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# **Adults' earliest memories of songs and melodies based on a large stratified sample**

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### **Abstract**

Most parents sing to their children. Yet, little is known regarding how early musical experiences are retained later in life. The present study is a first attempt to fill this gap in the literature. Based on the stratified sample from Kingo, Berntsen, and Krøjgaard (2013) we asked 973 adults about their first memories of a song or melody. The results revealed that adults' earliest memories of a song or melody generally were predated by memories for other events; thus, the music memories were not the very earliest memories. The earliest memories for musical experiences were rated as *typical*, *fragmented*, and *positive*. Women reported earlier music memories than men. Current age had no impact on the age of the earliest music memories, but older respondents rated their memories as more vivid. The reported parental communication quality during childhood was reliably related to the age and characteristics of the earliest music memories.

## **Adults' earliest memories of songs and melodies based on a large stratified sample**

Although the origins of music are unknown, human beings in any known culture appear to play and appreciate music (Trehub, 2013). Today, music is probably more prevalent in our lives than ever before which may, at least in part, be due to technical inventions and developments in media (Hargreaves & North, 1999; North, Hargreaves, & Hargreaves, 2004). The majority of our institutionalized ceremonies (e.g., weddings and funerals) are accompanied by music, and when we choose to listen to music ourselves, the variety of sources to choose from have become overwhelming (e.g., live concerts, radios, smart phones, mp3 players, computers, audio equipment, TV's). We are also exposed to music passively, for instance when presented with background music in shops, restaurants, and bars. Large companies use music extensively in advertisements: simple and easy recognizable melodies are used as memory cues for specific brands (Schulkind, Hennis, & Rubin, 1999), and well-known pieces of music accompany commercials in cinemas and TV in order to affect the listeners' impression of a given product (Zander, 2006). In short: In modern society the presence of music is probably more salient than ever.

Although the use of music differs across cultures and may have changed considerably in modern time, some aspects of music use appear to be universal: Lullabies have existed in all known historical periods (Tucker, 1984), and all over the world parents sing to their children (Trehub, Unyk, & Trainor, 1993). Lullabies and play songs are the most prevalent songs when parents sing to their infants and children (Trehub, Unyk, Kamenetsky, Hill, Trainor, Henderson, & Saraza, 1997; Tsang & Conrad, 2010). In general, singing for children typically serves the purpose of fostering emotional well-being. However, whereas play songs are used in order to amuse the child, lullabies are generally assumed to serve the purpose of soothing the child and facilitate sleep (Trehub & Trainor, 1998).

A substantial number of studies have shown that infants are indeed quite sophisticated music listeners (for reviews, see Ilari, 2002; Trehub, 2013). For example, in a study by Saffran, Loman, and Robertson (2000) seven-month-old infants were familiarized to excerpts from a Mozart sonata. Following a two week retention interval the infants were then tested on familiar and novel passages from the same piece of music by means of the head turn preferential listening procedure. Relative to controls the infants who had been familiarized listened significantly longer to the novel excerpts indicating memory for the familiar music passages over the two week retention interval (Saffran, Loman, & Robertson, 2000). A number of studies reveal how infants may be able to do so: The

results from a study by Platinga and Trainor (2005) showed that 6-month-old infants displayed a novelty preference for a novel melody relative to a familiar melody regardless of whether the familiar melodies at test were presented at the same pitch or transposed up or down. Thus, infants seem to remember melodies, not by their absolute pitch, but by their relative pitch (Platinga & Trainor, 2005). In a study by Trainor, Wu, and Tsang (2004) six-month-olds remembered the melody, but only if the tempo and timbre was preserved. Thus, it is not only the melody as such the infants remember; they also seem to be sensitive to the tempo and timbre of a melody.

Music is generally known to be a powerful contextual cue for remembering: Bartlett and Snelus (1980) were among the first to demonstrate that popular melodies are remembered across very long delays in adult participants. Shulkind et al. (1999) explored this issue further by making comprehensive examinations of both young and older adults' long-term memory for popular music extracted across the 20<sup>th</sup> century. Although many of the older 'classics' are still popular today, they were remembered significantly better by the older compared to the younger participants. Meanwhile, younger adults were more easily cued to remember popular songs from their youth relative to older adults' ability to be cued to remember popular songs from their respective youth, indicating a marked loss of memories across a lifetime (Shulkind et al., 1999). Cady, Harris, and Knappenberger (2008) examined to what extent different cues (hearing excerpts from a song, reading lyrics, seeing pictures of the artist, or only seeing the title of the song) related to popular songs would generate autobiographical memories in college-age participants. The results revealed that all cues related to a familiar melody resulted in autobiographical memories suggesting that participants can get access to a well-known melody by means of a variety of cues, and that familiar melodies as such are strong cues for autobiographical memories.

Although the majority of studies on musical cues for remembering have been done with adults, studies with infants have been conducted as well. For instance, in a conditioning study by Fagan, Prigot, Carroll, Pioli, Stein, and Franco (1997) three-month-old infants preserved memory across a seven days retention interval if the same piece of background music was played at both the learning phase and the test phase, but not when the music was changed.

To summarize, several studies have investigated adults' ability to remember songs from their lifetime, but such studies typically do not involve musical memories from the very first part of peoples' lives. Meanwhile, although we know that infants are quite sophisticated music listeners and that children in any culture have early musical experiences, very little is known about how well our musical experiences from childhood are retained later in life. The present study was a first step

in order to remedy this gap in the literature. In the present study we examined adults' memory for songs and melodies encountered early in life in the context of childhood amnesia.

