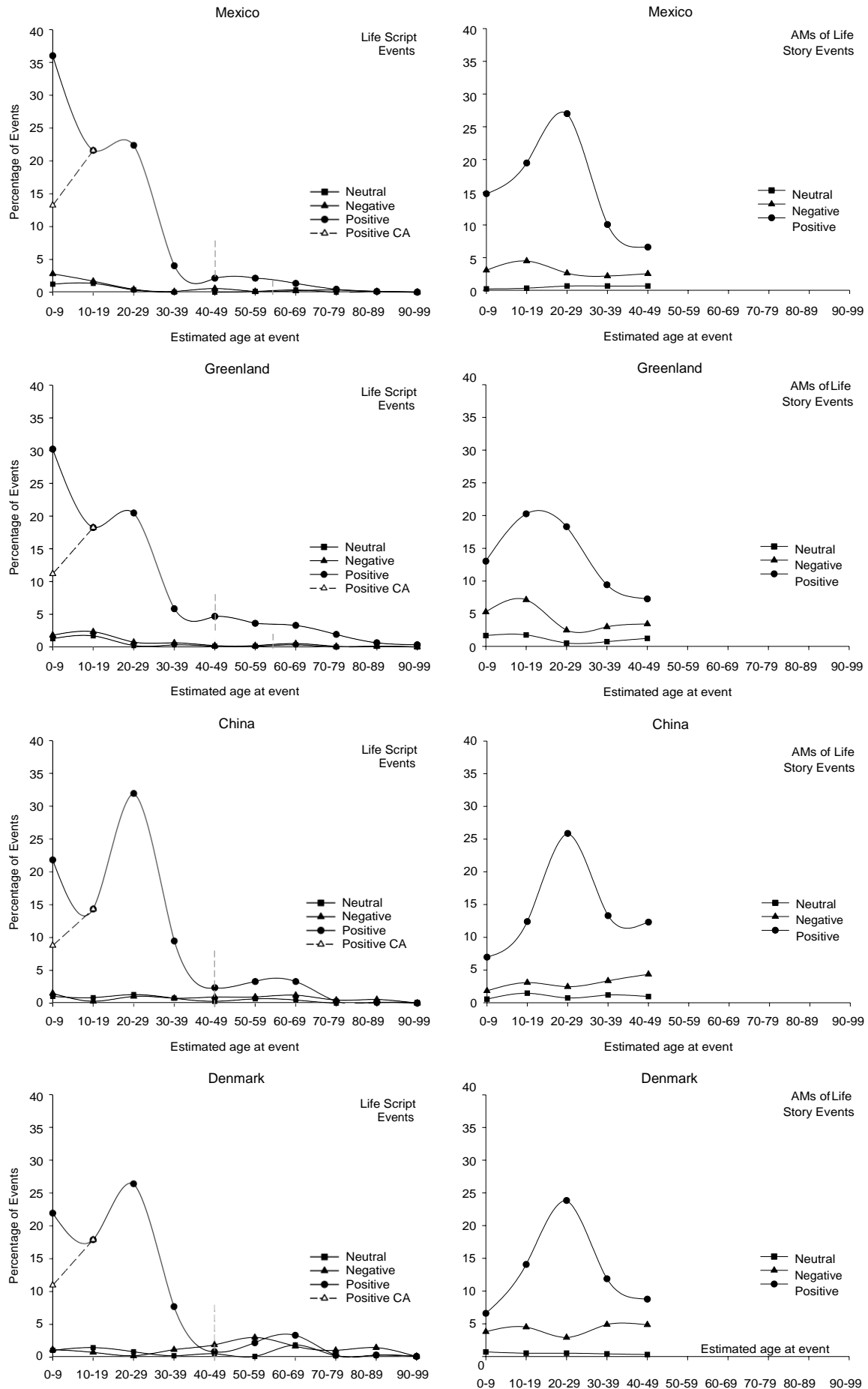




Figure 2. Lifespan distribution of cultural life script (left panel) and autobiographical memories (AMs) of life story events (right panel) for each of the four countries



## General Audience Summary

Imagine you are asked to remember the seven most important life events of your life. For people older than 40 years, it is very likely that most of the memories they report refer to positive events they experienced during adolescence and early adulthood, which results in more memories from these periods. This phenomenon is known as *the reminiscence bump*. We investigated whether the bump might result because individuals use the life script to help them recall autobiographical memories, but what is the life script? The cultural life script is information about the order and timing of important life events expected in someone's life, from birth to death.