Childhood amnesia refers to the marked paucity of autobiographical memories from the first 3-4 years of life. The term was originally coined by Freud (1905/1953) and remains to be somewhat paradoxical. Developmental psychologists argue that the first years of our lives are crucial for our psychological well-being later in life (e.g., Bowlby, 1951; Freud, 1949; Rutter, 2002), and young children are capable of remembering some events from the first 2-3 years of their lives (for a recent review, see Peterson, Warren, & Short, 2011). However, memories from the first years tend to become inaccessible as the children grow older and become adults.

Adults' earliest memories have been studied for more than a century. The most straightforward approach is simply to ask adults about their earliest memories (e.g., Bruce, Wilcox-O'Hearn, Robinson, Phillips-Grant, Francis, & Smith, 2005; Fitzgerald, 2010; Henri & Henri, 1898; Howes, Siegel, & Brown, 1993; Kingo et al., 2013; MacDonald, Uesiliana, & Hayne, 2000; Mullen, 1994; Peterson, Noel, Kippenhuck, Harmundal, & Vincent, 2009; Rabbitt & McInnis, 1988; Wang, 2001). Results obtained with this approach reveal the following general trends: For respondents from Western cultures, the mean age of the earliest memory is typically 3-4 years of age (e.g., Mullen, 1994; Wang, 2001), whereas respondents from Eastern collectivistic-oriented cultures tend to report 'later' earliest memories (MacDonald et al., 2000; Wang, Conway & Hou, 2004). Women often have earlier first memories than men (e.g., Howes et al., 1993) although exceptions do exist (e.g., Wang, 2001).

How do developmental psychologists explain childhood amnesia? Although the enigma cannot be considered resolved yet, a number of explanations have been suggested. First, maturation and development of the temporal lobes in general and hippocampus in particular are by some researchers considered crucial (e.g. Bauer, 2007; Richmond & Nelson, 2007). Second, the development of a cognitive self in the latter part on the second year of life (Howe & Courage, 1993, 1997) has been suggested as a necessary requirement in order to allocate event experiences to one-self. Third, concept development and more specifically language acquisition has been pointed out as a core component when attempting to explain the absence of memories in adults from the first 3-4 years of their lives (e.g., Morrison & Conway, 2010; Simcock & Hayne, 2002). Finally, from a socio-cultural approach (e.g., Nelson & Fivush, 2004) it has been argued that reporting autobiographical memories is a gradually developing ability highly influenced by the acquisition of cultural tools like the concept of time, language, and narratives. And from the socio-cultural

approach the maternal reminiscence style in particular has been suggested as central when attempting to explain the individual differences in adults' ability to remember events from the first years in life. Mothers employing an elaborative reminiscing style are more likely to have children who report earlier and more elaborated childhood memories (e.g., Fivush, Haden, & Reese, 2006; Jack, MacDonald, Reese, & Hayne, 2009). Whereas each of these factors probably contribute to childhood amnesia, none of the factors are likely to account for childhood amnesia on their own.

The majority of existing studies on adults' earliest memories have been based on reports from college students in general and psychology students in particular. This raises the possibility of sample bias effects with respect to especially the respondents' age and educational level. In a recent study we attempted to avoid potential sample bias effects by means of investigating adults' earliest memories in a large sample stratified with respect to age, gender, and educational level (Kingo et al., 2013). Because the present study is based on the data from the same stratified sample, we here review the results from Kingo et al. (2013) in some detail.

Based on a large sample ( $N = 1,043$ ) which was stratified with respect to age (20-70 years of age), gender, and educational level, Kingo et al. (2013) investigated adults' earliest memories as well as their phenomenological qualities. The results revealed that whereas the current age of the participants had no effect on the age of their earliest memories, their educational level did: respondents with higher education reported earlier first memories relative to respondents with lower education. Thus, according to these results previous studies using college students as respondents may indeed have been affected by sample bias effects with regards to educational level, although not by age. The results by Kingo et al. (2013) also revealed that women, regardless of their age and education, had earlier first memories than men. With regards to phenomenological qualities, older compared with younger respondents reported more vivid and more coherent first memories. Finally, the participants who reported to have had parents with more elaborative communication styles during childhood reported slightly earlier memories, and ratings of parental communicative style was a significant positive predictor of most measures of early memory characteristics (Kingo et al., 2013).

In the present study – based on the same sample as reported in Kingo et al. (2013) – we asked the participants about their first memories for music. More specifically, the participants were instructed to imagine or 'hear' the earliest experienced song/melody for themselves before proceeding to the specific questions (i.e. phenomenological qualities) regarding their first memory for music. The purpose of the present study was twofold. First, we wanted to investigate the earliest

memories for music in their own right. As outlined above, early musical experiences (e.g. lullabies) are universally present and songs or melodies are known to be powerful memory cues (Rubin, 1995; Weiss, Trehub, & Schellenberg, 2012). Thus, musical experiences may be among the very first memorable *recurrent* events that we encounter as children. Although recurrent events and unique episodes are analytically distinct, they are also related (Dahl, Sonne, Kingo, & Krøjgaard, 2013). For example, Nelson (1993) has proposed that from a developmental point of view, memories for specific events should be seen as part of a more general event schema system of which recurrent events are likely to be central. However, the relationship between recurrent and unique events appears to be rather complex. For instance, although recurrent events logically must be based on unique incidents of episodes, studies have shown that occasionally both children (Fivush, 1984) and adults (Ahn, Brewer, & Mooney, 1992) construct a generic event based on just a single incident. Meanwhile scripted knowledge is known to affect our ability to recall unique events: In children scripted knowledge facilitate recall of familiar specific events (e.g., Nelson & Gruendel, 1981, 1986), and cultural life scripts have been shown to structure adults' recall of autobiographical memories (Berntsen & Rubin, 2004).

Only few studies have examined adults' memories of the earliest recurrent events (e.g., Fitzgerald, 2010; Hanawalt & Gebhart, 1965; Wang, 2001). In the studies by Fitzgerald (2010) and Wang (2001) the respondents were asked to report their earliest memories and while content analysis revealed that specific memories were more prevalent than recurrent or generic events (Fitzgerald, 2010; Wang, 2001) none of the studies compared the phenomenological qualities of the two types of events. Hanawalt and Gebhardt (1965) compared valence in specific and recurrent event memories from the first five years in adults and found that recurrent events were rated as being more positive than specific events. Several studies have compared memories for specific and recurrent events in adults on a number of phenomenological qualities; however, in these studies the reported events were typically not childhood memories (see for example, Rubin, Schrauf & Greenberg, 2003; Berntsen & Hall, 2004)

Thus, second, we wanted to compare the earliest memories for music to the earliest memories of any event ('absolute' earliest memory in the following) in the study reported by Kingo et al. (2013). Such a comparison could inform us on the similarities and differences with regard to the age and the phenomenological qualities of the two types of memories as reported by the same respondents in a large stratified sample.

Because this is the first study investigating adults' earliest memories of songs and melodies our hypotheses are tentative and largely derive from the literature on earliest event memories, including our previous findings in the same sample (Kingo et al., 2013). We hypothesized that women would have earlier first memories for melodies than men; that the participants' age would not influence the age of the earliest memory for melodies, but that vividness would increase as the respondents got older. Because singing usually facilitates emotional well-being, we expected the earliest memories to be positive. Due to the repetitive nature of lullabies and play songs we expected the remembered events to be rated as typical. Given our earlier findings within the same sample we expected that participants with longer education would have earlier first memories of melodies, and we hypothesized that participants, who reported to have been allowed to lead the conversation with their parents during childhood and who had parents who had talked more with them when they were children, would report having earlier first memories of music.

Regarding the comparisons between, on the one hand, the 'absolute' earliest memories, and on the other hand, the first memories of a song or melody, we expected the following: That the earliest musical experiences had taken place later than the 'absolute' earliest memories of the participants; that the earliest memories of songs and melodies to be about more typical events than 'absolute' earliest memories; and that the earliest memories of songs and melodies were more positive than the 'absolute' earliest memories.

### **The Study**

The present study is based on the same data collection as the one reported in Kingo et al. (2013). None of the data on memories for music as well as their phenomenological qualities were reported in the Kingo et al. (2013) study. However, the data on ('absolute') earliest memories were reported in the Kingo et al. (2013) study and in the present context these data are re-analyzed and only used for comparison with the memories for musical content.

TNS Gallup collected the data by means of an internet based questionnaire. From a large panel of invited participants (n= 2,180) the overall response rate was 48%. The sample was stratified with respect to *age, gender, geography, and education*. As basis for the stratification TNS Gallup used data from Statistics Denmark.<sup>1</sup> Divergences in a specific sample from the absolute norms from Statistics Denmark were quantified by a 'weight effectiveness' and weighted (corrected) numbers were provided as well. In the present sample the weight effectiveness was 90

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<sup>1</sup> For further information on Statistics Denmark see: <http://dst.dk/en>

% which is very high.<sup>2</sup> Because of the very high weight effectiveness and in order to maintain direct face-value of the reported numbers, we chose to base the analysis on the non-weighted numbers.

### **Participants:**

Eighty-two participants were eliminated from the original total sample of 1,055 respondents, because they ( $n = 76$ ) either had replied “other age” (see below) to the key question concerning their age at earliest memory, or had not replied ( $n = 6$ ).<sup>3</sup> The final sample thus consisted of 973 adult participants (494 females), between 20 and 70 years of age (see Table 1). The large majority (94.0 %) were Scandinavian-Caucasian; 2.0 % were of other race, and 4.0 % were mixed. As compensation participants took part in a lottery of a number of gift certificates, each worth 40 Euro.

### **Materials:**

The questionnaire regarding memories of earliest musical experiences consisted of seven questions:<sup>4</sup> Participants were asked about the following aspects of their earliest memory of a song or melody (1) *age at earliest memory of a song or melody*, (2) *vividness*, (3) *typicality*, (4) *fragmentation*, and (5) *valence*. In addition the participants were asked two questions concerning the communication with their parent during childhood: (6) *amount of parent communication*, and (7) the degree to which they had been *allowed to lead conversations*. Because the survey did not include open-ended questions the respondents were not asked to specify the content of their earliest musical memory. In question (1) *age* was indicated in half-year slots up to 15 years of age plus an “other age” option. All other questions could be answered on 5 point Likert scales. Here follows the exact wording of the seven questions asked (translated from Danish) and the response options:

#### Question (1) *age at earliest memory of a song or melody*.

Think about the first song or melody you experienced in your childhood. Try to hear it for yourself if you can. Think about the earliest situation or experience that comes to mind that involved that song or melody. How old were you when the episode took place? (Response

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<sup>2</sup> Initially, we ran control assessments on means between non-weighted and weighted numbers and the differences were insignificant.

<sup>3</sup> For the comparisons between the memories of earliest musical experience and (absolute) earliest memories, we only included the 973 participants who had provided a specific age on both types of early memories. Thus, the 70 participants from the Kingo et al. (2013,  $n=1,043$ ) study who had complete records on the age of the (absolute) earliest memories, but had not specified their age for the earliest musical experience were removed from the analysis in the present context.

<sup>4</sup> The questions regarding (absolute) earliest memories and their phenomenological qualities were asked *before* the questions regarding earliest memories for songs or melodies. For details regarding these questions, we refer to Kingo et al. (2013).

options: 31 discrete options from age “0 years of age”; ½ year of age”; “1 year of age”... to “15 years of age”. The 31<sup>st</sup> option was “other age”).

Question (2) *vividness*.

To what extent does the statement below match your earliest memory of a song or melody?  
The memory appears vivid and clear. (Response options: A five point Likert scale [1 = Not at all; 5 = To a very high degree]).