We asked participants in Mexico, Greenland, China, and Denmark to nominate seven life events that a typical person in their culture will likely experience between birth and death, and at what age it is expected to occur and whether the event is emotionally positive, neutral, or negative. Subsequently, we asked the same participants to recall seven personal life events, indicate how old they were when the events occurred, and rate the emotional valence of their memories.

Results showed that when the ages of the life events and the memories were compared, the reminiscence bump of the autobiographical memories resembled that of the life script events, suggesting that the life script helped recall autobiographical memories, especially positive ones. We concluded that the way we remember our lives is influenced by cultural expectations about the life course, at least when we remember important memories.

*Table 1.* Life script event categories mentioned by at least 4 of the participants (per sample) in Mexico, Greenland, China, and Denmark with the percentage of participants who mentioned each event category, estimated age at event, and emotional valence.

#	Event Categories	Mexico (N=132)					Greenland (N = 137)					China (N = 154)					Denmark (N = 142)				
		Age at event		Valence			Age at event		Valence			Age at event		Valence			Age at event		Valence		
		%	M	SD	M	SD	%	M	SD	M	SD	%	M	SD	M	SD	%	M	SD	M	SD
1	Having children	47.73	23.19	4.44	2.34	1.24	35.77	25.10	5.92	2.62	0.53	52.60	27.73	2.48	2.57	1.08	80.28	27.13	5.04	2.77	0.46
2	Marriage	49.24	23.38	3.63	2.47	0.73	18.98	25.37	10.32	2.59	0.69	80.52	26.34	2.46	2.40	0.93	55.63	26.71	3.37	2.64	0.64
3	College	34.09	22.74	2.50	2.76	0.61	53.28	19.65	5.89	2.80	0.52	23.38	19.43	2.18	2.31	1.37	42.96	21.87	3.19	2.37	0.87
4	Begin school	28.79	5.92	0.37	2.68	1.04	37.23	10.57	12.83	2.73	0.49	11.04	6.12	0.28	2.59	0.71	52.11	6.15	0.52	2.45	0.74
5	Go to school	21.21	11.59	2.39	2.71	0.53	14.60	10.83	7.52	2.67	0.73	62.34	8.70	3.03	2.36	1.05	21.13	7.73	2.57	2.28	0.92
6	Kindergarden / Begin daycare	43.94	3.95	1.11	2.59	0.80	8.03	2.26	3.92	2.18	1.17	26.62	5.26	9.94	1.95	1.54	17.61	1.46	0.89	1.24	1.51
7	Having a job	17.42	19.00	3.26	2.74	0.86	27.74	23.43	12.15	2.71	0.73	39.61	22.00	3.67	2.52	1.02	0.00	-	-	-	-
8	Own birth	13.64	3.00	7.49	2.67	0.77	25.55	10.63 <sup>(a)</sup>	20.83	2.40	1.19	14.94	1.61	6.21	2.57	1.38	9.15	0.00	0.00	2.77	0.60
9	Retirement	8.33	58.64	7.45	1.82	1.25	6.57	64.78	0.67	1.44	1.51	16.88	57.69	3.46	1.69	1.19	30.28	64.33	7.74	0.53	1.50
10	Old age / Life after retirement	6.82	60.50	10.66	1.40	1.84	23.36	65.63	11.49	2.12	1.20	20.13	59.05	10.90	1.94	1.58	9.86	70.19	15.49	-0.29	2.30
11	Fall in love	16.67	13.88	1.70	1.83	1.17	10.95	15.00	1.41	1.87	1.85	0.00	-	-	-	-	27.46	14.63	3.21	2.33	1.00
12	First job	12.12	18.25	2.59	2.56	0.89	0.00	-	-	-	-	8.44	21.31	1.38	2.46	0.97	27.46	23.19	6.32	1.97	1.20
13	Confirmation	0.00	-	-	-	-	20.44	15.00	5.06	2.79	0.42	0.00	-	-	-	-	23.94	13.65	0.53	2.24	0.78
14	Baptism	15.15	0.74	0.44	2.45	1.70	12.41	0.56	0.59	2.76	0.75	0.00	-	-	-	-	6.34	0.19	0.21	2.78	0.44
15	High school	11.36	17.73	1.03	2.81	0.54	0.00	-	-	-	-	10.39	16.75	1.25	2.31	0.87	11.97	18.53	1.62	2.35	0.70
16	Grandchildren	8.33	50.45	7.89	2.64	0.67	10.22	47.93	10.05	2.71	0.47	0.00	-	-	-	-	14.79	57.83	5.23	2.71	0.46
17	Others' death	7.58	27.00	27.06	-2.00	1.94	5.11	40.86	25.47	-0.29	2.43	0.00	-	-	-	-	18.31	40.00	19.40	-2.10	1.31
18	Being part of a family	15.91	4.86	4.26	2.39	1.34	13.87	16.73	27.10	2.64	0.73	0.00	-	-	-	-	0.00	-	-	-	-
19	Leisure time and	5.30	16.25	16.61	2.88	0.35	15.33	26.16	18.92	2.60	1.04	7.79	7.92	3.94	2.31	0.95	0.00	-	-	-	-