Question (3) *typicality*

To what extent does the statement below match your earliest memory of a song or melody?  
The episode was typical for my everyday life at that time. (Response options: A five point Likert scale [1 = Not at all; 5 = To a very high degree]).

Question (4) *fragmentation*

When you recall your experience, does it then appear as a coherent episode with a beginning and an end, or is it more like one or more fragments? (Response options: A five point Likert scale [1 = Very incoherent; 5 = Very coherent])

Question (5) *valence*

When you recall the episode, are the emotions you experience then positive or negative?  
(Response options: A five point Likert scale [-2 = Very negative; 2 = Very positive])

Question (6) *how much the parents talked with them*

To what extent is the following statement true for you? When I was a child, my parents talked a lot with me about my experiences. (Response options: A five point Likert scale [1 = Not at all; 5 = To a very high degree])

Question (7) *the extent to which the participants when they were children were allowed to lead the conversation with their parents*

To what extent is the following statement true for you? In my childhood, when I talked with my parents about my experiences, I was allowed to lead the conversation and decide what I talked about (Response options: A five point Likert scale [1 = Not at all; 5 = To a very high degree])

**Procedure:**

The data were collected on a website, where the participants were given the following written instructions:

“Dear participant. This investigation is about your memories. The questions are exclusively about your assessments of your memories and their importance and quality. The investigation is part of a larger research project conducted at the Department of Psychology and Behavioral Sciences at Aarhus University. Both foreign and Danish researchers take part in the project. No economical, ideological, or political interests are involved in the study.”

## Results

Parametric tests were used throughout the analysis with an alpha level of .05. In each specific analysis, a few participants who had responded with the “Do not want to reply”-option in one or more of the relevant parameters, were removed from the given analysis. Table 2 provides an overview of the main findings for the sample, including the main data on (‘absolute’) earliest memories from the Kingo et al (2013) study, their phenomenological qualities, and paired comparisons of means between questions regarding (‘absolute’) earliest memories and questions regarding first musical experience.

Because the results concerning (‘absolute’) earliest memories were discussed in the Kingo et al., (2013) paper, we here focus on the results regarding the earliest musical experience as well as the comparisons between the two measures.

Initially, we conducted a series of one-sample t-test on the phenomenological qualities of the earliest musical experiences in order to see whether they differed from neutral (test value = “3”). The earliest musical experiences were significantly *Typical* ( $t[972] = 4.73, p < .001, r = .15$ ), *Fragmented* ( $t[972] = -3.16, p = .002, r = .10$ ), and *Positive* ( $t[971] = 35.57, p < .001, r = .75$ ), whereas *Vividness* was neutral ( $t[972] = 0.97, p = .34, r = .03$ ). Note that except for the *valence* score the effect sizes were small.

### **Comparisons between ‘absolute’ earliest memories and memories of first musical experiences:**

Comparisons between the phenomenological qualities of, on the one hand, the (‘absolute’) earliest memories and, on the other hand, the first musical experiences, reveal the following (see Table 2): As expected the earliest memories of a song or a melody took place significantly later than the very first memories. However, that the age at which the respondents had their earliest memories of a song or a melody and the age at which they had their ‘absolute’ earliest memories

correlated significantly ( $r = .48, p < .001$ ) suggesting some shared variability between the two measures. *Vividness* of earliest memories for a song or melody was systematically lower than for 'absolute' earliest memories. The earliest memories for a song or melody were more *typical* and *positive* than the 'absolute' earliest memories.

The stratified sample allowed us to investigate the possible effects of *gender*, *educational level* and *age group* as well as potential interactions between the factors. Information regarding the last completed educational qualification had been collected for each participant. For the sake of simplicity the variety of responses with regards to educational achievements was re-coded into four distinct categories: 1. Basic school (i.e., no completed education beyond 9-10 years of obligatory public school); 2. Vocational education (i.e., a non-academic education such as a workman training); 3. High school; 4. Higher education (high school exam required for enrolment).

In what follows we present the results from five (one for each dependent variable) three-way ANOVAs, each with *gender*, *educational level*, and *age group* as between-subjects factors and with (1) *age at earliest memory of a song or melody*, (2) *vividness*, (3) *typicality*, (4) *fragmentation*, and (5) *valence* as the dependent variables.

#### **Age at earliest memory of a song or melody:**

The results from the three-way ANOVA with *age at earliest memory of a song or melody* as dependent variable revealed a single main effect of *gender*,  $F(1, 934) = 4.46, p = .035, \eta_p^2 = .005$ . As predicted women ( $M_{\text{age}} = 5.56$  years,  $SD = 2.70$ ) had significantly earlier first memories of a song or melody than men ( $M_{\text{age}} = 5.99$  years,  $SD = 2.72$ ). No other main effects or interactions were obtained.

#### **Vividness:**

The results from the three-way ANOVA with *vividness* as dependent variable revealed a main effect of *age group*,  $F(4, 934) = 6.14, p < .001, \eta_p^2 = .026$  (see Figure 1). As hypothesized *vividness* tended to increase as the respondents got older ( $M_{20-29} = 2.76, SD = 1.38$ ;  $M_{30-39} = 2.83, SD = 1.16$ ;  $M_{40-49} = 3.20, SD = 1.21$ ;  $M_{50-59} = 2.95, SD = 1.24$ ;  $M_{60-70} = 3.21, SD = 1.16$ ). No other main effects or interactions were obtained.

### **Typicality:**

The results from the three-way ANOVA with *typicality* as dependent variable revealed no main effects or interactions (all  $p$ 's > .2).

### **Fragmentation:**

The results from the three-way ANOVA with *fragmentation* as dependent variable revealed a main effect of *age group*,  $F(4, 934) = 6.48, p < .001, \eta_p^2 = .027$ . Similar to the results obtained regarding vividness, the memories tended to become increasingly coherent (or less fragmented) in the older relative to the younger age groups ( $M_{20-29} = 2.52, SD = 1.26$ ;  $M_{30-39} = 2.57, SD = 1.17$ ;  $M_{40-49} = 3.00, SD = 1.16$ ;  $M_{50-59} = 2.92, SD = 1.17$ ;  $M_{60-70} = 3.05, SD = 1.16$ ). No other main effects or interactions were obtained (all  $p$ 's > .24).

### **Valence:**

The results from the three-way ANOVA with *valence* as dependent variable revealed no main effects or interactions (all  $p$ 's > .08).

### **Can parent-child communication predict age at earliest memory of a song or melody?**

In order to investigate the potential influence regarding how the parents of the respondents had communicated with the respondents when they were children, we examined the responses from questions concerning (6) *amount of parent communication* ( $M = 2.74, SD = 1.06$ ), and (7) *allowed to lead conversation* ( $M = 2.86, SD = 1.02$ ) to the dependent variables. Because these two items on parent communication qualities were highly positively correlated ( $r = .62, p < .001, N = 972$ ), we computed an aggregate variable, *parent communication quality*, operationalized as the mean of the responses to the questions (6) and (7).

In order to analyze the potential impact of *age group*, *gender*, and *educational level* on *parent communication qualities*, a three-way ANOVA with *age group*, *gender*, and *educational level* as between subjects factors and the aggregate variable *parent communication quality* as the dependent variable was conducted. This analysis yielded a single main effect of *age group*,  $F(4, 933) = 10.15, p < .001, \eta_p^2 = .042$  (see Figure 2), reflecting that younger respondents reported to have had parents with higher parent communication qualities than the older respondents ( $M_{20-29} = 3.21, SD = 0.81$ ;  $M_{30-39} = 2.98, SD = 0.83$ ;  $M_{40-49} = 2.71, SD = 0.92$ ;  $M_{50-59} = 2.77, SD = 1.00$ ;  $M_{60-70} = 2.64, SD = 0.93$ ).

In order to examine the influence of parent communication quality on the dependent variables while controlling for other factors, we conducted a series of multiple linear regression analyses -- one for each of the following dependent variables: *age at earliest memory of a song or melody*, *vividness*, *typicality*, *fragmentation*, and *valence*. Each analysis had *parent communication qualities*, *age group*, *education*, and *gender* as independent variables. The independent variables were entered simultaneously in the model. The results from these regression analyses are presented in Table 3a. For comparison, the previously published results (Kingo et al., 2013) from equivalent analyses regarding 'absolute' earliest memories are displayed in Table 3b.

The regression analyses regarding earliest musical experiences (see Table 3a) revealed that *parent communication quality* was a significant predictor for *all* dependent variables, even when controlling for *age group*, *education*, and *gender*. Furthermore, *parent communication quality* was also the strongest predictor in all cases except in predicting *fragmentation*, where it 'only' by a narrow margin was surpassed by the factor *age group*. The finding that *parent communication quality* was a reliable predictor for all dependent variables replicated the pattern in results obtained regarding 'absolute' earliest memories (Kingo et al., 2013; see Table 3b).

## Discussion

Surprisingly little is known about adults' earliest memories of songs or melodies, in spite of the fact that such experiences play an important role in the early years of most children's lives. The present study was undertaken to begin to fill this gap. The data were derived from a stratified sample, and the obtained results are systematic and clear. Since the data originated from the same sample in which we previously investigated adults' ('absolute') earliest memories as well as their phenomenological qualities (cf. Kingo et al., 2013) we were able to compare the results on the adults' memories for their earliest musical experiences to their very earliest memories. This is not only interesting because of the lack of knowledge on adults' earliest musical experiences. Parents around the world sing to their children (Trehub et al., 1993), and when doing so lullabies and play songs are the most prevalent songs (Trehub et al., 1997; Tsang & Conrad, 2010). Therefore, it seems likely that at least some of the earliest musical experiences may have been recurrent events. This makes the earliest musical experiences further interesting because adults' earliest memories of recurrent events in general seem to be relatively unexplored territory. We first discuss the results regarding the phenomenological qualities of the earliest memories of a song or a melody.

Subsequently, we focus on the comparisons between the earliest musical memories and the 'absolute' earliest memories. Finally, we discuss the results obtained regarding the possible impact of the factors *age group*, *gender*, *educational level*, and *reported parental communication quality* on the earliest memories of songs or melodies.

In general, the phenomenological qualities of the earliest memories of songs and melodies were in accordance with our expectations, although it should be noted that except for the valence scores, the effect sizes were small. The adults' earliest memories of a song or melody were rated as *typical*, *fragmented* and highly *positive*, whereas the average *vividness* rating was neutral. That the earliest memories of a song or melody were rated by the respondent's as being *typical* came as no surprise. Unfortunately, we do not know what kind of songs or melodies the participants referred to in their reports, but an educated guess would be lullabies or play songs. Considering the fact that parents all over the world sing to their children (Trehub et al., 1993), and that lullabies and play songs are the most prevalent songs when parents sing to their infants and children (Trehub et al., 1997) we find it likely that many of the reported earliest musical experiences concerned lullabies or play songs. A few studies suggest that play songs may be slightly more prevalent in early life than lullabies (Trehub et al., 1997; Tsang & Conrad, 2010).