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sports /Having a

hobby

20	(Happy) Childhood	8.33	6.27	4.94	2.00	2.05	8.03	9.67	10.70	2.25	1.06	4.55	4.57	3.09	2.00	0.82	7.04	4.19	5.63	2.90	0.32
21	Birthdays	19.70	3.04	2.21	2.42	0.81	0.00	-	-	-	-	0.00	-	-	-	-	5.63	10.21	18.06	2.88	0.35

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#	Event Categories	(N=132)					(N = 137)					(N = 154)					(N = 142)				
		%	M	SD	M	SD	%	M	SD	M	SD	%	M	SD	M	SD	%	M	SD	M	SD
22	Parents' death	0.00	-	-	-	-	0.00	-	-	-	-	3.90	55.43	7.72	-1.71	2.36	20.42	57.32	12.66	-1.88	1.13
23	Being looked after and child care	0.00	-	-	-	-	24.09	11.22	20.90	2.13	1.36	0.00	-	-	-	-	0.00	-	-	-	-
24	Having peers	9.85	7.92	4.50	2.77	0.44	4.38	7.33	5.87	2.78	0.44	5.19	15.13	11.63	2.13	1.36	4.23	16.40	19.99	2.50	0.84
25	Puberty	8.33	13.00	1.48	1.82	1.08	4.38	18.75	10.52	1.17	1.47	0.00	-	-	-	-	10.56	14.07	2.15	1.53	1.41
26	Own death	0.00	-	-	-	-	5.11	52.71	35.48	0.00	2.08	8.44	77.69	24.47	-1.46	1.45	9.15	81.88	4.66	-0.85	2.41
27	Raising or educating a child	0.00	-	-	-	-	5.11	17.63	15.16	2.75	0.71	15.58	26.90	8.74	2.21	1.22	0.00	-	-	-	-
28	Begin walking	8.33	1.18	0.40	3.00	0.00	5.11	3.86	7.13	2.71	0.49	5.84	3.33	5.52	2.67	0.71	0.00	-	-	-	-
29	Travelling	11.36	21.13	15.92	2.40	1.06	0.00	-	-	-	-	0.00	-	-	-	-	7.75	17.45	17.18	2.36	0.81
30	University entrance exam	0.00	-	-	-	-	0.00	-	-	-	-	18.83	18.53	0.76	2.38	0.90	0.00	-	-	-	-
31	Buying a house	7.58	33.10	4.91	2.60	0.70	0.00	-	-	-	-	10.39	31.13	4.43	1.69	1.14	0.00	-	-	-	-
32	Enter adulthood	6.06	19.13	1.25	2.38	1.41	5.84	25.89	15.40	2.33	1.12	0.00	-	-	-	-	5.63	24.44	15.12	2.38	1.06
33	Leave home	0.00	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-	16.90	19.81	1.59	2.13	0.80
34	Job search	0.00	-	-	-	-	0.00	-	-	-	-	16.23	22.82	3.95	2.36	0.86	0.00	-	-	-	-
35	Being filial	0.00	-	-	-	-	0.00	-	-	-	-	16.23	40.72	14.81	1.72	2.05	0.00	-	-	-	-
36	First communion	15.15	9.05	1.19	2.85	0.37	0.00	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-
37	Being breastfed and infant care	0.00	-	-	-	-	9.49	15.70	21.72	2.60	1.06	5.19	0.94	0.68	2.67	0.50	0.00	-	-	-	-
38	Begin talking	6.82	1.56	0.73	3.00	0.00	0.00	-	-	-	-	7.14	4.45	9.82	2.73	0.65	0.00	-	-	-	-
39	The "right" job	0.00	-	-	-	-	0.00	-	-	-	-	8.44	24.19	3.11	2.62	0.87	4.93	27.71	7.04	2.29	0.76