No expectations were formulated for *fragmentation*, but the obtained results are in accordance with other results on earliest memories in this respect (Bruce et al., 2005; Bruce Phillips-Grant, Wilcox-O'Hearn, Robinson, & Francis, 2007). Thus, when respondents reported their earliest musical memories, the events they reported were typically not recalled as coherent episodes with a clear beginning and end, but tended to appear more like one or more fragments. As hypothesized, the *valence* of the earliest memory of a song or melody was significantly positive. This result was in accordance with existing evidence showing that singing to children serves the purpose of fostering emotional well-being (Trehub & Trainor, 1998), as well as the general positivity bias in autobiographical memory (Walker, Skowronski, & Thompson, 2003). We now turn to the comparisons between, on the one hand, the earliest memories of a song or melody, and on the other hand, the respondents' ('absolute') earliest memories.

As hypothesized, the participants' first memories of a song or a melody were reported to have taken place significantly later in childhood than their 'absolute' first memories. Considering the substantial variety of candidate events for first memories, it would seem unlikely if musical events *on average* would be the very first.

The earliest memories of a song or melody were rated as significantly less *vivid*, but as more *typical* and as more *positive* compared to the respondents' ('absolute') earliest memories. We had no expectations regarding *vividness*, but the reduced vividness ratings may be seen as a consequence of the musical memories being about more typical events (see below), because memories of recurrent (typical) events are likely to be less rich on specific details. The increased *typicality* is in accordance with the assumption that memories of songs and melodies are more likely to be recurrent events (and hence more *typical*), than any early specific memory. That the earliest memories of a song or melody were significantly more *positive* compared with the ('absolute') earliest memories of the respondents was not surprising either given the typical positive atmosphere related to hearing lullabies or play songs. Whereas the very first memories are not constrained with regard to topic and emotional valence, singing to children serves the purpose of providing emotional well-being (Trehub & Trainor, 1998). Consequently, the earliest memories of a song or melody are probably more likely to involve positive valences relative to the very first memories. No differences were found with regard to fragmentation.

Among the potential factors – *gender*, *age group*, and *education* – to affect the age of earliest memory for a song or melody, only *gender* had a significant effect. As hypothesized, women had significantly earlier memories than men. This is in accordance with previous findings on earliest memories in general (e.g., Howes, et al. 1993; Mullen, 1994, Study II; Kingo et al., 2013). *Age group* had no effect on the age of the earliest memory of a song or melody. This result converges with the results of the ('absolute') earliest memories from the same sample (Kingo et al., 2013).

The analyses revealed that *education* had no effect on age or quality of *earliest memory of a song or melody*, whereas the regression analysis showed that *education* did have a small, yet significant, effect on *fragmentation*. In our previous study on ('absolute') earliest memories (Kingo et al., 2013) educational level did affect the age of the memories. One possible explanation as to why the effect of *education* appeared weaker in the present study relative to the results from Kingo et al., (2013) may be that memories of the first song or melody are likely to have originated from a recurrent, not unique, event (e.g., lullaby or play song). Granted this is correct, family habits and routines as well as the extent to which parents talk to their children (to be discussed briefly) may have been more powerful factors than educational level in the present study.

Considering the phenomenological qualities of the earliest memories of a song or melody, we found that *age group* had significant influence on both *vividness* and *fragmentation*. Older respondents tended to rate their first musical memories as more vivid and coherent (less

fragmented). These results replicate the findings from the same sample regarding the phenomenological qualities of the very first memories (Kingo et al., 2013). This finding may be influenced by nostalgia (Holbrook, 1993) or older participants may have had more opportunities to rehearse the earliest memories of a song or melody and thus form more coherent and vivid memories.

The finding from the regression analyses that *parental communication quality* significantly predicted every measured dependent variable lends at least indirect support to theories on maternal reminiscence style influencing the formation of early memory and the development of autobiographical memory skills (e.g., Nelson & Fivush, 2004). This result is further underscored by the fact that it replicates the pattern in results obtained regarding 'absolute' earliest memories from the same sample (Kingo et al., 2013). However, caution is warranted, because in contrast to the majority of studies on the impact of maternal reminiscence style (e.g., Jack et al., 2009; Fivush, Haden, & Reese, 2006; Reese & Newcombe, 2007) the data from the present study regarding *parental communication quality* are retrospective and subjectively -- not prospective, objectively measured data, in contrast to the data reported in the child developmental literature.

Younger respondents on average reported their parents to have had more elaborative *parental communication quality* (leaving the child with more freedom and initiative) compared to older participants. Child-rearing practices and norms have changed considerably in the last century (e.g., Sommer, 2012) and this corresponds well to the data obtained in the present study that younger respondents reported more elaborative parental communication quality compared to older respondents.

One limitation of the present study is that we do not know what kind of song or melody the respondents reported as basis for their first musical memory. Based on research from the music literature, it is most likely a lullaby or a play song, which also corresponds well to the obtained event typicality measures. Another limitation concerns the fact that we did not ask the respondents to what extent their memories had been rehearsed. Consequently, the potential explanation that the increased vividness across age may be due to rehearsal remains speculative. Finally, we acknowledge that we cannot be certain that the earliest musical experiences were recurrent events. As already argued there are, however, several reasons to believe that this was indeed the case, and none of the obtained results regarding the phenomenological qualities of the reported memories indicate that this should not be the case. However, knowing the extent to which the reported earliest musical experiences were indeed examples of recurrent events would have strengthened the study.

We have presented the first study on adults' earliest memories of a song or melody based on a large stratified sample. The results replicate many of the findings obtained when investigating adults' ('absolute') earliest memories, which suggests that similar forgetting mechanisms may be in play. Nonetheless, the results also differ in some respects – probably at least in part because musical experiences are typically recurrent events and not unique ones. Memories for recurrent and unique events reflect closely related aspects of event memory in general (Dahl et al., 2013; Nelson, 1993), and the present study may provide a first step in examining and comparing the phenomenological qualities of adults' earliest memories of both recurrent and unique events in the same sample. In order to pursue this path further, it would be worthwhile to examine whether the obtained pattern of results would replicate when collecting information on adults' earliest memories of other kinds of early, typically recurring events (e.g., having breakfast, being put to bed, or having a bath).