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40	(Committed) romantic relationship(s)	6.06	21.25	3.96	2.00	1.31	0.00	-	-	-	-	16.88	21.98	5.50	2.27	0.83	7.04	22.60	2.95	2.80	0.42
42	Living as an adult	0.00	-	-	-	-	12.41	29.26	8.14	2.41	0.80	0.00	-	-	-	-	0.00	-	-	-	-
43	Being healthy	0.00	-	-	-	-	0.00	-	-	-	-	12.34	26.40	23.97	2.05	1.93	0.00	-	-	-	-
44	Serious disease	0.00	-	-	-	-	0.00	-	-	-	-	5.84	44.63	16.03	-0.78	2.39	6.34	52.75	13.00	-1.33	1.58

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#	Event Categories	(N=132)					(N = 137)					(N = 154)					(N = 142)				
		%	Age at event		Valence		%	Age at event		Valence		%	Age at event		Valence		%	Age at event		Valence	
			M	SD	M	SD		M	SD	M	SD		M	SD	M	SD		M	SD	M	SD
45	Siblings	0.00	-	-	-	-	4.38	19.83	21.17	3.00	0.00	0.00	-	-	-	-	7.75	3.32	0.96	2.67	0.49
46	Playing	10.61	3.73	2.89	2.73	0.70	0.00	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-
47	Education and Studying	0.00	-	-	-	-	0.00	-	-	-	-	9.74	10.88	8.98	2.24	1.79	0.00	-	-	-	-
	professional success																				
49	Divorce	0.00	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-	8.45	41.09	5.20	-1.67	0.98
50	First contact	0.00	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-	8.45	1.38	3.15	2.75	0.45
51	Being sick	0.00	-	-	-	-	0.00	-	-	-	-	7.79	32.25	27.54	-1.08	1.78	0.00	-	-	-	-
52	Taking a vacation	7.58	7.44	5.46	1.70	1.77	0.00	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-
53	Being part of society	0.00	-	-	-	-	7.30	26.25	11.25	2.40	1.90	0.00	-	-	-	-	0.00	-	-	-	-
54	Having a harmonious family	0.00	-	-	-	-	0.00	-	-	-	-	6.49	27.70	15.66	2.40	1.07	0.00	-	-	-	-
55	Settle on career	0.00	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-	6.34	26.17	9.82	2.56	0.53
56	Personal realization	6.06	31.89	15.11	2.20	0.92	0.00	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-
57	Christmas	6.06	3.38	1.92	2.75	0.46	0.00	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-
58	Spending time with the family	6.06	13.00	20.01	2.38	1.06	0.00	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-
	or family																				
	responsibility independent																				
61	Goal achievements	5.30	25.43	7.93	2.43	0.98	0.00	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-
62	Choosing schools or major	0.00	-	-	-	-	0.00	-	-	-	-	5.19	13.25	6.37	2.25	1.06	0.00	-	-	-	-
63	Having a career	0.00	-	-	-	-	0.00	-	-	-	-	5.19	31.88	4.85	2.38	0.92	0.00	-	-	-	-

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64	Long trip	0.00	-	-	-	-	5.11	15.43	3.87	1.86	1.46	0.00	-	-	-	-	0.00	-	-	-	-
65	Outdoor experiences	0.00	-	-	-	-	5.11	21.67	14.71	3.00	0.00	0.00	-	-	-	-	0.00	-	-	-	-
66	First hunting	0.00	-	-	-	-	5.11	13.14	3.18	2.71	0.49	0.00	-	-	-	-	0.00	-	-	-	-



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#	Event Categories	(N=132)					(N = 137)					(N = 154)					(N = 142)				
		Age at event		Valence			Age at event		Valence			Age at event		Valence			Age at event		Valence		
		%	M	SD	M	SD	%	M	SD	M	SD	%	M	SD	M	SD	%	M	SD	M	SD
67	First friend	0.00	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-	4.93	4.67	2.07	2.29	0.76
68	Religion and spirituality	4.55	10.83	19.28	2.50	0.55	0.00	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-
69	Reaching first 6 and 12 months of life	0.00	-	-	-	-	4.38	18.50	30.37	3.00	0.00	0.00	-	-	-	-	0.00	-	-	-	-
70	Partner's death	0.00	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-	4.23	76.67	2.58	-2.67	0.52
71	Other	74.24	16.80	17.99	1.36	2.19	75.18	19.76	18.26	1.77	1.99	67.53	27.13	18.10	1.53	2.04	59.86	21.13	16.88	1.35	2.01

Note: (a) Some participants seem to have provided a date for “own birth” in a metaphorical, more than a literal, way.

Supplemental Material: Appendix A

*Table A1.* Life script categories mentioned by at least 4% of Mexican participants (N = 132) with number and percentage of participants who mentioned each category, and prevalence, importance, estimated age at event, and emotional valence for each category

Event	Mentioned by <sup>a</sup>		Prevalence		Importance		Age at event		Valence	
	<i>n</i> =	%	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
1 Marriage	65	49.24	74.50	16.02	6.09	1.11	23.38	3.63	2.47	0.73
2 Having children	63	47.73	81.29	17.43	6.43	1.03	23.19	4.44	2.34	1.24
3 Kindergarden	58	43.94	90.14	12.94	6.28	1.14	3.95	1.11	2.59	0.80
4 College	45	34.09	50.07	25.75	6.33	1.02	22.74	2.50	2.76	0.61
5 Begin school	38	28.79	87.26	11.70	6.37	1.32	5.92	0.37	2.68	1.04
6 Go to school	28	21.21	77.39	18.99	6.43	0.84	11.59	2.39	2.71	0.53
7 Birthdays	26	19.70	88.92	13.62	6.00	1.23	3.04	2.21	2.42	0.81
8 Having a job	23	17.42	85.17	14.61	6.74	0.75	19.00	3.26	2.74	0.86
9 Fall in love	22	16.67	87.92	16.59	5.78	1.48	13.88	1.70	1.83	1.17
10 Being part of a family	21	15.91	69.26	31.33	6.00	1.71	4.86	4.26	2.39	1.34
11 Baptism	20	15.15	89.40	14.49	6.55	0.89	0.74	0.44	2.45	1.70
12 First communion	20	15.15	85.50	10.38	6.65	0.59	9.05	1.19	2.85	0.37
13 Own birth	18	13.64	96.11	6.98	6.50	1.42	3.00	7.49	2.67	0.77
14 Birthday 15th	17	12.88	63.12	16.78	6.06	0.83	15.00	0.00	2.41	0.62
15 First job	16	12.12	85.50	17.78	6.63	1.02	18.25	2.59	2.56	0.89
16 High school	15	11.36	63.53	23.27	6.75	0.58	17.73	1.03	2.81	0.54
17 Travelling	15	11.36	60.47	26.54	5.00	1.96	21.13	15.92	2.40	1.06
18 Playing	14	10.61	93.87	8.41	6.20	1.21	3.73	2.89	2.73	0.70
19 Having peers	13	9.85	92.69	6.96	6.23	0.93	7.92	4.50	2.77	0.44
20 Academic and professional success	12	9.09	48.85	27.70	6.46	0.78	27.92	4.80	2.77	0.44
21 Retiremen	11	8.33	64.36	24.77	5.64	1.50	58.64	7.45	1.82	1.25
22 Puberty	11	8.33	72.55	37.57	5.73	1.10	13.00	1.48	1.82	1.08
23 Grandchildren	11	8.33	71.82	22.72	6.55	0.69	50.45	7.89	2.64	0.67
24 Begin walking	11	8.33	86.64	29.60	7.00	0.00	1.18	0.40	3.00	0.00
25 Childhood	11	8.33	92.55	14.64	6.09	1.81	6.27	4.94	2.00	2.05
26 Others' death	10	7.58	98.50	3.37	6.90	0.32	27.00	27.06	-2.00	1.94
29 Buying a house	10	7.58	64.50	28.91	6.60	0.70	33.10	4.91	2.60	0.70
30 Taking a vacation	10	7.58	76.50	16.84	5.60	1.65	7.44	5.46	1.70	1.77
27 Old age	9	6.82	85.40	18.24	6.00	1.41	60.50	10.66	1.40	1.84
31 Begin talking	9	6.82	85.22	32.67	6.67	0.71	1.56	0.73	3.00	0.00
28 Personal realization	8	6.06	71.40	22.08	5.40	1.58	31.89	15.11	2.20	0.92
32 Enter adulthood	8	6.06	91.25	11.26	6.75	0.71	19.13	1.25	2.38	1.41
34 Romantic relationships	8	6.06	88.75	9.91	6.13	1.13	21.25	3.96	2.00	1.31
35 Christmas	8	6.06	95.63	7.29	6.88	0.35	3.38	1.92	2.75	0.46
36 Spending time with the family	8	6.06	82.50	21.88	6.63	0.74	13.00	20.01	2.38	1.06
37 Being financially	7	5.30	70.00	28.28	6.14	1.21	27.71	17.20	1.71	1.50

independent

39	Religion and spirituality	6	4.55	60.83	42.00	5.83	1.47	10.83	19.28	2.50	0.55
40	Other	98	74.24	72.82	26.10	5.91	1.54	16.80	17.99	1.36	2.19

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<sup>a</sup>In a few cases, the same person mentioned the same category twice. These duplicates are not included in the count, but they are included in

the ratings.