When considering research on early musical experiences, we believe that in order to move science forward in this specific area, we need studies that combine the use of stratified samples with information about the content of the very first musical memories. Future studies would also benefit from having actual objective measures of *parental communication quality* and maternal reminiscence style rather than relying on retrospective and subjective reports. Given the fact that the reported *parental communication quality* had substantial predictive force with respect to all dependent variables, the relevance of more objective measures of this variable is obvious. Finally, future research may benefit from comparing early music memories with other types of memories of early cultural experiences, such as stories, TV-shows or movies. This would open a new line of research for those interested in attaining a deeper understanding of what happens to our memories from the first years of life.

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**Table 1.**

*Participants*

Age range			
(years)	<i>n</i>	Women	Men
20-29	114	60	54
30-39	129	68	61
40-49	213	106	107
50-59	253	128	125
60-70	264	132	132
Total	973	494	479

**Table 2.**

*Overview of Main Findings on ('absolute') Earliest Memories (from Kingo et al., 2013,) and Earliest Memory of a Song or Melody, as well as Paired Comparisons Between the Two Measures*

	Earliest Memory (Kingo et al., 2013)#	Earliest Memory of a Song or Melody	Comparisons (paired <i>t</i> -test) Between Means of Earliest Memories and Earliest Memory of a Song or Melody		
	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>t</i> -value	df	<i>r</i>
Age (in years)	4.12 (1.84)	5.77 (2.72)	-21.02*	972	.56
Vividness <sup>§</sup>	3.49 (1.12)	3.04 (1.23)	9.75*	970	.30
Typicality <sup>§</sup>	2.35 (1.34)	3.17 (1.15)	-16.31*	970	.46
Fragmentation <sup>§§</sup>	2.87 (1.17)	2.88 (1.19)	-0.26	972	.01
Valence <sup>§§§</sup>	3.41 (1.18)	3.97 (0.85)	-12.66*	971	.38

# The data reported here stem from a re-analysis of the data based on the 973 participants who responded to all questions on both types of early memories

§ Five point Likert scale (1 = Not at all; 5 = To a very high degree)

§§ Five point Likert scale (1 = Very incoherent; 5 = Very coherent)

§§§ Five point Likert scale (-2 to 2, recoded as follows: 1 = Very negative; 5 = Very positive)

\*  $p < .001$

**Table 3a.**

Results from multiple linear regression analyses regarding earliest musical memories.  $\beta$  values significant at  $p < .05$  are presented in bold.

Predictors*	Dependent variables														
	Age at earliest musical memory ( $R^2=.05$ , N=972)			Vividness ( $R^2=.03$ , N=972)			Typicality ( $R^2=.05$ , N=972)			Fragmentation ( $R^2=.05$ , N=972)			Valence ( $R^2=.05$ , N=971)		
	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$
Parent com. qual.	-.55	.09	<b>-.19</b>	.17	.04	<b>.13</b>	.27	.04	<b>.22</b>	.22	.04	<b>.17</b>	.17	.03	<b>.19</b>
Age Group	-.03	.07	-.01	.12	.03	<b>.13</b>	.02	.03	.03	.16	.03	<b>.18</b>	-.02	.02	-.03
Education	-.21	.07	<b>-.09</b>	-.06	.03	-.06	.03	.03	.03	-.08	.03	<b>.08</b>	.02	.02	.02
Gender	-.39	.17	<b>-.07</b>	.11	.08	.04	.07	.07	.03	.01	.07	.01	.17	.05	<b>.10</b>

\*All potential predictors were entered simultaneously

**Table 3b.**

Results from the previously reported (Kingo et al., 2013) multiple linear regression analyses regarding 'absolute' earliest memories.  $\beta$  values significant at  $p < .05$  are presented in bold.\*

Predictors**	Dependent variables														
	Age at 'absolute' earliest memory ( $R^2=.05$ , N=1,043)			Vividness ( $R^2=.07$ , N=1,043)			Typicality ( $R^2=.01$ , N=1,043)			Fragmentation ( $R^2=.07$ , N=1,043)			Valence ( $R^2=.05$ , N=1,043)		
	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$
Parent com. qual.	-.24	.06	<b>-.12</b>	.13	.04	<b>.11</b>	.15	.05	<b>.10</b>	.13	.04	<b>.11</b>	.28	.04	<b>.22</b>
Age Group	-.02	.05	-.02	.18	.03	<b>.21</b>	.02	.03	.02	.20	.03	<b>.24</b>	.00	.03	.00
Education	-.23	.05	<b>-.14</b>	-.04	.03	-.04	-.02	.04	-.02	-.09	.03	<b>-.10</b>	-.01	.03	-.01
Gender	-.44	.12	<b>-.11</b>	.28	.07	<b>.12</b>	.08	.08	.03	.12	.07	.05	.08	.07	.03

\* In Kingo et al. (2013) only the significant  $\beta$  values were reported. For comparison we here report all values.

\*\*All potential predictors were entered simultaneously

Figure 1.