**Table A2.** Life script categories mentioned by 4% of Greenlandic participants (N = 137) with number and percentage of participants who mentioned each category, and prevalence, importance, estimated age at event, and emotional valence for each category

		<i>n</i> =	%	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
1	College	73	53.28	60.86	22.45	6.32	1.05	19.65	5.89	2.80	0.52
2	Begin school	51	37.23	88.65	21.28	6.76	0.92	16.57	12.83	2.73	0.49
3	Event Having children	49	35.77	73.23	22.49	6.13	1.07	25.10	5.92	2.62	0.53
4	Having a job	38	27.74	70.53	25.11	6.61	0.89	23.43	12.15	2.71	0.73
5	Own birth	35	25.55	85.15	24.01	6.14	1.38	10.63 <sup>b</sup>	20.83	2.40	1.19
6	Being looked after and child care	33	24.09	70.23	23.97	6.36	1.06	11.22	20.90	2.13	1.36
7	Old age	32	23.36	68.74	23.72	5.62	1.44	65.63	11.49	2.12	1.20
8	Confirmation	28	20.44	90.71	18.35	6.86	0.45	15.00	5.06	2.79	0.42
9	Marriage	26	18.98	64.22	28.66	6.00	1.18	25.37	10.32	2.59	0.69
10	Leisure time and sports	21	15.33	67.52	28.55	6.20	1.04	26.16	18.92	2.60	1.04
11	Go to school	20	14.60	88.67	20.78	6.76	0.70	10.83	7.52	2.67	0.73
12	Being part of a family	19	13.87	78.57	19.11	6.45	1.01	16.73	27.10	2.64	0.73
13	Baptism	17	12.41	90.29	14.48	6.53	0.80	0.56	0.59	2.76	0.75
14	Living as an adult	17	12.41	63.76	23.39	6.35	0.61	29.26	8.14	2.41	0.80
15	Fall in love	15	10.95	84.43	22.51	5.73	1.39	15.00	1.41	1.87	1.85
16	Grandchildren	14	10.22	65.00	25.00	6.50	0.76	47.93	10.05	2.71	0.47
17	Being breastfed and infant care	13	9.49	75.60	24.63	6.33	1.59	15.70 <sup>b</sup>	21.72	2.60	1.06
18	Childhood	11	8.03	82.08	22.71	5.75	1.22	9.67	10.70	2.25	1.06
19	Begin daycare	11	8.03	71.00	23.71	5.73	1.27	2.26	3.92	2.18	1.17
20	Being part of society	10	7.30	62.20	35.33	5.90	1.66	26.25	11.25	2.40	1.90
21	Retirement	9	6.57	82.22	15.63	5.67	1.58	64.78	0.67	1.44	1.51
22	Enter adulthood	8	5.84	86.11	19.33	6.33	0.87	25.89	15.40	2.33	1.12
23	Outdoor experiences	7	5.11	70.75	26.48	6.67	0.78	21.67	14.71	3.00	0.00
24	Raising or educating a child	7	5.11	79.25	17.65	6.00	1.20	17.63	15.16	2.75	0.71
25	Others' death	7	5.11	95.57	9.25	5.14	2.12	40.86	25.47	-0.29	2.43
26	Own death	7	5.11	80.29	36.25	4.43	2.30	52.71	35.48	0.00	2.08
27	Long trip	7	5.11	32.00	18.43	4.43	1.99	15.43	3.87	1.86	1.46
28	Begin walking	7	5.11	98.57	3.78	6.29	0.76	3.86	7.13	2.71	0.49
29	First hunting milestones	7	5.11	60.00	17.32	6.57	0.79	13.14	3.18	2.71	0.49
30	Having peers	6	4.38	86.67	15.61	6.22	0.83	7.33	5.87	2.78	0.44
31	Reaching first 6 and 12 months of life	6	4.38	95.00	11.18	6.71	0.76	18.50 <sup>b</sup>	30.37	3.00	0.00
32	Siblings	6	4.38	70.80	35.73	6.33	0.82	19.83	21.17	3.00	0.00
33	Puberty	6	4.38	63.33	25.03	5.50	1.05	18.75	10.52	1.17	1.47
34	Other	103	75.18	64.83	30.15	5.76	1.60	19.76	18.26	1.77	1.99

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<sup>a</sup>In a few cases, the same person mentioned the same category twice. These duplicates are not included in the count but they are included in the ratings.

<sup>b</sup>Some participants seem to have provided a date for own birth in a metaphorical, more than a literal way. In the other cases, some participants seem to have considered their own age when the imaginary child experienced the event.

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**Table A3.** Life script categories mentioned by 4% of Chinese participants (N = 154) with number and percentage of participants who mentioned each category, and prevalence, importance, estimated age at event, and emotional valence for each category

Event	Mentioned by <sup>a</sup>		Prevalence		Importance		Age at event		Valence	
	n=	%	M	SD	M	SD	M	SD	M	SD
1 Marriage	124	80.52	91.93	12.86	6.67	0.68	26.34	2.46	2.40	0.93
2 Go to school	96	62.34	88.09	21.83	6.68	0.74	8.70	3.03	2.36	1.05
3 Having children	81	52.60	86.99	17.50	6.79	0.56	27.73	2.48	2.57	1.08
4 Having a job	61	39.61	92.26	14.37	6.70	0.76	22.00	3.67	2.52	1.02
5 Kindergarden	41	26.62	86.98	21.60	6.09	1.27	5.26	9.94	1.95	1.54
6 College	36	23.38	64.36	30.16	6.61	0.80	19.43	2.18	2.31	1.37
7 Life after retirement and in old age entrance exam	31	20.13	85.34	26.68	6.31	1.18	59.05	10.90	1.94	1.58
9 Retirement	26	16.88	85.69	18.29	6.35	0.85	57.69	3.46	1.69	1.19
10 Being in a committed relationship	26	16.88	89.50	17.46	6.54	1.03	21.98	5.50	2.27	0.83
12 Being filial	25	16.23	86.48	17.80	6.64	0.76	40.72	14.81	1.72	2.05
13 Raising or educating a child	24	15.58	88.46	22.71	6.50	0.93	26.90	8.74	2.21	1.22
15 Being healthy	19	12.34	84.75	26.12	6.45	1.39	26.40	23.97	2.05	1.93
16 Begin school	17	11.04	86.65	30.08	6.85	0.34	6.12	0.28	2.59	0.71
17 High school	16	10.39	70.81	25.00	6.50	0.89	16.75	1.25	2.31	0.87
18 Buying a house	16	10.39	66.25	24.68	6.31	0.95	31.13	4.43	1.69	1.14
19 Education and Studying	15	9.74	89.29	19.69	6.76	0.75	10.88	8.98	2.24	1.79
20 First job	13	8.44	95.69	7.55	6.85	0.38	21.31	1.38	2.46	0.97
21 Own death	13	8.44	97.69	5.63	5.77	2.17	77.69	24.47	-1.46	1.45
22 The "right" job	13	8.44	76.54	32.04	6.92	0.28	24.19	3.11	2.62	0.87
23 Having a hobby	12	7.79	67.31	31.27	5.54	1.56	7.92	3.94	2.31	0.95
24 Being sick	12	7.79	93.25	14.11	6.42	1.00	32.25	27.54	-1.08	1.78
25 Begin talking	11	7.14	98.18	6.03	6.82	0.60	4.45	9.82	2.73	0.65
26 Having a harmonious family social or family responsibility	10	6.49	77.50	27.81	6.60	0.52	27.70	15.66	2.40	1.07
29 Serious disease	9	5.84	68.44	34.76	6.33	0.71	44.63	16.03	-0.78	2.39
30 Choosing schools or major	8	5.19	85.67	24.57	6.58	0.90	13.25	6.37	2.25	1.06
31 Being breastfed and infant care	8	5.19	82.89	16.16	6.56	0.72	9.04	0.68	2.67	0.50
32 Having peers	8	5.19	91.25	21.00	6.63	0.74	15.13	11.63	2.13	1.36
33 Having a career	8	5.19	68.50	30.16	5.88	1.64	31.88	4.85	2.38	0.92
34 Having a happy childhood	7	4.55	90.00	11.55	6.00	1.00	4.57	3.09	2.00	0.82
35 Parents' death	6	3.90	92.86	18.90	6.86	0.38	55.43	7.72	-1.71	2.36
36 Other	104	67.53	76.71	30.09	6.20	1.39	27.13	18.10	1.53	2.04

<sup>a</sup>In a few cases, the same person mentioned the same category twice. These duplicates are not included in the count, but they are included in the ratings.