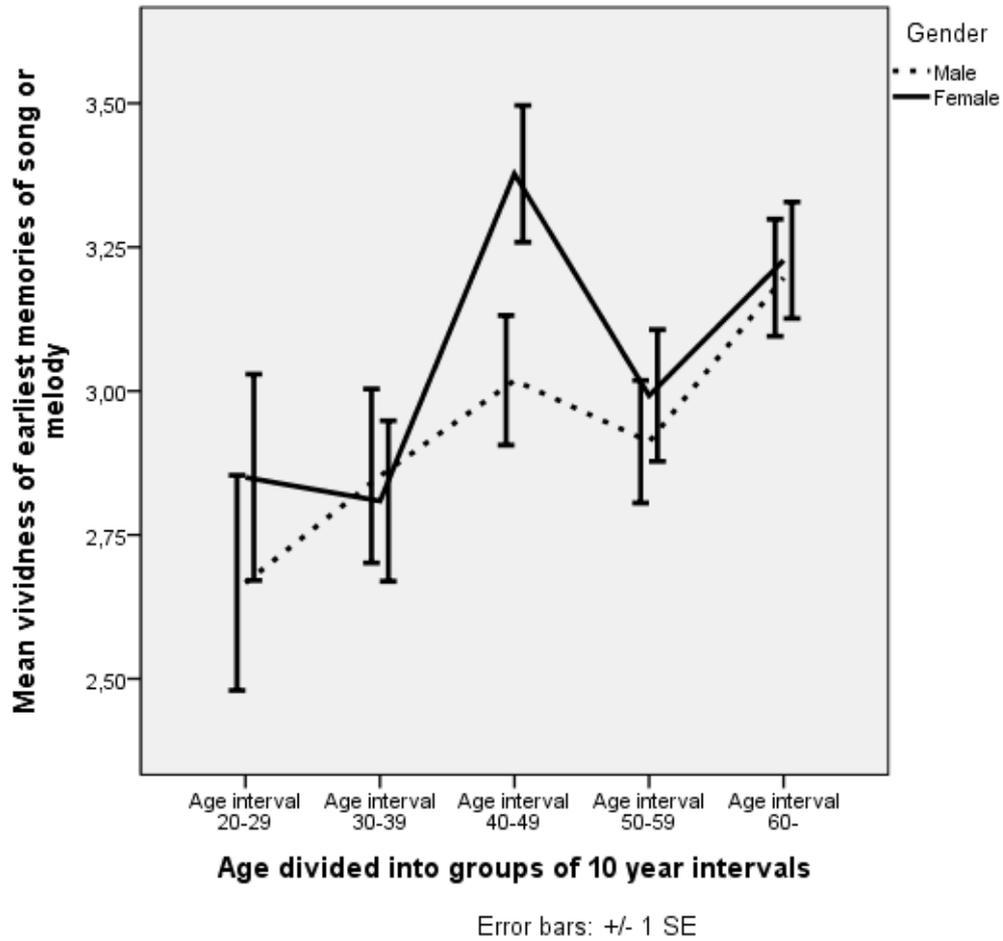


Figure 1. Graphic representation of the mean reported vividness for earliest memory for song and melody for each gender across different age groups. Error bars: +/- 1 SE.

Figure 2.

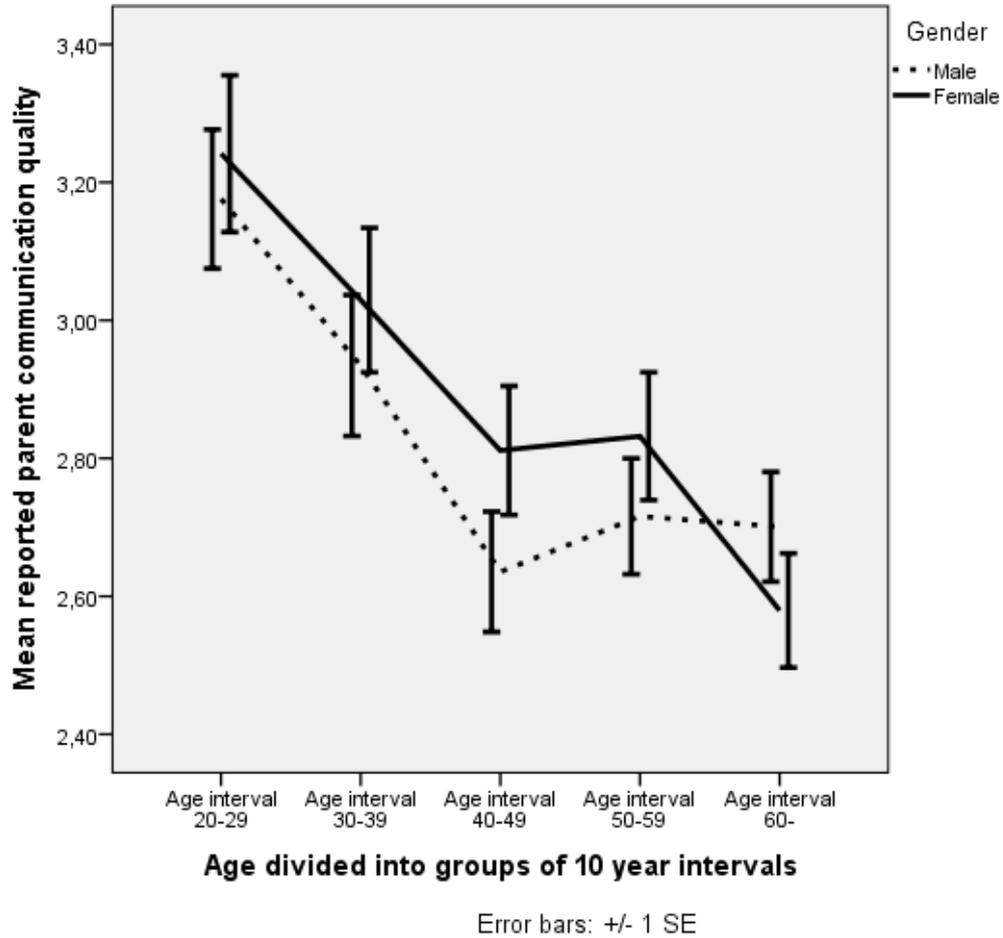


Figure 2. Graphic representation of the mean reported parent communication quality for each gender across different age groups. Error bars: +/- 1 SE.