**Table A4.** Life script categories mentioned by 4% of Danish participants (N = 142) with number and percentage of participants who mentioned each category, and prevalence, importance, estimated age at event, and emotional valence for each category

Event	Mentioned by <sup>a</sup>		Prevalence		Importance		Age at event		Valence	
	n=	%	M	SD	M	SD	M	SD	M	SD
1 Having children	114	80.28	77.48	12.64	6.47	0.75	27.13		2.77	0.46
2 Migrations	74	52.11	98.22	10.56	6.89	0.35	6.15	0.52	2.45	0.74
3 Begin school	61	42.96	79.01	13.38	6.53	0.67	21.87	3.19	2.37	0.87
4 College	43	30.28	89.28	11.40	5.79	1.26	64.33	7.74	0.53	1.50
5 Retirement	39	27.46	95.55	7.12	6.20	1.11	14.63	3.21	2.33	1.00
6 Fall in love	39	27.46	92.13	10.40	6.69	0.80	23.19	6.32	1.97	1.20
7 First job	34	23.94	75.82	14.49	5.56	0.89	13.65	0.53	2.24	0.78
8 Confirmation	30	21.13	96.78	6.53	6.84	0.37	7.73	2.57	2.28	0.92
9 Go to school	29	20.42	94.53	7.17	6.00	1.19	57.32	12.66	-1.88	1.13
10 Parents' death	26	18.31	97.12	9.98	5.81	1.52	40.00	19.40	-2.10	1.31
11 Others' death	25	17.61	94.60	6.38	6.20	0.91	1.46	0.89	1.24	1.51
12 Begin daycare	24	16.90	95.63	5.11	5.92	1.56	19.81	1.59	2.13	0.80
13 Leave home	21	14.79	68.62	16.87	6.29	0.72	57.83	5.23	2.71	0.46
14 Grandchildren	17	11.97	72.00	20.15	5.76	1.15	18.53	1.62	2.35	0.70
15 High school	15	10.56	90.87	16.64	6.13	1.19	14.07	2.15	1.53	1.41
16 Puberty	14	9.86	72.93	29.01	5.29	1.94	70.19	15.49	-0.29	2.30
17 Old age	13	9.15	100.00	0.00	6.92	0.29	81.88	4.66	-0.85	2.41
18 Own death	13	9.15	99.92	0.28	6.62	0.65	0.00	0.00	2.77	0.60
19 Own birth	12	8.45	50.83	15.05	5.58	1.24	41.09	5.20	-1.67	0.98
20 Divorce	12	8.45	87.92	20.12	6.58	0.90	1.38	3.15	2.75	0.45
21 First contact	11	7.75	83.75	9.56	6.17	1.47	3.32	0.96	2.67	0.49
22 Siblings	11	7.75	81.73	15.74	5.27	1.10	17.45	17.18	2.36	0.81
23 Travelling	10	7.04	84.80	13.92	6.90	0.32	4.19	5.63	2.90	0.32
24 Childhood	10	7.04	80.50	14.80	6.00	0.82	22.60	2.95	2.80	0.42
25 Romantic relationships	9	6.34	92.00	25.62	5.77	1.48	57.75	12.00	1.22	1.58
26 Serious disease	9	6.34	90.56	10.44	6.67	0.50	26.17	0.87	2.56	0.52
27 Settle on career	8	5.63	78.33	16.96	6.00	1.00	0.19	0.21	2.78	0.44
28 Baptism	8	5.63	94.13	8.89	6.50	1.07	24.44	15.12	2.38	1.06
29 Enter adulthood	8	5.63	95.94	10.52	6.25	1.04	10.21	18.06	2.88	0.35
30 Birthdays	7	4.93	91.29	12.04	6.43	0.79	4.67	2.07	2.29	0.76
31 First friend	7	4.93	57.86	14.68	6.00	1.15	27.71	7.04	2.29	0.76
32 The "right" job	6	4.23	51.67	9.83	5.17	1.94	76.67	2.58	-2.67	0.52
33 Partner's death	6	4.23	93.67	9.89	6.67	0.82	16.40	19.99	2.50	0.84
34 Having peers	6	4.23	79.22	24.54	5.88	1.51	21.13	16.88	1.35	2.01
35 Other	85	59.86								

<sup>a</sup>In a few cases, the same person mentioned the same category twice. These duplicates are not included in the count, but they are included in the ratings.